Draft Proposal for the Allocation of Congestion Revenue Rights to Merchant Transmission

1 Introduction

This paper provides a draft proposal as well as a list of underlying principles for allocating Congestion Revenue Rights (CRR) to Merchant Transmission (MT) owners.

The California Independent System Operator (CAISO) is proposing that when new transmission capacity is added under a MT model and this new transmission capacity is provided to be put under CAISO Operational Control, the CAISO will allocate CRRs to the party responsible for the increased transmission capacity for the amount no greater than the increase in capacity, as approved by the CAISO. Under the MT model, the owner of the new transmission capacity will receive a CRR allocation only if the MT owner does not recover the investment cost under a FERC regulated and approved rate of return through an Access Charge or through direct payment from a Participating Transmission Owner (PTO). Stated differently, transmission upgrade projects that are receiving a rate of return or a direct payment from a PTO are not eligible for CRR allocations.

2 Types of Transmission Upgrades

The different types of transmission upgrades can be categorized at a high level as those associated with large generation interconnections and those not associated with large generation interconnections. This section describes these different types of upgrades as well as their eligibility in receiving CRRs.

2.1 Associated with Large Generation Interconnections

As described below, there are two types of transmission upgrades associated with the interconnection of large generators (greater than 20 MW) to the CAISO controlled grid.

Interconnection Facilities: These facilities consist of the Participating Transmission Owner's (PTO) Interconnection Facilities and the Interconnection Customer's Interconnection Facilities. Collectively, Interconnection Facilities include all facilities and equipment between the Generating Facility and the Point of Interconnection, including any modification, additions or upgrades that are necessary to physically and electrically interconnect the Generating Facility to the ISO Controlled Grid. Interconnection Facilities are sole use facilities and shall not include Distribution Upgrades, Stand Alone Network Upgrades or Network Upgrades.

Network Upgrades: The additions, modifications, and upgrades to the ISO Controlled Grid required at or beyond the Point of Interconnection to accommodate the interconnection of the Large Generating Facility to the ISO Controlled Grid. Network Upgrades shall consist of Delivery Network Upgrades and Reliability Network Upgrades. Note that these upgrades must be first approved by the CAISO.

Network Upgrades will be eligible for CRR allocations, whereas Interconnection Facilities will not be eligible for CRR allocations.

2.2 Not Associated with Large Generation Interconnection

For transmission upgrades that are not explicitly associated with the interconnection of a large generator, there are two types:

Economically driven upgrades: transmission upgrades that are put under the control of the CAISO and will promote economic efficiency and is not needed for ensuring system reliability. Note that these upgrades must be first approved by the CAISO.

Reliability driven upgrades: transmission upgrades required to ensure system reliability consistent with all Applicable Reliability Criteria.

The economically driven upgrades that do not recover their investment cost under a FERC-approved rate of return or a reimbursement or direct payment from a PTO, are eligible for a CRR allocation. Note that these upgrades must be first approved by the CAISO. It is assumed that reliability driven upgrades are made by the corresponding PTO and are put under a rate-of-return cost recovery mechanism and thus are not entitled to CRR allocations.

3 Principles for Allocating CRRs to Merchant Transmission

The following is a list of principles that applies to the CRR Allocation that includes allocation to MT owners.

- CRRs will be allocated to the MT owner only after the MT upgrades have been energized and in operational control of the CAISO.
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- Once the CAISO has included the MT related transmission upgrades in the FNM, these upgrades need to be consistently modeled in the FNM in all subsequent CRR Allocations/Auctions and other CRR related processes.
- The terms of the CRRs that are allocated to the MT owner should be good for the life of the transmission facility.
- If the incorporation of MT related transmission upgrades causes previously awarded CRRs to become infeasible, it is the responsibility of the MT owner to provide counter flow CRR Obligations to relieve the infeasibility only for the terms of those CRRs that were deemed infeasible.
- The CRRs allocated to the MT owners should not at any time become a revenue liability to the MT owner; except in the case of those counter flow CRR Obligations provided to the MT owner to relieve any infeasibility caused by the MT upgrade.

4 Overall Merchant Transmission CRR Allocation Methodology

The overall MT CRR allocation methodology is broken into two parts. The first part describes the actual process of CRR allocation, e.g., apply Source/Sink pairs and perform the optimization/SFT (Simultaneous Feasibility Test) process. The second part describes where the allocation of CRRs to MT owners will fit into the current steps in the overall CRR allocation and auction process (i.e., the allocation of CRRs to all eligible entities as well as the auction).

4.1 Allocation Process

The list below enumerates the steps taken for the general allocation of CRRs to MT owners. This approach is independent of the step in the overall process of allocating/auctioning CRRs where the allocation of CRRs to MT owners fits.

1. Assume a given network model that does not include the MT related transmission upgrade(s).
2. Have the MT owner submit nominated CRR information. Since the CRR will not be a liability, the hedge type must be an Option. Since the hedge type is an Option, the MT owner cannot nominate Network Service Right CRRs, but can only nominate Point-to-Point CRRs (i.e., balanced Source/Sink Pairs). The information needed for each CRR is Source location, Sink location and MW.
3. Apply all (if any) previously allocated/awarded CRRs (this may include CRR Options used to remove Transmission Ownership Rights (TOR)) as fixed CRRs to the network model without including the upgrade (term this the “Fixed CRRs”). Note that the application of the Fixed CRRs should be feasible for this FNM.
4. Apply the MT owner supplied nominated CRRs to the network model, except that the MW amounts should be replaced with very large positive values. These values should be large enough to cause infeasibility when the associated Source/Sink pairs are applied to the FNM.
5. Assuming infeasibility, solve the optimization problem and determine the amount of cleared CRRs[1]. The objective function for the optimization problem will be to maximize the MW amount of CRRs allocated. Since the MT owner’s nominated CRRs are the only control variables in the optimization/SFT process, these CRRs will be reduced to obtain feasibility, while still attempting to maximize the MW amount of CRRs allocated. These cleared CRRs will be termed “Capacity CRRs”. These CRRs are not to be allocated to the MT owner, but rather to block capacity in the FNM from being allocated to the MT owner during this specific allocation process.
6. Add the MT related transmission upgrade to the FNM. The incorporation of this upgrade may have two impacts on the FNM: (i) it may change the flow pattern of

[1] Cleared CRRs are the final Source/Sink pairs that result after the process has achieved feasibility via optimization/SFT. Each individual cleared CRR has a MW amount that is less than or equal to the nominated MW amount.

the network model because more/less impedance may be added between two locations, thus potentially impacting the set of shift factor derived from the original FNM and (ii) it may decrease/increase constraint limits within the FNM.

7. Apply to the FNM the Fixed CRRs, the Capacity CRRs and the original Source/Sink pairs (along with the original MW) nominated by the MT owner.
8. Solve the optimization problem with the MT owner's nominated Source/Sink pairs as the control variables. If the optimization process was able to find an optimal feasible solution, the cleared control CRRs are the CRRs that will be allocated to the MT owner. If the optimization process[2] could not find a feasible solution (i.e., an infeasible[3] solution) by just using MT owner nominated Source/Sink pairs as the control variables it is the responsibility of the MT owner to provide additional CRRs. Note that these additional counter-flow CRRs will be determined by the amount of reduction in the penalty based CRR control variables associated with the Fixed CRRs only. Reduction in the Capacity CRR control variables will not result in an allocation of additional counter-flow CRRs to the MT owner. These CRRs will be of hedge type Obligation, in order to alleviate the infeasibility (these additional CRRs must produce counter-flow to alleviate the infeasibility, Obligation CRRs provide counter-flow, whereas CRR Options do not provide counter flow). The CAISO will determine the amount of additional Obligation CRRs needed and provide this information to the MT owner. The MT owner will need to provide these additional CRRs as long as the MT upgrade is creating infeasibility for those CRRs that were allocated and auctioned before MT upgrade was energized. Alternatively, once the CAISO has established the amount of cleared CRRs based on MT owner's nominated Source/Sink pairs, it could provide this information to the MT owner. The MT owner could then re-submit the nominated Source/Sink pairs, but with the MW value equal to or less than the original nomination (note that the Source/Sink locations must stay the same).

[2] Note that in the optimization process, the Fixed CRRs and the Capacity CRRs will also be used as control variables, except that they will have large-valued penalty functions associated with them. This allows the optimization to actually come to a feasible solution by first using the control variables from the MT nominated CRR set. If these controls are exhausted and feasibility is still not obtained, the optimization process will use the Fixed CRRs and the Capacity CRRs as control variables and will adjust these CRRs to obtain feasibility.

[3] For example, assume a line *l* with an OTC of 100 MW. Assume that the set of Fixed CRRs are applied to the FNM before the MT upgrade is made and assume that these CRRs create a net flow on line *l* of 98 MW. Assume this flow is caused by 105 MW of flow in one direction and 7 MW of flow in the opposite direction. Now assume that when the MT upgrade is inserted into the FNM, it changes the shift factors in the FNM in such a way that the 7 MW of counter-flow is reduced to 4 MW of counter-flow, while there is no change on the 105 MW flow. There is an overload on the system because the net flow on line *l* due to the Fixed CRRs is now 101 MW (= 105 – 4). Neither the capacity CRRs or the MT nominated CRRs will help alleviate the overload since these are Option CRRs and do not provide counter-flow. In the optimization, some of the CRRs that contribute to the 105 MW will be reduced until the overload is relieved. Assume that one of these CRRs is from A to B of 20 MW and was reduced to 10 MW to get the net flow on line *l* from 105 MW down to 104 MW (104 – 4 = 100 MW = line *l* OTC). The MT owner would be allocated a CRR from B to A of 10 MW and the original CRR from A to B would be left at its original value of 20 MW. The net result of the original CRR from A to B of 20 MW and the 10 MW CRR Obligation from B to A is a CRR of 10 MW from A to B.

4.2 Merchant Transmission Allocation in Overall CRR Process

This section describes how the allocation of CRRs to a MT owner fits into the overall CRR allocation/auction process.

Currently, the CAISO proposal for allocating and auctioning CRRs involves both a long-term and short-term process. The long-term CRRs are allocated/auctioned with the network capacity scaled down to some specified level (e.g., 75% of a given set of operating constraint values). For CRR Study 2, the long-term CRRs have a term length of 1 month and an availability of up to 12 months (i.e., a market participant can be allocated CRRs for up to 12 months in the future) and are also referred to as annual-term CRRs. There will be two time-of-use periods, on-peak and off-peak, and thus there will be $12 \times 2 = 24$ individual long-term allocations as well as 24 individual long-term auctions. The same FNM will be used for all of these 24 allocations and all 24 auctions and the FNM will have all transmission lines in service[4]. The short-term CRRs are allocated/auctioned with no scaling downward of the forecasted network capacity, but with scheduled-outages taken into consideration, i.e., actually transmission branches and/or transmission capacity removed from the FNM. The short-term CRRs have a term length of 1 month and an availability of 1 month and are also referred to as monthly-term CRRs.

The MT owner will be allocated CRRs as outlined in the process noted in Section 4.1 for each time-of-use period defined by the CAISO. This allocation to a MT owner will take place sometime after the first monthly-term CRR auction that is subsequent to the date of the transmission upgrade going in-service.

In order to be more precise on the issue of the timing, note the following terms:

D_{sti} The date upon which the monthly-term CRR auction is to start for month *i*.

D_{mt} The date upon which the MT upgrade is energized, put under the operational control of the CAISO and is ready for operation.

ΔT A CAISO defined time period to be used as a buffer period.

The CAISO will allocate CRRs to the MT owner after the short-term auction of CRRs for month *i*, such that, ($D_{mt} < D_{sti} - \Delta T$) and ($D_{sti} - \Delta T - D_{mt}$) is minimized in terms of chronological time.

For example, suppose that the monthly-term auction of CRRs for June (month 6 for some given year) is started on May 15. Assume that the buffer period is 1 week. If the MT related transmission upgrade is in-service by May 8, then it would be allocated CRRs,

[4] There may be exceptions to this rule. If there are known situations (at the time of the annual allocation/auction process) that bulk system transmission facilities will be outaged for large lengths of time, these outages may be reflected back into FNM that is being used for those corresponding months. Note that if these outages are not modeled in the annual-term process they will be modeled in the monthly-term process. There may be situation that when these outages are modeled in the monthly-term process, the corresponding annual-term CRRs may not be feasible. This implies that the outages should have been modeled in the annual-term process.

whose term would start on June 1. The MT owner would not have CRRs from the May 8 to June 1 via an allocation.

As noted above, the short-term allocation/auction process will take into consideration scheduled-outages. Before the MT allocation procedure is started, any transmission branches and/or transmission capacity that were removed from the FNM due to scheduled-outages will be replaced back into the FNM.

For the next monthly-term allocation and auction for month (i+1), the new transmission upgrade would be modeled in the FNM and the CRRs that were allocated to the MT owner would be applied as fixed CRRs along with all annual-term CRRs before the monthly-term allocation and auction. If the application of the annual term CRRs causes infeasibility due to the MT upgrade, the MT owner must provide for counter-flow CRRs. For the subsequent annual-term allocation/auction, the CRRs that were allocated to the MT owner would be applied as fixed before the annual-term allocation and auction.

4.3 Source and Sink Restrictions

For MT upgrades associated with Large Generation Interconnections, the Source from any requested CRRs must be located at the first Point of Interconnection with the CAISO grid. For MT upgrades not associated with Large Generation Interconnections, there will be no limitations on the location of either the Sources or the Sinks.