California Independent
System Operator Corporation

Transmission Outages for the Congestion Revenue Rights process under MRTU

Transmission Maintenance Coordination Committee

Presented by
Scott Jercich, P.E., MBA
Member of the CAISO CRR Team

April 19, 2007
California ISO Offices

Purpose of the Presentation

- Briefly review what are Congestion Revenue Rights (CRRs)
- Show examples of how CRRs will work in the new market
- Review the definition and importance of “revenue adequacy”
- Discuss importance of modeling “significant” outages
- Discuss the upcoming transmission outage stakeholder process and the approach to handling transmission outages provided by TMCC in its white paper.
- Examine how other ISOs handle transmission outages

Congestion Revenue Rights – brief review

- A Congestion Revenue Right (CRR) is a financial instrument that allows holders to manage financial risk associated with unpredictable congestion charges that can result when moving energy from one point to another on the grid.

- Congestion occurs when load cannot be served by lower cost energy due to transmission constraints. This causes higher cost energy to be used in place of lower cost energy to serve load.

- Owning CRRs can provide cash payments from the CAISO to offset or eliminate transmission congestion charges incurred when scheduling energy in the Day Ahead market.

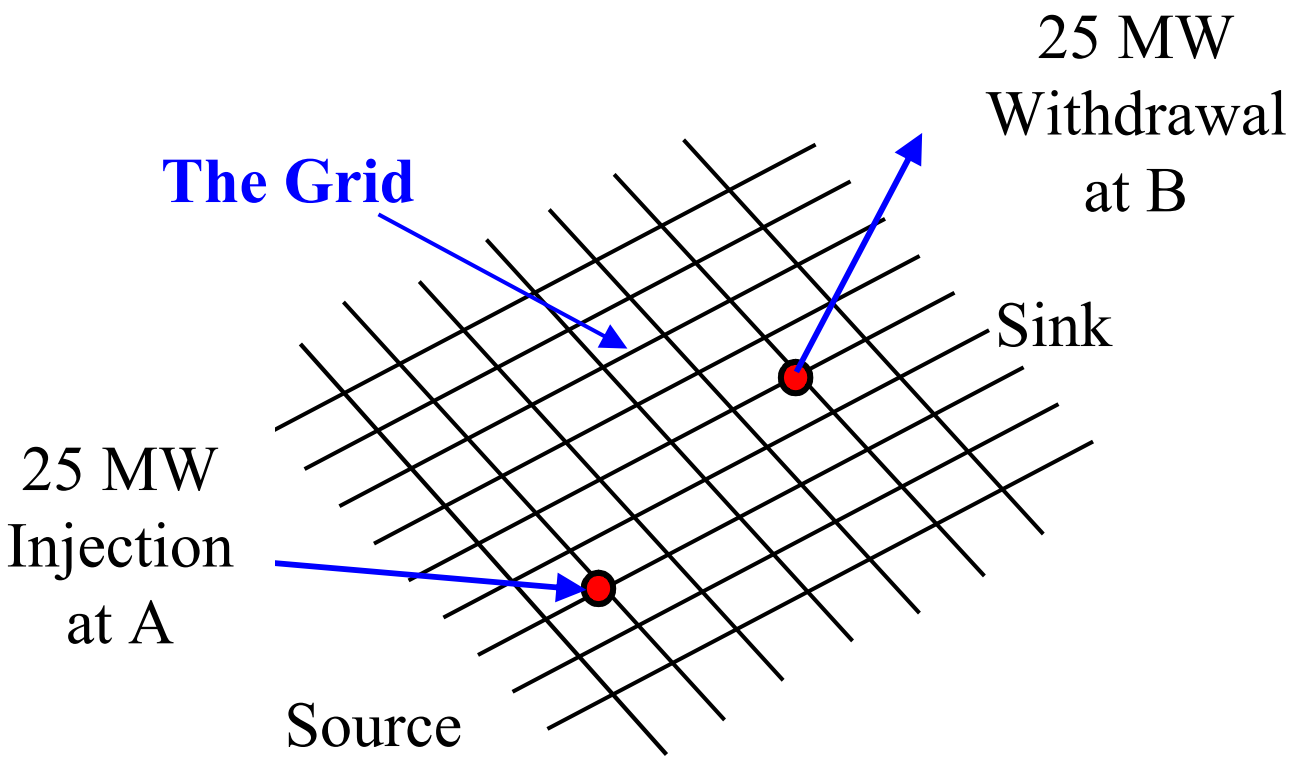
Congestion Revenue Rights – brief review cont…

- Locational Marginal Pricing (LMP) will be used as the approach to transmission congestion pricing in the new energy market.

- LMP is the marginal cost of supplying, at least cost, the next increment of electrical demand at a specific location on the grid. The difference in LMP prices between the sink and source represents the congestion charge in moving energy from the source to the sink.

- LMPs will be calculated at every load and generator bus on the grid in both the Day-Ahead and Real Time markets.

CRR Examples

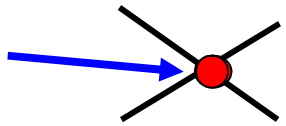
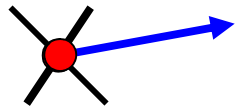


Assumptions –

1. Market Participant has been allocated 25 MW of CRRs from point A to point B.
2. Market Participant schedules 25 MW of energy from A to B consistent with his CRR.

Congestion Revenue Rights

Example – Part A (LMP higher at Sink than Source)

25 MWs of CRRs   25 MW of CRRs

LMP @ Source A = $20/MWh

LMP @ Sink B = $25/MWh

Day-Ahead Energy Settlement =

$(LMP_A) \times (\text{Scheduled Source } MW_A) - (LMP_B) \times (\text{Scheduled Sink } MW_B)$

($20 X 25 MW) – ($25 X 25 MW) = -$125 (LSE Pays to ISO)

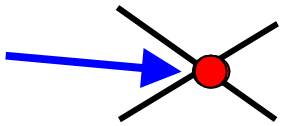
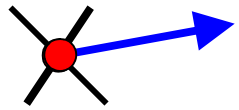
Day-Ahead CRR Entitlement Settlement =

$(LMP_B - LMP_A)$ (CRR MWs owned)

($25 - $20) X 25 MW = +$125 (LSE Receives from ISO)

Congestion Revenue Rights

Example – Part B (LMP higher at Source than Sink)

25 MWs of CRRs   25 MW of CRRs

LMP @ Source A = $25/MWh LMP @ Sink B = $20/MWh

Day Ahead Energy Settlement =

(LMP_A) X (Scheduled Source MW_A) – (LMP_B) X (Scheduled Sink MW_B)

($25 X 25 MW) – ($20 X 25 MW) = +$125 (LSE Receives from ISO)

Day-Ahead CRR Entitlement Settlement =

$(LMP_B - LMP_A)$ X (CRR MWs owned)

($20 - $25) X 25 MW = -$125 (LSE Pays to ISO)

Congestion Revenue Rights – revenue adequacy

- The money to pay CRR holders comes from the collection of congestion rent from Market Participants who schedule energy on the grid plus proceeds from CRR auctions.
- When congestion rent collected equals or exceeds payouts to CRR holders, the CRR program is “revenue adequate.”
- Reasons for revenue inadequacy are well understood.

Congestion Revenue Rights – revenue adequacy

- One of the axioms of being “revenue adequate” is that the full network model used when allocating CRRs must be consistent with the full network model used in the Day-Ahead market. If the two models are sufficiently inconsistent, revenue inadequacy can result.

- An example of an inconsistency that might cause revenue inadequacy is if the CAISO assumes all transmission lines will be in service during a particular month when running the CRR allocation but in the Day Ahead market transmission lines are out of service due to planned outages and thus not represented in the full network model.

Congestion Revenue Rights – revenue adequacy

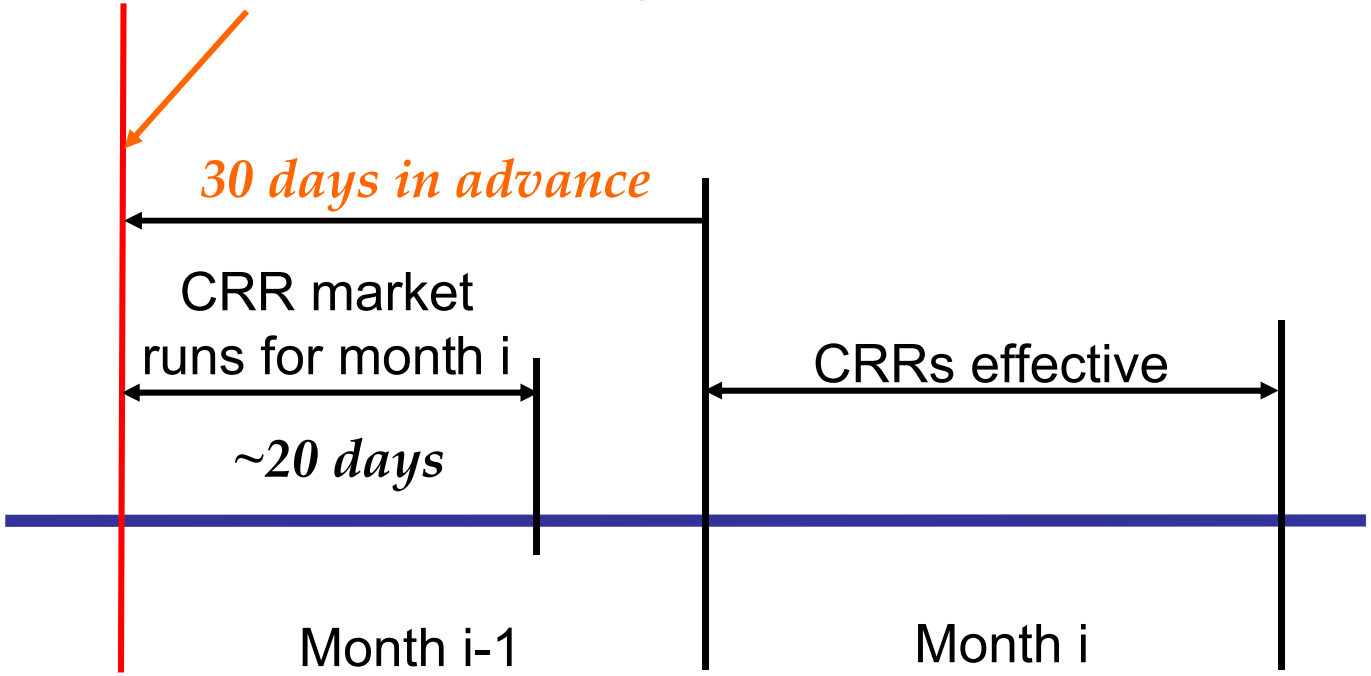
• It is important to consider transmission outages in the CRR allocation process in order to minimize the chances of revenue inadequacy.

Congestion Revenue Rights – Procedure for modeling outages

- CAISO needs to establish a transparent procedure for modeling outages in the CRR allocation process
- Procedures need to include modeling for both the annual and monthly CRR process
- Annual process
  - Major planned outages known well in advance
- Monthly process
  - Planned outages reported under the 30-day rule
  - Planned and unplanned outages less than 30 days before start of the month

Congestion Revenue Rights –

Timeline for consideration of outages in the monthly CRR process



Identification and reporting of "significant" outages

What planned outage will have a "significant" impact on revenue adequacy?

-- "Significant" outages are outages that will likely cause revenue inadequacy if not considered in the full network model during the CRR allocation process.

-- CAISO is very happy to work with TMCC to develop a logical and simple approach to identifying significant outages and their timely reporting in accordance with the 30 day criteria.

Significant Outages

-- The CAISO is planning to conduct a study to identify which outages are “significant.”

-- CAISO is planning to begin a CRR transmission outage stakeholder process and wishes TMCC to be involved in the process.

-- Outage criteria will be considered such as the criteria proposed by TMCC.

TMCC Proposed Criteria

Provided to CAISO by

Mike Gugerty, Manager

Transmission/Substation

Maintenance & Inspection

Foothill S/C

Proposed scheduling of work time frames, to be used with proposed MRTU CCR's in place.

Work to be done during Peak (6am-10pm)

Short term work as listed in the BPM T-113 section 2.1 and 2.2 shall be scheduled with a 72 hour notice with approval to be made after CAISO Outage Coordination Office looks at the outage with consideration to reliability to the system. (This would be no different than scheduling an outage in today's atmosphere prior to MRTU)

On:

- Voltages above 200 Kv- any outage 24 hours or less
- Voltages below 200 Kv- any outage 72 hours or less

All outages that fall under E-509A shall be scheduled as they are prior to the MRTU.

All other outages would be considered long term and would be subject to the revised MRTU scheduling practices(30-60 day ahead of the outage)

Other work to be scheduled with 72 hour notice

Multiday during Non Peak

Any paths that do not have CCR's sold above the CCR's that have been released for the PTO's for the up coming scheduling period, the CAISO shall post to the PTO's which paths will be released from the 30-60 day outage scheduling requirement.

Congestion Revenue Right Outages

How do other ISOs handle outages?

PJM	MISO	ISO New England	New York ISO
For the annual auction, lines taken out of model if an outage of two or more months is expected. For monthly auction, take lines out if outage is equal or greater than five days, unless line is one critical to revenue adequacy. In which case, it is taken out of the model regardless of the duration of the outage.	For annual process, lines taken out of model for the full season if , in one or more months of the season, a line outage is expected to last seven or more days and one of the days includes the 15th of the month. For monthly process, lines taken out of model if outage is expected to last seven or more days and one of the days includes the 15th of the month.	For 345 kV lines, will take lines of importance out of FNM for outages equal or greater than three days. Will derate constraint limits for outages less than three days.	If a line is scheduled to be out for more than half the term of the upcoming TCC auction, it is a candidate to be removed from the full network model. The NYISO then asks the transmission owner whether it should be taken out or remain in the model.