CAISO Responses to Questions Submitted on the CRR Study 1

Q1 In Appendix A there is a list of Load Groups which relate to the aggregation areas used in the study. These Groups are identified by abbreviation only.

A1 As noted in the report, these smaller level load aggregation points were used to break down the large load aggregation points (PGE3, PGE4, SCE and SDGE). These smaller level load aggregations were originally developed in the LMP Study 2 and are very similar to the current ISO defined Load Groups (see the URL below which is an CAISO Zone map). A description of these smaller load aggregations is provided in the table below.

URL for CAISO Zone Map:
http://www.caiso.com/docs/1999/11/16/19991116091901296l1.pdf

Pnode_DZ	Pnode_LG	IOU Area	Description
PGE3	PGHB	PG&E	Humboldt
PGE3	SF _LG	PG&E	San Francisco (Bay Area)
PGE3	PGP1	PG&E	SF Peninsula-North (Bay Area)
PGE3	PGEB	PG&E	East Bay (Bay Area)
PGE3	PGP2	PG&E	SF Peninsula-South (Bay Area)
PGE3	PGSB	PG&E	South Bay (Bay Area)
PGE3	PGDA	PG&E	De Anza (Bay Area)
PGE3	PGME	PG&E	Metcalf (Bay Area)
PGE3	PGSJ	PG&E	San Jose
PGE3	CS1 _LG	PG&E	City of Santa Clara
PGE3	PGF1	PG&E	Fresno North
PGE3	PGNC	PG&E	North Coast
PGE3	PGBC	PG&E	BattleCreek
PGE3	PGCC	PG&E	Central Coast
PGE3	PGSN	PG&E	San Joaquin
PGE3	PGNB	PG&E	North Bay
PGE3	PGNV	PG&E	North Valley
PGE3	RD1 _LG	PG&E	City of Redding
PGE3	PGSA	PG&E	Sacramento Valley
PGE3	PGVA	PG&E	VacaDixon
PGE3	PGDE	PG&E	Delta
PGE3	PGSI	PG&E	Sierra
PGE3	PGST	PG&E	Stockton
PGE3	MI1 _LG	PG&E	Modesto Irrigation District
PGE3	TI1 _LG	PG&E	Turlock Irrigation District
PGE3	PGFG	PG&E	Geysers
PGE4	PGLP	PG&E	Los Padres
SCE1	SCLD	SCE	SCE Low Desert
SCE1	SCEA	SCE	SCE East
SCE1	SCWE	SCE	SCE West

SCE1	SCNW	SCE	SCE Northwest
SCE1	SCNO	SCE	SCE North
SCE1	SCHD	SCE	SCE High Desert
SCE1	SCSO	SCE	SCE LAOC
SDG1	SDG1	SDG&E	San Diego
CDWR5	CDWR5	PG&E	CDWR in ZP26
CDWR6	CDWR6	SCE	CDWR in SCE
CDWR7	CDWR7	SCE	CDWR in SCE

Q2 The report refers to "October 2002 base case", which was utilized in developing load distribution factors.

(A) Please provide a copy of the October 2002 base case.

(B) Provide an explanation why this case was chosen to develop LDFs, how LDFs were derived from the base case data, and why the ISO believes that these LDFs are appropriate for use in this study.

A2 CRR Study 1 used certain data from LMP Study 2 to help speed up the study. LMP Study 2 used the 2002 Heavy Summer base case with additional modeling updates through October 2002 (these modeling updates were made by the Operations Engineering and the EMS department). For this first study (CRR Study 1), the set of LDFs taken from the load in 2002 Heavy Summer base case were used for all market runs, rather than developing different sets of LDFs for different time periods, to help cut down on the data management and in order to obtain results as soon as possible. Further CRR studies will take into consideration the different load patterns (and thus the different LDFs) that occur throughout the year.

Q3 What were the specific LDFs used for the three trading hubs, SP15, NP15 and ZP26? (I am looking for a table similar to the one labeled "Aggregated Demand Zones and Load Group Information".)

A3 The trading hubs (NP15, ZP26 and SP15) are defined as all the load points in each of the 3 current congestion zones as defined in the 2002 Heavy Summer base case. The LDFs are defined by normalizing[1] the load from the base case used in the study in each of the zones and these loads were taken from the 2002 Heavy Summer base case. To relate the table of Demand Zones and Load Groups to the current congestion zones: (1) NP15 consists of all the “PGE3” Load Groups and their associated LDFs; (2) ZP26 is identical to PGE4; and (3) SP15 consists of the combination of “SDG1” with all the “SCE1” Load Groups.

Q4 97% of load was included in the study; 3% was not. In what zone(s) is the "missed" load located? What portion of "missed" load is estimated to be located in congested areas?

[1] Normalization is the process of dividing the load at a particular bus by the total load from all buses that make up the trading hub. The result is the LDF for that bus.

A4 The ISO is aware of the entities that did not provide us with data but we do not know at this time at which load aggregation points they are located in. As we start work on CRR study 2 we hope to receive information from these entities for use in the study. Please also see the response to Question #13.

Q5 Regarding the graphs on pages 9 to 12. Why are there different numbers of LSEs represented in different months?
A5 Not all LSEs requested nominations for every monthly allocation.

Q6 The CAISO utilized Alstom software for this study, and has indicated their intention to purchase this software if/when FERC approval is received. At the same time, it is acknowledged that this software package does not have the capability of modeling Network Service Rights. What discussions have been held with Alstom regarding their willingness and ability to adapt their software to accommodate NSRs? What is the cost? How does this compare with other software products on the market?
A6 Under the RFB submitted by the CAISO the functionality for Network Service Rights (NSRs) was one of the system requirements, which ALSTOM agreed to provide. This functionality is not in the current version of their software but will be provided as we go forward with this project, if/when FERC and ISO Board approval is received. The cost was part of Alstom's bid price, but was not broken out as a separate cost element. The RFB process for selecting the CRR Auction software vendor was a very comprehensive and time-consuming process. There were several vendors that supplied the ISO with responses, which showed various levels of compliance (with various aspects of the requirements including the provision for NSRs) with our request. ALSTOM was ultimately selected as the vendor of choice.

Q7 Is there any assessment about the differences in results when ETC rights are modeled as CRR Obligations, as it is stated in ISO's July 2003 MD02 filing, versus being modeled as CRR options, as done in this study (we expect that modeling as CRR Obligations will increase the availability of CRRs)?
A7 The ISO will begin sensitivity runs shortly that will be based on CRR Study 1. One of these sensitivity runs will include changing ETC Options to Obligations. Market Participants will be provided with the results at a later date.

Q8 What are the CRR high/low tariff power flow cases representing, average high/low tariff transmission network loading, or other? Has a sensitivity analysis been done in this sense?
A8 For CRR Study 1 the 2002 Heavy Summer base case was used and with respect to the voltage levels (high/low) as it applies to the Transmission Access Charge, no distinction was made in the study. No related sensitivity studies have been performed at this time. In CRR Study 2, different loading levels will be taken into account when performing the monthly allocations in order to determine more accurate sets of LDFs.

Q9 How is the breaking down of source/sink pairs done for CRR analysis? Has a sensitivity analysis been done in this sense?
A9 The breakdown of source/sink pairs is done according to the table in the Appendix, labeled 'Aggregated Demand Zones and Load Group Information'. This table reflects how each bid with a sink in one of the four larger demand zones, PGE3, PGE4 SCE1 and SDG1, would be split according to the LDFs. There has not been a sensitivity study performed on this breakdown. Note that these smaller load aggregations were developed with the results from LMP Study 2 in which these groupings were formed by analyzing LMP differences.

Q10 How will high/low tariff DC modeling in CRR analysis be coordinated with hourly AC modeling in the day-ahead market (in order to provide that CRR software will allocate CRRs in the amount that could be scheduled in the day-ahead market and that congestion revenues should cover the settlement of all CRRs in most cases)?
A10 For the CRR allocation and auction, a DC[2] full network model (FNM) will be used. There will be an annual CRR term and a monthly CRR term. The annual CRR term will use the most recent network model that is available prior to the annual term CRR allocation and auction, however, the load pattern to be used in the annual allocation is still an open issue. The annual allocation and auction will be limited to 75% of the system capacity.

For the monthly allocation and auction, 100% of the network capacity will be available less the capacity created by the annual term CRRs. In order to coordinate with the Integrated Forward Market (which will use an AC network model) the CAISO will take into consideration any new completed network upgrades and scheduled outages on transmission facilities for creating the network model that will be used for the monthly CRR allocation and auction. At this time, the procedure for determining which scheduled outages will be included in the monthly allocation and auction has not been completed. For example, it is unclear if a transmission facility that is scheduled to be non-operational for 8 hours for given month should be outaged in the FNM for the monthly allocation and auction. If all scheduled outages for a month are simultaneously outaged in the monthly FNM, then it is anticipated that this will greatly reduce the amount of CRR MW that can be allocated/auctioned. In general, there needs to be coordination between the CAISO and the transmission provider on scheduling of outages so that the system reliability is maintained and load can be served.

By considering which scheduled outages should be included into the model, however, does not necessarily mean that the forward market FNM will be always 100% coordinated with the FNM used in the monthly CRR allocation and auction. This is due to fact some of the scheduled outages that will actually be outaged and modeled in the forward market FNM may not be modeled in the CRR full network model. On the other hand, schedule outages that are modeled in the CRR FNM may be subsequently cancelled

[2] All the ISOs in the US, except the NY ISO, are using a DC model for the CRR allocation/auction process.

and not modeled in the forward market FNM. Forced outages may occur in the system and modeled in the forward market FNM, but not modeled in the CRR FNM.

As far as operating constraints, the CAISO will determine if certain operating constraints need to be scaled down to account for the absence of reactive power modeling within the CRR DC FNM. This can be accomplished by scaling or adjusting the active power limits on transmission facilities by a certain, system-wide percentage and/or by making adjustments on individual lines. Also, those operating constraints that are nomograms and include parameters other than active power flow on a transmission facility or a transmission interface will need to be modeled as an interface flow limit in order to be modeled in the DC FNM and the CAISO will be looking into how to do this in CRR Study 2.

Because the CRR DC FNM and the forward market AC FNM cannot be 100% fully coordinated at all times, there may be hours in which revenue adequacy is not met (i.e., payment to CRR holders is greater than the congestion rents). This is why a CRR balancing account will be established. The CAISO expects, however, that on average and over a certain period of time the CAISO will maintain revenue adequacy.

Q11 Should the next CRR analysis be accompanied with some characteristics of the 24-hour day-ahead market runs for the same market?
A11 This type of analysis will be covered in CRR Study 2.

Q12 In future allocations, should one expect that one's aggregate MW cleared not be less than one's aggregate result from this study and/or should one expect that the amount cleared for any specific bid not be less than the amount shown in this study for that specific bid?
A12 It would depend on the assumptions used as we go forward. We feel that this study was fairly conservative, as mentioned in the CRR Study report, and that consequently future allocations based on less conservative assumptions will clear a higher amount of requested CRRs (based on the current nominations). At the same time, it is important to realize that CRR Study 2 will attempt to identify sets of CRRs for each LSE that provide an optimum congestion hedge on a dollar basis, rather than purely on a MW basis. Under this approach it is conceivable that congestion revenue cost adequacy (zero or near zero net exposure to congestion charges over the year) could be achieved with a smaller MW quantity of CRRs than Study 1 indicated.

Q13 How many LSEs failed to provide data for the CRR study and how many MWs do the missing data represent? How many MWs were represented by the LSEs that did provide data?
A13 The CRR request data that was received by the ISO along with ETCs appears to cover approximately 96 to 97% of the load in the ISO Control Area. This calculation was done by looking at all load schedules submitted by Scheduling Coordinators (SCs) over

various times throughout the year 2003 and comparing this information against the entities making CRR requests. Please also see the response to Question #4.

Q14 At page 28 of the study, the ISO describes how load aggregation areas were broken down into smaller load groups to alleviate constraint violations, encountered during the SFT, in a more efficient manner and thus allow a larger number of CRR Obligations to clear the market. Does that mean that LSEs must schedule to the smaller load groups to ensure that all the awarded CRRs still comply with the SFT? If so, will settlements occur at the smaller load group or the larger load aggregation level?
A14 At this time the CAISO is not requiring the LSEs to make their requests at the smaller load group levels. We still envision that settlements will take place at the larger load aggregation level.

Q15 In the tables showing the Monthly CRR Requests and Allocations to LSEs, how is it that June and August results in such high levels of allocations compared to March and November? Is this strictly related to the paths on which CRRs were requested, i.e. the LSEs requested CRRs on different paths in different months? The results also conflict with the inclusion of more constraints in June and August than March and November, please explain.
A15 You are correct that not all LSEs requested exactly the same source/sink nominations for every month so consequently the level of allocation will vary according the source/sink requests. The Binding Constraints tables in the Appendix show the binding constraints created by putting each market's nominations on the system and seeing which lines and or interfaces had flows exceed their limits. As to the last sentence of the question, the change in the number of binding constraints is due to the different patterns that were submitted for the different months. The increased number of binding constraints (not the number of constraints that were enforced) does not necessarily correlate to a larger amount of CRR curtailment.

Q16 Please provide Requests and Allocations by path. In addition, please provide by path the resulting MWs remaining after the allocation process that would be subject to auction.
A16 Under LMP, requests for and allocations of CRRs will not be path-specific. Instead, CRRs will be defined on a source-to-sink basis, and will correspond to power flows over the entire grid. In this way the LMP approach and the CRR design resemble the actual flow of electricity, rather than the path-specific simplification that is used in today's radial/zonal model. On the second part of this question it is worth noting that due to the nature of how CRR obligations can create counterflow it is possible for a path to be fully loaded in both directions but still provide CRRs in the auction if additional counterflows offset each other. For example, if a path from A to B is fully loaded in the allocation but during the auction an entity bids for 10MW from A to B and someone else bids for 10MW from B to A then both bids would be cleared.

Q17 Please state the reasons why LSE P18 receives only a small percentage of requested CRRs in many of the cases, i.e., because that LSE requested CRRs on paths that had were oversubscribed?

A17 We have provided specific explanation of results to LSEs requesting such information only in relation to their own requests, but in general your statement is correct. During the allocation of CRR obligations if the total set of source-to-sink CRR requests result in a path limit being exceeded, then some of the requested CRRs cannot be allocated. The allocation software will reduce those CRR requests that have the greatest effectiveness in relieving the path overload, in order to eliminate overloads with minimal overall reduction in CRR allocations.

Q18 Has the ISO performed an estimate of the financial impacts to LSEs of not getting 100% of their requested CRRs? If not, is such a study planned?

A18 We have not performed this type of analysis in CRR Study 1, but we intend to do so in CRR Study 2. We intend to hold additional discussions with market participants regarding the assumptions and the methodology we plan to implement in the next phase of the study.

Q19 The report states that ETCs were modeled as options for purposes of the simultaneous feasibility test, consistent with treatment of ETCs in the original (2002) MD02 filing and that changes in the July 2003 MD02 filing would allow for modeling ETCs as obligations; the result being availability of additional CRRs to the market. The report (p. 33) also states that the ISO intends to fully honor the ETCs in the forward markets and in real time under both the original (2002) and Amended (July 2003) MD02 proposals. This does not appear to be entirely consistent, and we would appreciate further clarification regarding what exactly is meant by the statement that the ISO intends to fully honor the ETCs.

A19

The ISO intends to fully honor the ETCs by giving the rights holders scheduling priority in the forward markets, by allowing them to submit schedule changes after the close of the hour-ahead market if their rights so allow, and by taking appropriate actions in real time, such as re-dispatch, to accommodate real-time ETC changes. The one big difference between the original MD02 filing (May-June 2002) and the Amended filing (July 2003) is that the CAISO no longer proposes to reserve transmission capacity in the forward markets for unscheduled ETC rights. This difference is the key distinction that requires a change from modeling them as options to modeling them as obligations in the CRR allocation process.

Q20 In describing the process taken by the ISO in preparing the study, the report describes the provision of certain ETC information by the PTOs to the ISO. We understand the ISO's position that it does not wish to interpret ETCs and that is wishes to obtain direction regarding ETCs from the appropriate PTO. However, the report

describes certain "challenges" to obtaining the necessary ETC data and converting the ETCs to the format needed for the CRR study. The process was evidently not straightforward, which leads to the concern that differing interpretations of ETCs could be possible. We believe that ETC holders should be able to review the data provided by the PTO to the ISO regarding their ETCs.
A20 The CAISO would be willing to work with each of the PTOs and the respective ETC holder to provide this information but any interpretation of the ETCs will be between the PTO and the ETC holder.

Q21 In future CRR studies, we request that the modeling of non-converted ETCs as options, not obligations, be maintained. Even if the ISO abandons the ETCs-as-options approach as its primary MD02 proposal, it is important to include a sensitivity run with the ETCs modeled as options.
A21 The first CRR Study did include all ETCs as options. We plan on discussing other steps for future studies and any sensitivity studies at the Stakeholder meeting on Monday, October 20, 2003.

Q22 The ISO's preliminary study looked at four specific months of monthly CRR allocations in addition to the annual CRR allocations. What are the ISO's plans for the other eight months of potential monthly CRR allocations? Will those months eventually be studied separately after seeking & receiving LSE data from those specific months?
A22 At this point we are still formulating the modeling time period for CRR Study 2, and the CAISO will contact all participants in advance if additional data (e.g., for the other 8 months) is needed for the study.

Q23 Regarding Network Service CRRs, when will the ISO be able to include the required capabilities in the study software to consider and analyze such network CRRs?
A23 ALSTOM will not be developing that functionality until after a contract has been executed, which will be subsequent to a FERC order to proceed with implementation of LMP under MD02.

Q24 In Section 4.3.1 (p. 17) of the study report, the ISO mentions if "all ETC reservation patterns were not simultaneously feasible, the CRR performed pro-rata curtailments to achieve simultaneous feasibility." In Section 8 (p. 44) of the report, it is mentioned that, "the quantity of non-converted ETCs that are simultaneously feasible is 95% for both off-peak and on-peak periods." Can the ISO share with Market Participants where/on which primary paths (i.e. - Path 15) the ETCs were not 100% feasible? Similarly, were there specific paths that were primarily responsible for the LSE annual (and monthly) CRR shortfalls in Tables 7-10 (p. 36-41)?
A24 This would need to be discussed with the PTOs and the ETC holders. Since the focus of this study was to determine MW coverage for LSEs we have not discussed the specifics of the ETC rights with the PTOs or the ETC holders yet. The majority of the

few LSE nominations that were curtailed were violating multiple constraints and determination of which constraint was primarily responsible for curtailment for a particular nomination when there are many binding constraints is difficult.

Q25 In Section 5.1.1 (Page 19) of the report, the ISO mentions that there are many sub-transmission projects scheduled to be completed by the start of 2005, but such projects were not modeled in the study. Can the ISO provide a brief listing of those projects?
A25 The CAISO is still looking into this request.

Q26 In Section 5.1.2 (Page 21) of the report, the ISO mentions that additional constraints will be analyzed and modeled and will need to be included later in the process. Does the ISO have an approximate timetable for the identification of the additional constraints?
A26 The identification of these constraints (from the list of all CAISO operational constraints) will be analyzed with the help of Transmission Planners and Operations Engineers. At that time those that are appropriate to model will be included in our model that will be used in the CRR Study 2.

Q27 How were the LDFs determined for the specific load groups? (Such as the "CS1_LG" LDF of 0.022187893 in Appendix A?)
A27 The LDFs are determined from the load within the base case that was used for this study (Heavy Summer 2002 with additional EMS changes through October 2002). For a particular load group, all load at load buses within the load group are normalized to 1.0 and this normalization produces the LDFs.

Q28 It appears that the monthly LSE-received allocation percentages were noticeably lower, during on-peak periods, in March (80%), June (87%) and November (86%) than during the month of August (91%). Has the ISO concluded the reasons why this is the case?
A28 Market 8 allocates CRRs for the month of August. Out of the months chosen in this Study, August is the month where the peak load occurs. The LSEs asked for more CRRs for Market 8 than for the other 3 monthly markets. This increased amount of CRR nominations changed the pattern of the CRRs and in doing so this new pattern provided counter flows for other CRRs that were previously curtailed.

Q29 Can the ISO estimate the financial impacts on market participants of the congestion costs that remain unhedged?
A29 This will be a central focus of CRR Study 2.