April 8, 2004

Scott Jercich
Project Manager
CRR Implementation
California ISO

Dear Scott:

Subject: Comments on Assumptions/Methodology for CRR Study 2

I am sorry I will not be able to attend the April 13th meeting due to a prior engagement at NCPA.

However, I hope that I could obtain answers to the questions put to you in my memo dated March 25, 2004 attached herewith. Although I did cc the CRR stakeholders, it appears that many of them had not seen the memo. I would therefore request you to distribute it to all. The memo is attached to this email - and also cc'd to a few of the participants whose email addresses I do have.

Because I will not be able to attend the April 13th meeting, I offer additional comments to my March 25th memo as it relates to modeling.

1) When I mentioned that LMP studies have been performed by CAISO with an AC OPF program which modeled a "closed-loop network model for external areas to ensure that the effectiveness of dispatch within the ISO control area includes the associated network flows", (see Page 7 of attached LMP Study 3), Roger stated he did not know of this model, and insisted that loop flows are not modeled. This may well be a post-LMP Study 3 decision, but it does not help us exactly in understanding the way the right and left hands work.

2) The importance of loop flows is seen in the comment on page 3 of LMP Study 3 regarding the April 9, 2003 - AC OPF simulation by CAISO: "Capacity on COI was almost fully scheduled in forward markets, and adding loop flow may place the total flow over the limit in Hours 10 to 13." Again on the May 28 event: "Congestion on COI due to high loop flow."
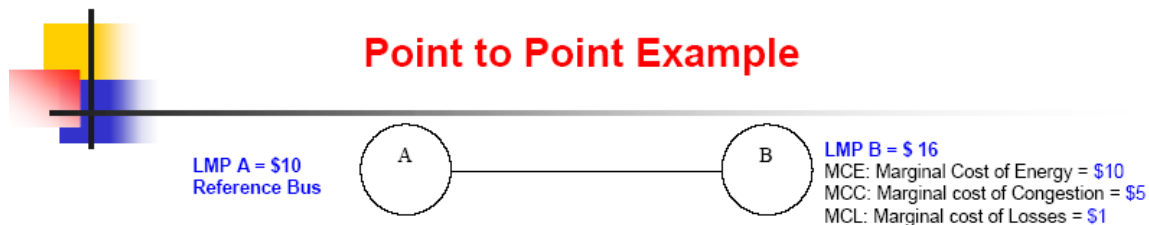
When Schedule cuts are required for loop flow, in current operational practice, CAISO and BPA determine the amount of required curtailments. Hence if an entity suffers a 100 MW curtailment in COI schedule, it has to make up the 100 MW by other generation (or drop load). Holding a 100 MW CRR for COI is thus not sufficient one would believe. Please comment.

3) In my memo I raised the question of dealing with dispatch of an extra generation of about 1800 to 1900 MW in CAISO to cover losses -losses that are NOT modeled in a DC OPF - but are present in an AC OPF. This has never been clearly explained. Does a

holder of a 200 MW DC modeled CRR from a generator node to a load node need to cover additionally 3%-5% of losses and thus only get a real coverage of 190 to 196 MW? Or does the generator have to dispatch 206 to 210 MW to cover losses?

If the dispatch is from a 200 MW generator to 5 different loads located in different locations how does the loss coverage work?

The loss issue is illustrated in your Settlements example below. The LMP price in an AC OPF at a node is comprised of the 3 components shown in the figure. The $100 difference in the example is clearly due to losses.

Point to Point Example

LMP A = $10
Reference Bus

A ———————— B

LMP B = $ 16
MCE: Marginal Cost of Energy = $10
MCC: Marginal cost of Congestion = $5
MCL: Marginal cost of Losses = $1

Schedule & CRR Consistent & In the Direction of Congestion

A SC owns 100 MW of CRRs from A-B and schedules 100 MW from A-B.
CRR Revenue Entitlement (Obligation Type) = -100 (5) = - 500
CRR Revenue Entitlement (Option Type) = - 500
Charge to SC = 100 (16) - 100 (10) = 600

Regarding the CRR classes evaluation; we received a separate email from you asking our views about filming the CRR classes. The CRR classes have indeed been useful and you have spent a great deal of time and effort, but they only give a part of the whole picture. It answered a few questions, but has raised others.

My suggestion is that before filming the CRR classes, it would be a good idea for the CAISO to first hold also a Workshop on the whole LMP-CRR process answering ALL questions relating to how the process is planned to work from the Forward Markets - and its AC OPF modeling - to the CRR and its DC modeling - to the Settlements and its LMP calculations from real-time data via state-estimators working with an AC model. A film of this whole process will be really instructive; also additionally it will be useful to also record the questions asked and the answers given. I believe piece-meal answers to just CRR questions without the whole picture is not really useful to all market participants.

Please call me at 916-781-4218 or email at les@ncpa.com if you should have any questions.

Sincerely,

Les Pereira P.E.
Director, Transmission Planning & Design
Northern California Power Agency