**CAISO CRR Credit Policy – Initial Draft**

**March 20, 2007**

## I.    CRR AUCTION CREDIT REQUIREMENTS

The CAISO credit requirements for participation in the CRR auction and allocation process will have five elements:

1.    Bidders will post credit prior to the auction covering for each CRR bid, the higher of their CRR bid (bid price times quantity) or the pre-auction credit coverage margin for those CRRs.  Bids lacking sufficient credit coverage will not be included in the auction.[1]

2.    The pre-auction credit coverage margin will be determined using the same formula used to determine the post auction credit coverage margin applied to a zero price CRR.

3.    CRRs will be paid for at the conclusion of the auction.

4.    Once a CRR holder has paid for all CRRs it purchased in the auction, the CRR holder's credit coverage in excess of that needed to hold the purchased CRRs will be released.  No payments will be made to the CRR holder for the purchase of negatively priced CRRs until the credit coverage required to hold the CRR is in place.

5.    No credit coverage will be required to participate in the annual and seasonal CRR allocation processes, but credit coverage may be required for holding some CRRs acquired in these processes.

The credit coverage requirement for participation in the CRR auction by entities submitting bids for a portfolio of CRRs will typically exceed the payments ultimately made by the CRR holder for the purchase of CRRs in the auction.  This will be the case both because auction participants will generally not be the high  bidder for every MW of CRRs on which they submit a bid and because the clearing price in the auction will be lower than the bid price of all but the marginal purchaser.

Once the auction is complete, market participants awarded CRRs in the auction will be required to pay for the CRRs which they were awarded in the auction and to post

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[1]    The CAISO will need to specify rules to handle the situation in which the credit is sufficient to cover some but not all of a market participant's bids.

any required credit coverage for holding the awarded CRRs. The credit requirement established for auction participation will not be reduced until the market participant has paid for the awarded CRRs and will be reduced only to the extent that the credit coverage requirement exceeds that required to hold the awarded CRRs.

## II.     CREDIT REQUIREMENTS FOR HOLDING CRRS

### A.     Credit Requirement

Entities holding CRRs may be required to post credit coverage for their potential liability for payments associated with the CRRs they hold.  For CRRs that are negatively priced in the auction, the required coverage will be equal to the absolute value of the price of the CRR in the auction, plus a credit coverage margin. [2] For CRRs that are positively priced in the auction, credit coverage will be required only to the extent that the credit coverage margin for that CRR exceeds the CRR's price in the auction.  CRRs with positive auction prices in excess of the credit coverage margin will provide credit coverage for other CRRs held by the same entity.

Thus, CRRs with substantial positive prices in the auction will generally not require any credit coverage to hold and will provide credit coverage for the holding of other CRRs.  CRRs with auction prices that are negative or positive but close to zero, on the other hand, are likely to require credit coverage by the holder.

It is possible that some CRR holders could be required to provide additional credit coverage beyond that required to participate in the CRR auction in order satisfy the credit coverage margin for holding the CRRs they are awarded in the auction.  This is most likely for entities that purchase CRRs at negative prices in the auction.  In most cases, however, the additional credit coverage required should not be materially more than the payment due to the CRR holder for the negatively priced CRR.

### B.     Determination of the Credit Coverage Margin

The purpose of the credit coverage margin is to provide reasonable assurance that if CRR payments differ from the expected level, the CRR holder will be able to satisfy its financial responsibilities.[3]  While the numerical parameters used to determine the credit coverage margin have not yet been set, the general structure of the formula determining the credit coverage margin will be a function of the CRR auction price, the term of the

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[2]     It is important to keep in mind that the CRR auction will be conducted using the full network model and therefore all possible CRRs will be priced in the auction, even if no CRR with exactly the same source and sink was sold in the auction.  This principle is common to all CRR auctions and underlies the use of auction revenue rights in PJM, ISO-New England and New York.

[3]     Futures exchanges and clearing exchanges such as NYMEX impose margin requirements for the same reason; see, for example, www.nymex.com/ewd_marginsaspx.

CRR, and the month or season covered. This discussion focuses on the formulation of the credit coverage margin to be used at the initial implementation of MRTU.[4]

Since the base credit requirement is determined by the auction price, one measure of the prospective variability is the historic variability of CRR payments relative to the auction price. At the initial implementation of LMP pricing in California, however, there will be no historical data on the actual variability of CRR payments, and there will be no historic auction prices to be compared to the CRR payments. Moreover, there will be no historical data on the sources and sinks of CRRs that might be typically purchased in the auction. Three general approaches have been identified for addressing this lack of historic data for estimating an appropriate credit coverage margin.

## 1.     *LMP Study Price Data*

One set of data that could be used to assess the likely variability of CRR payments relative to CRR auction prices is the congestion data generated for historical periods in the LMP studies. While these studies are not based on the outcomes of actual day-ahead market bidding, they reflect the historical variation in load and weather conditions.[5]

The LMP studies provide a potential set of returns for analysis of the variability of congestion payments but do not provide a set of auction prices to which the congestion payments can be compared in order to assess the variability of the net returns. If there were many months of auction prices with the same expected level of congestion charges one could calculate the mean value of the simulated congestion charges for a set of CRRs and then calculate the variation of the simulated auction returns around the assumed mean. One problem in applying this methodology in practice is that the expected level of congestion charges would certainly not have been the same from month to month over the simulated period, so calculating the variation of the simulated monthly congestion charges around the mean for the period covered by the LMP simulations would have the potential to greatly overstate the actual variability in CRR returns around the auction price.[6]

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[4]   After the MRTU markets have been in operation for a period of a year or two it will likely be appropriate to reexamine the credit coverage margin based on the observed variability of CRR payments and auction prices. At that time, it is possible that the formula determining the credit coverage margin might be elaborated to depend on factors such as whether the CRR sources or sinks at a LAP and in which LAP the CRR sources or sinks, if it is observed that greater variability appears to be associated with such factors.

[5]   It should be kept in mind that the LMP studies are based on a simulation of real-time loads and prices. CRRs will settle against day-ahead prices. It is expected that day-ahead prices will be less variable relative to forward expectations than would be real-time prices.

[6]   That is, the expected level of congestion payments and thus CRR prices would likely have been high in many of the months with high simulated CRR payments and lower in the months with low simulated CRR payments, so calculating variability relative to the overall mean tends to overstate the variability of payments relative to CRR prices that reflect expected payments in each period.

This problem could be addressed to a degree by calculating the mean CRR payments separately for each month of the year, to reflect the seasonal variations that would likely be reflected in CRR auction prices. There would still be only two or three months of data for each month of the year, however. The deviation around the mean for each month would therefore have very few degrees of freedom. Estimating the variance around the monthly means over the year would have relatively few degrees of freedom. There would in consequence be a potential to understate the variance of CRR returns because of the very few degrees of freedom in estimating the mean.

A slightly different approach would calculate a summer, winter and shoulder month mean CRR price and then compute the deviation of the monthly returns relative to the means, then calculate an overall estimated variance. This approach would tend to overstate the variance because the mean would be estimated over seasons rather than for months. Perhaps an average based on the two calculations might provide a balance, keeping in mind the reality that very limited information is available for estimating the prospective variability of CRR returns. Moreover, the process of calculating hypothetical auction prices based on simulated returns and then comparing the hypothetical auction prices to the same simulated returns is different from the actual process generating uncertain payment obligations for annual CRRs.

It also must be kept in mind that the CAISO LMP simulations covered only a few years and the actual prospective variation in market conditions may be much greater than the variability observed over such a short historical period.

Once the variability of monthly returns is computed, it would need to be projected to an estimate of the variability of annual returns. This could be done assuming that the monthly returns are independent and normally distributed.[7]

Another issue in applying this methodology would be the choice of the set of CRR paths over which the variability of returns would be calculated. It is suggested as a starting point that these variability measures be calculated for CRRs from each generator in NP 15 to the NP-15 hub and to the PG&E LAP, and for CRRs from each generator in SP-15 to the SP-15 hub and the SCE and SDGE LAPs. A single variability measure would be calculated for all CRRs.

## 2. *Historical California Congestion and FTR Prices*

A second approach to estimating the likely variability of CRR payments relative to CRR auction prices that could be used as a check would be to develop an estimate of CRR payment variability based on the historic level of variability in congestion on path 15 and

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[7]   It is likely that the actual variation of CRR payments around the CRR auction price will not be normally distributed. In view of the approximations being used to derive the estimated variability of CRR returns prior to CAISO LMP implementation, it is not thought to be useful to test more complicated distributions.

the CAISO external ties relative to the auction prices of FTRs on these paths.  Thus, this approach would compare the auction price and CRR payments for these hedges and estimate the distribution of the payments relative to the auction prices.  This measure of payment variability would not capture the full range of CRR payment variability under MRTU, but would have the advantages of being based on actual auction prices, actual market congestion outcomes and the California transmission system.[8]

### 3.     *Historical Non-CAISO CRR Data*

A third approach to estimating the variability of CRR payments would be to develop an estimate of CRR payment variability based on the historical level of FTR payment variability and FTR prices in one of the eastern ISOs.  This approach would have the advantage of basing the variability analysis on actual point-to-point CRR obligation prices and returns for the kind of CRRs actually purchased by market participants, but the returns would not reflect California conditions.  While this kind of returns analysis would not be sufficient for determining CAISO CRR credit requirements, it would provide a useful check on the validity of the simulation based analysis.

### 4.     *Conclusions*

Whichever approach is used to estimate an appropriate credit coverage margin it is envisioned that these calculations will be undertaken prior to the start of the MRTU market and the parameters used to determine the credit coverage margin will be calculated and input to the CAISO billing and settlement system.  These parameters would remain fixed until the CAISO and its market participants find it appropriate to reexamine the determination of the credit coverage margin based on actual experience under MRTU market operation.

There is an inherent tradeoff between the size of the credit coverage margin and the likelihood of defaults by CRR holders that results in losses to the CAISO congestion account.  Defaults in the CRR market have the feature that the shortfall may potentially continue over the remaining term of the CRR that produced the default and therefore have ongoing consequences for CAISO settlements.

In the event of a payment shortfall due to a market participant default, all market participants who are net creditors in a CAISO trade month are "short-paid" on a pro-rata basis – i.e., if CAISO creditors are to collectively receive $10,000,000, and the CAISO collects only $9,900,000 after liquidating the collateral of the defaulting party, the

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[8]     The fact that the historic FTRs were options with returns calculated in a different manner than CRRs would likely tend to reduce the volatility of the historic FTRs relative to the variability of payments to CRRs in the future.  If it were found that the variability of returns calculated from historic FTR data was much higher than the variability calculated under the first method, this would suggest that the first methodology might be understating the variability of CRR payments.

creditors would be paid 99% of the amount due to them and are provided a claim against the defaulter for the balance. In the event of a default on a CRR, this short payment would potentially continue over the remaining term of the CRR. Accordingly, a default by a CRR holder could have an ongoing negative impact on participation in CAISO's markets and the price at which supply is offered.

The CAISO will therefore seek to ensure that the credit coverage provided for CRRs is sufficient to reduce the likelihood of potential losses from default on CRR payments to a very low level. In addition, the CAISO may study alternatives to address the "recurring" default problem posed by CRRs. Such alternatives may include:

1.    Re-valuing a defaulting market participant's CRR portfolio at the time of default, and liquidating the portfolio by unwinding the positions at the next available CRR auction.

2.    More broadly reconsidering the shortfall allocation methodology used by CAISO in the event of a payment default.

The CAISO believes these alternatives cannot be adequately discussed and developed for implementation by the January 31, 2008 MRTU "go-live" date, but intends to further discuss these ideas with stakeholders over the near-to-intermediate term.

## C.    Adjustments in Required Credit Coverage

It is proposed that there will be three types of adjustment over time in the required CRR credit coverage. The first will be a gradual reduction in the required credit coverage for holding CRRs as the CRR approaches termination and CRR payment obligations or receipts are accounted for in EAL components 1 through 4 (actual and estimated settlements data) and updates of the required credit coverage based on the most recent auction prices for CRRs covering the remaining term of the CRR. The second will be a shift in the credit requirement for holding a CRR in the event that the CRR is transferred to a different creditworthy entity for the entire remaining duration of the CRR. The third will be an adjustment in the credit requirement to account for transactions in which only a portion of the settlement responsibility for a CRR is transferred to another entity, i.e., a situation in which the holder of an annual CRR transfers the settlement responsibility for a particular month, day or hour to another entity.

### 1.    *Adjustments Based on Termination Date and Updated Prices*

The credit requirement for holding CRRs will initially be reduced as the CRRs approach their termination date using an approximation based on the remaining duration of the CRR. Since this approximation does not account for potential seasonal differences in the variability of returns, the reduction will only be applied to the base credit requirement, not the credit coverage margin. Thus, for a CRR with a negative price of $-P$ in the auction and a credit coverage margin of $M$, the initial credit coverage requirement would

be P + M.  It is proposed that the required credit coverage would be θP + M, where θ is the ratio of the CRR's remaining duration to the CRR duration for which P and M were calculated.  Thus, for an annual CRR, it is proposed that after the first two months covered by the CRR have passed, the CRR credit requirement (EAL-5) would fall to 5/6 P + M.

In addition, the credit requirement for holding a CRR would be periodically redetermined for its remaining term based on more recent auction valuations.

## 2.	*Adjustments to Reflect Permanent CRR Transfer*

In the event that a CRR holder transfers financial responsibility for a CRR for the entire remaining term of the CRR, the credit coverage requirement for the remaining term will be transferred to the acquiring party on the effective date of the transfer.  The transfer will not occur until the required credit coverage is in place for the new holder.

## 3.	*Adjustments to Reflect Partial CRR Transfers*

While the proposed methodology for establishing CRR credit requirements would assess the variability of payments associated with a CRR over the term of the CRR, it is not proposed to attempt to assess the variability of CRR payments on an hour-by-hour basis. If CRR holders are permitted to permanently transfer, without recourse, the CRR settlement obligations associated with a subset of hours to another entity, it is essential that the CRR credit requirement established by the CAISO for the entity acquiring these rights reasonably reflect the payment risk associated with the carved out hours.  Simple prorata credit requirement rules such as prorating the credit requirement based on the proportion of hours transferred could give rise to material uncollateralized positions and the potential for material losses in the CAISO settlements.

One type of partial transfer that could seriously undermine the CAISO settlements would be the transfer of the responsibility for a subset of hours that are likely to have the bulk of the payment obligations for a given CRR, such as the afternoon hours in the summer component of an annual CRR, to an entity with minimal assets.

For example, consider an annual CRR acquired by entity A in the auction at a negative price of $1,000,000 for which the CAISO calculates a credit coverage margin of $250,000.  Suppose that the holder in turn transferred the CRR obligation associated with hours 14 through 20 for the summer weekdays for 10 weeks beginning June 15 to entity B.  The transfer would account for 300 out of 8760 hours, so if the CAISO applied a proportional credit requirement to entity B, the underlying credit requirement for entity B would be $34, 247 plus a credit coverage margin of $8,562, while entity A would have a credit requirement of $965,753 and a credit coverage margin of $241,438.

Suppose, however, that the expected value of the payments due on this CRR during the hours transferred to entity B were $900,000.  Even if the payments due on the

negatively priced CRR were consistent with expectations, the CAISO would be substantially undercollateralized for entity B's CRR payment obligations, while it would be substantially overcollateralized for entity A's remaining obligations. Such a simple proration rule for setting credit requirements for partial CRR transfers would therefore invite transfers designed to shift the payment obligation to entities that would be unable to cover the payments due. A second type of transfer that could undermine the CAISO settlements would be the transfer to an entity with minimal assets of the responsibility for a set of hours for which it can be foreseen at the time of the transfer that the required payments will be particularly large. For example, suppose entity A acquired a CRR for July at a negative price of -$400,000 and had a credit coverage margin of $150,000. The negative price for the CRR would reflect the expected level of payments given likely weather conditions, recognizing that some weeks might be very hot with high congestion, while other weeks might be cool. If entity A could transfer responsibility for the CRR to a poorly capitalized entity B when the short-term weather forecast predicted extreme weather conditions, the original CRR holder might be able to transfer liability for $200,000 of its obligations to entity B. If the CAISO only required a proportional credit requirement of say $100,000 plus $37,500 of credit margin from entity B, the CAISO would have uncollateralized CRR payment obligations if the weather were as hot as expected. Similar problems could arise if a transmission forced outage occurred which could be foreseen to raise congestion charges for the next week, and the CRR holder were able to transfer CRR responsibility to a financially weak entity after learning of the outage.

Given the potential for these types of transfers to give rise to material uncollateralized CRR payment obligations under a simple prorata credit requirement allocation rule, much more complex methods would be necessary to determine credit requirements for partial CRR transfers if such partial transfers completely released the original CRR holder from its payment obligations.[9] While it would in principle be possible for the CAISO to develop hour specific credit requirement criteria, this would be very difficult to implement in practice and is not a realistic option at the time of MRTU implementation.

Since it is impracticable to develop sufficiently accurate hour-by-hour CRR credit requirements of the necessary sophistication to cover partial CRR transfers for the initial MRTU implementation, a simple prorata rule will be employed to reallocate the CRR credit requirement between the original holder and the entity making such a partial acquisition. However, it is proposed that the original holder will remain obligated to cover any payments due on the CRR for the transferred hours, should the acquiring entity fail to make any required payments.

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[9] Partial transfers also have some more subtle effects on the appropriate credit policy for the two components depending on the correlation in the variability of payments in the divested and retained hours but these effects are less likely to have material adverse financial affects on the CAISO.

Thus, in the examples above, entity A's credit requirement for holding the CRRs would be reduced and shifted to entity B on a prorata basis as described in the example, however, the shift in credit requirement would not eliminate entity A's financial responsibility for the CRR should entity B be unable to make the required payments.[10]

## III.    LONG-TERM CRR CREDIT ISSUES

There are two credit policy issues relating to long-term CRRs.  The first concerns the appropriate credit policy for long-term CRRs that are acquired either in the allocation process or auction.  The second concerns the appropriate credit policy for the long-term payment obligations of external LSEs that choose to participate in the allocation process for long-term CRRs by prepaying the transmission access charge.

### A.    Long-Term CRRs Allocated to Internal LSEs

It is anticipated that the allocation of long-term CRRs to LSEs will be carried out prior to the implementation of a long-term auction.  This will foreclose the initial use of auction prices for these long-term CRRs in determining the required amount of credit coverage.  Three approaches are under consideration for determining the required credit coverage during the period prior to implementation of a long-term CRR auction.

The first approach would be require the CRR holder to maintain coverage for a CRR with n remaining years equal to n times the credit coverage requirement for a one-year CRR with the same source and sink.  Thus, for a 10 year CRR with an expected value of -$500,000 in the first year and a credit coverage margin for the first year of $100,000, the total credit requirement would be $6,000,000 (10 * [$500,000 + $100,000]).  Alternatively, for a 10 year CRR with an expected value of $50,000 in the first year and a credit coverage margin of $75,000, the total credit requirement would be $250,000 (10* $25,000).

This approach would have two principle limitations.  First, the expected value of the CRR over the year covered by the current annual auction need not be equal to its expected value in subsequent years.  The value of the CRR in the current year might be much lower or higher than in subsequent years because of expected changes in load, expected generation additions or expected transmission expansions.[11]  Second, unless the variability of CRR payments was perfectly correlated over the term of the CRR, the

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[10]    It is important to recognize the source of credit problem in the example is that the prorata rule assigns too little credit coverage requirement to the acquiring entity and leaves to much with the original CRR holder.  As long as the credit coverage of the transferring entity remains available to the CAISO in the event of a default by the acquiring entity, the CAISO's overall credit coverage would not be undermined by such partial transfers.

[11]    In addition, even if the expected value of the CRR in the current year were exactly equal to its expected value in subsequent years, the present value of the expected CRR payments would not equal n times the current auction price because of the time value of money.  This discounting could be relevant in some circumstances.

variance of the CRR payments relative to the auction price over an n-year period would be less than n times the variance over a single year, so multiplying the credit coverage margin by n would very likely overstate the appropriate credit coverage margin.

A second approach would require the CRR holder to maintain credit coverage for a CRR with n remaining years equal to n times the expected value based on the auction price plus the square root of n times the credit coverage margin for the corresponding one year CRR. Thus, for a 10-year CRR with an expected value in the first year of -$500,000 and a credit coverage margin of $100,000, the total credit requirement would be $5,000,000 and a credit margin of $316, 228, for a total credit requirement of $5,316,228. Conversely, for the positively valued CRR with a first year expected value of $50,000 and a credit coverage margin of $75,000, the credit coverage requirement would be 10 times the expected values, +$500,000, and a credit cover margin of $237,171, for a net of -$62,829, implying a credit requirement offset.

This approach attempts to correct the second limitations of the first approach by multiplying the credit coverage margin by the square root of n. The calculation thereby reflects the likelihood that the year to year variations in payments would not be perfectly correlated. While it is possible that the actual returns will turn to be somewhat positively or negatively correlated over time, the assumption that they will be uncorrelated is a reasonable starting point.

A third approach would require the CRR holder to maintain credit coverage for a CRR with n year remaining on the same basis as if it were an annual CRR, except that the required coverage would not be adjusted down based on the termination date until the CRR enters the final year of its term. Thus, the LSE would maintain one year's credit coverage on a continuing basis until the final year. For the examples above, this would require the holder of the negatively valued CRR to maintain credit coverage of $600,000, while the holder of the positively valued CRR would be required to maintain credit coverage of $25,000.

Under all three approaches, the required level of coverage would potentially be redetermined periodically based on the price in the most recent auction of a CRR covering the same period with the same source and sink.

## B.    Long-term CRRs Held by External LSEs

Long-term CRRs held by external entities will be subject to the same credit coverage requirement for holding CRRs as would internal LSEs, i.e., either option one, two or three above, depending on which is selected for internal LSEs, , subject to the same year to year adjustments based on year-to-year changes in auction prices.

In addition, external LSEs acquiring long-term CRRs through the allocation process must maintain credit coverage for one year of transmission access charge payments beyond the current prepaid year.