

**The following White Paper proposes a draft methodology for determining the incremental amount of transfer capability that would be the basis for the quantity of "Merchant Transmission CRRs" to be allocated to eligible entities.**

**This White Paper was previously posted on August 12, 2005, and reviewed with stakeholders as part of the 2005 stakeholder process to develop and resolve a number of MRTU policy issues. The CAISO has not resolved this specific methodology, but offers this White Paper as the new starting point for review and discussion. Readers should note that parts of this White Paper (i.e., discussion of "long-term CRRs") may be out-of-date. (February 21, 2007)**

## **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) sponsors.

The California Independent System Operator (CAISO) is proposing that when new transmission capability is added under a MT model and this new transmission capability is provided to be put under CAISO Operational Control, the CAISO will allocate CRRs to the party responsible for the increased transmission capability for the amount no greater than the increase in capability, as approved by the CAISO. Under the MT model, the sponsor of the new transmission capability will receive a CRR allocation only if the MT sponsor 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.

Large Generator Interconnection Upgrade Eligibility Summary:

- Network Upgrades will be eligible for CRR allocations.
- 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.

Non-Large Generator Interconnection Upgrade Eligibility Summary:

- Economically driven upgrades will be eligible for CRR allocations.
- Reliability driven upgrades will not be eligible for 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 sponsor:

- CRRs will be allocated to the MT sponsor only until after the MT upgrades have been energized and in operational control of the CAISO.
- 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 sponsor should be good for the

- minimum of: (i) thirty (30) years and (ii) the life of the transmission facility.
- In the event that the upgraded facilities in question are associated with explicit operating limits and these operating limits are decreased at some time in the future, the CRRs allocated to the MT sponsor should be subject to a CRR decrease.
  - If the incorporation of MT related transmission upgrades causes previously awarded CRRs to become infeasible, it is the responsibility of the MT sponsor to provide counter flow CRR Obligations to relieve the infeasibility only for the terms of those CRRs that were deemed infeasible.
  - The MT sponsor should have the ability to choose the appropriate revenue stream type for the allocated CRRs (i.e., either Option or Obligation).

## 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 sponsors 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 sponsors. This approach is independent of the step in the overall process of allocating/auctioning CRRs where the allocation of CRRs to MT sponsors fits.

1. Assume a given network model that does not include the MT related transmission upgrade(s).
2. Have the MT sponsor submit nominated CRR information. Because of the nature of the MT allocation procedure, the MT sponsor can only submit point-to-point CRR nominations. The information needed for each CRR nomination 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 sponsor supplied nominated CRRs to the network model. However, replace the nominated MW amount with very large MW amount. , These MW values should be large enough to cause infeasibility when the associated Source/Sink pairs are applied to the FNM. These nominated CRRs at this step are adjustable and are used as control variables in the optimization process (this includes the SFT).
5. Assuming infeasibility, solve the optimization problem and determine the amount of cleared CRRs<sup>1</sup>. The objective function for the optimization problem will be to maximize

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<sup>1</sup> 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 proxy-bid based value for the allocated CRRs. Since the MT sponsor'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 proxy-bid based value. These cleared CRRs will be termed "Capacity CRRs". These CRRs are not to be allocated to the MT sponsor, but rather are used to block capacity in the FNM from being allocated to the MT sponsor during the next step of the 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 the network model because more/less impedance may be added between any two specific locations, thus potentially impacting the set of shift factors derived from the original FNM and (ii) it may decrease/increase constraint limits within the FNM.
7. Apply the Fixed CRRs and the Capacity CRRs to the FNM. Apply the original MT nominated CRRs to the FNM.
8. Solve the optimization problem with the MT sponsor'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 sponsor.

If the optimization process<sup>2</sup> could not find a feasible solution (i.e., an infeasible<sup>3</sup> solution) by just using MT sponsor nominated Source/Sink pairs as the control variables it is the responsibility of the MT sponsor to provide additional CRR Obligations that will alleviate the infeasibility. These additional CRRs will be termed "counter-flow CRRs" and will be determined by the amount of reduction in the penalty based CRR control variables associated with the Fixed CRRs and the Capacity CRRs. The CAISO will determine the amount of additional counter-flow CRRs needed and provide this information to the MT sponsor. The MT sponsor will need to provide these additional counter-flow CRRs as long as the MT upgrade is creating infeasibility for those CRRs that were allocated and auctioned before MT upgrade was energized.

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<sup>2</sup> 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.

<sup>3</sup> 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.

9. Additionally, once the CAISO has established the amount of cleared CRRs based on MT sponsor's nominated Source/Sink pairs from the previous step, it could provide this information back to the MT sponsor. The MT sponsor could then resubmit the nominated Source/Sink pairs, but with each MW value equal to or less than the original nominated value (note that the Source/Sink locations must stay the same due to the Capacity CRRs).

## **4.2 Merchant Transmission Allocation in Overall CRR Process**

This section describes how the allocation of CRRs to a MT sponsor 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). As noted in the Principles, the allocation of CRRs to the MT sponsor will not take before the transmission facility upgrades are in-service and energized. In the time period between any two normally scheduled CRR allocation processes, one or more MT sponsored transmission facility upgrade are placed in service and are energized, the CAISO will perform the MT CRR allocation process at the start of the next normally scheduled CRR allocation process. If there were more than one MT sponsored transmission facility upgrade put into service during this period, the MT allocation process would allocate CRRs to MT one at a time and process them in the same chronological order that their transmission upgrades became energized. In processing each allocation, the transmission facility upgrades from the previous allocation will be modeled in the subsequent allocation process for the next MT sponsor.

For example, assume the following CRR allocation and auction schedule. In October through November of year  $(y - 1)$ , allocate and auction long-term CRRs for the year  $y$ . During the first two weeks of month  $(m - 1)$  allocate and auction CRRs for the upcoming month  $m$ . Assume that two MT (MT1 and MT2) sponsored transmission facility upgrades were energized. MT1 was energized on the 5<sup>th</sup> of month 3 and MT2 was energized on the 18<sup>th</sup> of month 3. At the start of month 3 for the next two weeks, the CAISO will be performing the allocations and auctions for month 4. Since, the upgrades were energized after the start of this particular process, the allocation processes for these MT sponsored upgrades will occur during the first two weeks of month 4, which is actually the allocation and auction process for month 5. The MT allocation process for both MT1 and MT2 will occur before the general allocation and auction process. The allocation of the CRRs to MT1 will take place before the allocation of MT2. The FNM used in the allocation of MT2 will include the upgrades associated with MT1.

## **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. Note however, each Source and Sink will be a CAISO defined Source or Sink. The CAISO defined Sources and Sinks will be consistent with the resources used in the forward market for scheduling generators, load and import/exports.