

MSWG EXPANSION TCC AWARD PROCESS Project Update II

Prepared for NYISO Market Structure Working Group

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AGENDA

- Generator Interconnection Issue
- Software for Auctions of TCC Options
- Auction Revenue Rights (ARRs)
- Decision Points
- Project Status

Parties have questioned whether problems could arise from a possible mismatch between the proposed procedures for awarding expansion TCCs and the procedures used to determine the costs (if any) of network upgrades required for new generator and merchant transmission interconnections.

- The studies undertaken to determine the reliability impacts of interconnections and assign cost responsibility for required network upgrades occurs prior to approval of the interconnection request.
- The study that would be used to award expansion TCCs (if any) to these upgrades would occur after the network upgrade is in operation.
- Different transmission system configurations would likely be used in the two studies, leading to a possible mismatch between the cost assignment and the TCCs awarded.

A mismatch between cost assignment and TCC awards is unlikely to occur because it is not expected that expansion TCCs would be awarded for the network upgrades required under the NYISO Minimum Interconnection Standard.

- Under the Minimum Interconnection Standard, network upgrades are required only to maintain reliability, not to increase deliverability.
- Typical upgrades are enhancements of circuit breakers to reduce fault current levels or the upgrading of equipment to decrease the fault clearing time.
- These network changes do not increase the transfer capability of the bulk transmission system. They maintain the system at its current level of reliability, after the interconnection has occurred.

GENERATOR INTERCONNECTION ISSUE

Findings

- Hence, it is not expected that incremental expansion TCCs would be awarded for any network upgrades required under the Minimum Interconnection Standard.
- Incremental expansion TCCs could be awarded in connection with transmission voluntarily built to support a generator interconnection, but it is our understanding that in this case no cost allocation would occur at the time of the NYISO reliability assessment.

Steve Corey (NYISO) will discuss this issue further with the MSWG.

TCC OPTIONS SOFTWARE

Overview

At a previous MSWG we discussed the feasibility, in concept, of offering awards of TCC options to parties that expand the transmission system.

- Questions remained about the practical feasibility of the software required to perform the simultaneous feasibility test to implement these concepts.
- The MSWG asked the LECG project team to work with the NYISO to inquire into the current state of development of software that would allow for combined auctions of TCC options and TCC obligations.

Two software vendors have completed DC models for conducting a joint auction of TCC options and obligations. A third vendor has built a prototype model.

- The two models solve in minutes for NY-sized systems or larger.
- The models appear to be correctly representing options within a DC context.
- The actual revenue adequacy of these auction models, in comparison with existing AC or DC auction models for TCC obligations, is unknown.
- PJM will start using one of these models within a few months to offer FTR options in its auctions.

The NYISO currently uses an AC model in its TCC obligations auction. At present, no one has determined a feasible software design for an AC model to conduct a joint auction of TCC options and obligations.

- The design of a full AC security analysis is difficult because in an AC model the shift factors depend on the net injections at each bus, so that they depend on the combination of options that is exercised.
- It may be possible to devise heuristics to bypass this problem. For example, we might perform the AC security analysis assuming the worst-case flows from the candidate set of options that would be exercised on a normal day with very high congestion cost. This would place priority on maintaining the revenue adequacy of the auction awards on the days with the highest congestion cost. Other approaches are being considered.

The comparative revenue adequacy of alternative software implementations of TCC auctions with options is unknown.

- There is a fundamental outstanding question about whether a DC model for options is sufficient or whether an AC model is required. The linearization in the DC model works for evaluating small changes to an existing dispatch solution, but might be less valid for evaluating the on/off changes introduced by options.
- Specific implementation issues may effect the revenue adequacy of either model:
 - Treatment of losses in DC model.
 - Reactive power assumptions in AC model.

At this time, it appears that the MSWG faces the following choices regarding the next steps to take to introduce TCC options in NY (not mutually exclusive):

1. Implement a DC auction model with options.
 - Would any governance or legal issues be raised in switching to a DC model?
2. Test the revenue adequacy of the DC options (and obligations) model, perhaps in comparison with the current AC obligations model. This work could be performed by a subcontractor.
3. Provide funding for further development work on an AC auction model with options.
4. Provide funding to more directly study whether an AC or DC model of options is appropriate. This has to do with the non-linearity of the constraint functions.
5. Postpone any further work on options and wait for an AC model to be developed or for the DC model to be proved elsewhere.

In support of either an AC or DC model with options, the MSWG might consider whether changes should/could be made to the NYISO tariff approach to TCC revenue surpluses and deficits (revenue inadequacy).

- If the market desires TCC options, perhaps some thought should be given to how participants in the market could fairly share the costs, in terms of possible increases in revenue inadequacy, of making the options available.
- An alternative approach would be to slightly undersell the NY system, so as to avoid revenue inadequacy. In this case, thought would need to be given to how to fairly share any resulting revenue surpluses.

Task 3 of the expansion TCC project is to consider the award of incremental rights as ARR.

- The ARR approach would provide a cash payment to a party that expands the transmission system, representing the incremental value of its expansion facilities.
- There are two general approaches to ARRs:
 - Give expanders the alternative of electing to be awarded incremental rights as ARRs, instead of either ST or LT TCCs.
 - Award ARRs in addition to any ST or LT TCCs assigned to a transmission expander.

ARRs

Mock Auction Award Process

In a December 1999 presentation to the MSWG, Mike Cadwalader described a workable approach to the award of ARR for transmission expansions. The steps are:

1. Run an actual auction for the full transmission system, i.e., including all transmission system expansions.
2. Run a “mock” auction that excludes the transmission facilities of the party that will be awarded ARRs.
 - Use the same bids (MWs and locations) as in the actual auction, but change the dollar value of each bid to be equal to the applicable locational market-clearing price in the actual auction.
3. Determine the ARR awards to the expander by calculating the increase in the TCCs sold in the actual auction versus the mock auction.
4. Calculate the ARR payments by multiplying the ARR awards by the market clearing prices in the actual auction.

ARRs

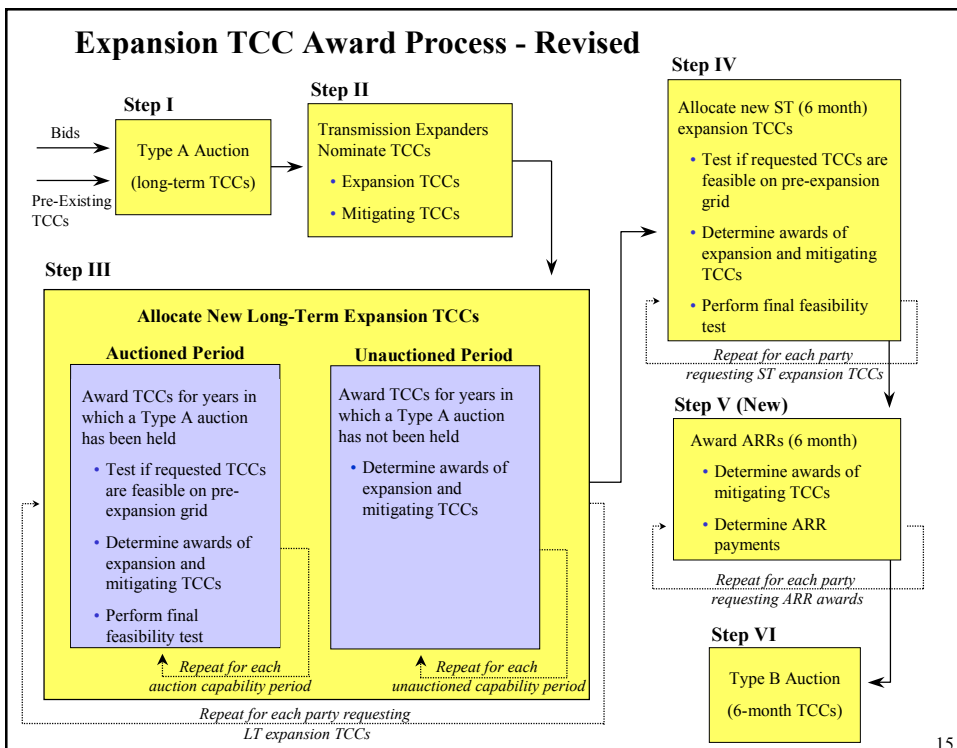
Example of ARR Awards

The following table provides an example of the calculation of ARRs and ARR revenue (Cadwalader, 12/99 presentation to the MSWG, p. 27).

EXAMPLE: DETERMINATION OF ARR PAYMENTS						
ARR POI	ARR POW	TCCs Sold in Actual Auction (MW)	TCCs Sold In Mock Auction (MW)	ARRs (MW)	Actual Auction Price (\$/MW)	ARR Revenue (\$)
W	N	80.00	70.00	10.00	166.67	1667
W	S	33.33	10.00	23.33	200.00	4667
S	N	80.00	0	80.00	(33.33)	(2667)
S	E	6.67	20.00	(13.33)	100.00	(1333)
N	E	80.00	80.00	0	133.33	0
W	E	80.00	80.00	0	300.00	0
Total						2333

The mock auction approach to awarding ARR is revenue adequate.

- Revenue adequacy is guaranteed by using the market clearing prices for the actual auction as the bids for the TCCs considered in the mock auction.
- In 1999, this approach to revenue adequacy was demonstrated and proved for cases in which there is a single transmission expansion. The proof has now been extended to multiple expansions, each of which wishes to be awarded ARRs.



It appears to be relatively straightforward to merge the steps required to award ARR into the MSWG award process that is currently proposed for expansion TCCs.

- ARR awards would be made each six months following the Type B auction.
 - All transmission facilities will be included in the transmission model for the Type B auction.
 - Since the Type B auction is not multi-period, we would not have to apply the ARR award process in a multi-period context.
- The transmission facilities added by parties requesting awards of ARRs, rather than ST or LT TCCs, would be left out of the transmission models used in Steps I-IV to award ST and LT expansion TCCs.

Following the Type B auction, ARRs would be awarded to one party at a time, in reverse of the order of the actual commercial operation of the facilities that they have added to the transmission system. Suppose that two parties are receiving ARR awards:

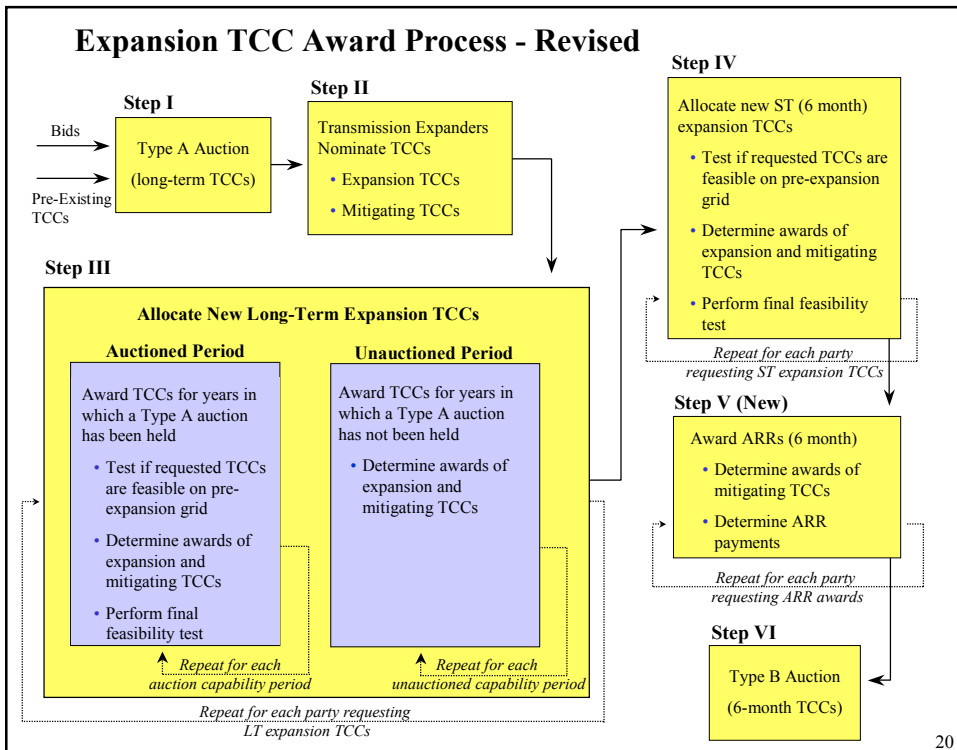
- ARRs would be awarded first to the last party (#2) to add an expansion.
 - A mock auction would be run on a grid that excludes the expansion facilities of party #2
 - The ARRs for party #2 (ARR_2) would be equal to the TCCs awarded in the actual auction (TCC_A) less the TCCs awarded in this mock auction (TCC_{M2}).
- The ARRs would be awarded, next, to the second-to-last party (#1) to add an expansion.
 - The mock auction would be run on a grid that excludes the expansion facilities of both parties 1 and 2.
 - ARR_1 would be equal to $TCC_A - ARR_2 - TCC_{M1}$, where TCC_{M1} is the set of TCCs awarded in the mock auction held for party #1.

The LECG project team has tested this ARR approach, verifying that it is revenue adequate. However, a few issues remain to be explored and discussed:

- The approach needs to be expanded to include a test of the feasibility of pre-existing TCCs on the post-expansion grid, i.e., a grid that includes the facilities added by the party taking ARRs.
 - Parties electing to take ARRs might need to be assigned mitigating TCCs.
 - Mitigating TCCs would need to be assigned based on the set of TCCs that exists after Step IV, prior to the Type B auction.
 - Mitigating TCCs would need to be assigned in order of the actual date of commercial operation of the expansions receiving ARRs.
 - Default bids for mitigating TCCs could be constructed from the results of the Type A auction, as before.
 - If assigned prior to the Type B auction, the mitigating TCCs could be sold in this auction.

- Some additional investigation should be made of the impact of setting the bid prices in the mock auction equal to the market clearing prices in the actual auction.
 - It has been shown that using the actual bid prices in the mock auction may be revenue inadequate. So, we know that in at least some cases using the market prices rather than the actual bid prices reduces the ARR payments.
 - An alternative approach to ARRs might be possible in which the mock auction is run based on actual bid prices and the expander is awarded:
 - *min (calculated ARR revenue, auction revenue remaining after paying those with outstanding TCCs).*

ARR payments would potentially need to be pro-rated among expanders if this approach were used in situations in which multiple expanders elect ARRs.



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DECISION POINTS

Choices

The revised expansion TCC award process preserves the structure and objectives of the original MSWG proposal and provides choices to expanders when possible. While providing choices to expanders is beneficial, it also introduces complication. The MSWG needs to consider whether some choices could be eliminated.

- Types of expansion awards offered.
- Choices for awarding mitigating TCCs.
- Approaches to resolving infeasibility in the final award step.
- Whether ARRs should be offered incrementally to LT and ST TCC awards, or only as an alternative to TCCs.

DECISION POINTS

Types of Awards

Which types of transmission expansion awards should be offered before and after LT options are available?

Comparison of Alternative Types of Expansion Awards		
Award Type	Pros	Cons
LT TCCs	Associated transmission capacity included in all TCC auction and expansion award models; available to create synergy with subsequent expansions (efficiency). TCC awards assured for 20 years.	Risk of changes in future congestion patterns: - negative payments - change in valuable TCCs.
ST TCCs	Parties can change nominated TCCs every 6 months to reflect changes in congestion patterns.	Risk of not being awarded requested TCCs without assuming mitigating TCCs; TCC awards are not assured. Mitigating TCC awards may change every 6 months. Associated transmission capacity is never included in the Type A auction or in models used to award LT TCCs.
(10-Year) Rolling Awards	Mitigates risk of changes in congestion patterns in the years following the Type A auction.	Associated transmission capacity is not included in every period of the Type A auction or of models used to award LT TCCs. TCC awards are not assured for years after the Type A auction.
ARRs	Awards change every 6 months to reflect changes in congestion patterns. May be helpful if expander is uncertain about how to nominate ST or LT TCC awards.	Mitigating TCC awards may change every 6 months. Associated transmission capacity is never included in the Type A auction or in models used to award Awards are uncertain; will change every 6 months based on the results of the Type B auction and other transmission expansions that occur.
LT Options	Associated transmission capacity included in all TCC auction and expansion award models. TCC awards assured for 20 years. No risk of negative payments.	Remaining risk of changes in future congestion patterns; change in valuable TCCs.

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PROJECT STATUS

Remaining Tasks

- LECG
 - Complete testing of ARR award process.
 - Complete testing of Englander approach for the unauctioned period.
 - Complete project report.
- MSWG/LECG/NYISO
 - Decide which optional parts of the award process to include/exclude form the final recommendation to the BIC.
 - Decide what needs to be completed prior to BIC vote: awards for controllable lines?
 - Decide on next steps to address extensions/enhancements on the Outstanding Issues List.
 - Report to BIC: target date for BIC vote?
- NYISO
 - Perform full-scale proof in concept of expansion TCC award process.
 - Prepare tariff filings, manuals, etc.

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