



Appian Way Energy Partners Comments on CRR Auction Reform Proposal

Abram W Klein & Tal Levy

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Appian Way appreciates the opportunity to comment on CAISO's proposal to alter the CRR market. We have included our earlier comments from January 12 as an Appendix to this document as we remain convinced that the solution to the CAISO's CRR problems lies in making incremental changes to the CRR market design, not in the radical redesign proposed by CAISO. In particular, Appian Way believes CAISO should focus on 1) improving modelling consistency between the CRR auction model and the DAM; 2) improvements to the DAM to reduce the use of nomograms and rely instead on contingency analysis as other ISOs do; and 3) reduce the quantity of CRRs allocated and auctioned to ensure revenue adequacy and ensure that CAISO does not sell transmission rights in excess of the transmission capacity. Some of CAISO's proposals address these concerns and should be given a chance before undertaking a more radical market redesign that distorts the market, restricts open access and compromises the ISO's crucial role in facilitating a market for congestion risk management and transactions.

Appian Way's biggest concern with the CAISO proposal is the limitation on eligible bidding nodes, and these comments are restricted to this issue. Congestion risk is an inherent aspect of the nodal market design and having the ISO facilitate an open and competitive market for congestion contracts is a critical aspect of an efficient and competitive electricity market.

Restriction on Generator to Generator CRRs

CAISO proposes to restrict bidding an FTR to sink at a generation node while allowing bids to source from generation nodes. With only one side of the market represented at the generation nodes, we believe this will create a market distortion and inefficient price signals that increase the cost for generators to buy hedges. Clearly, the restriction eliminates the possibility to offer counter-flow CRRs which would increase the availability of congestion hedges to generators at these locations.

Moreover, generation owners often have many different plants at multiple locations, each with outage schedules and risks, as well as additional complex customer relationships at many locations on

the grid. Financial market participants may also have complex bilateral relationships with generators, and load obligations at locations all over the transmission grid. Retail service providers may also serve loads at many locations on the grid, and many experts believe that the electricity grid of the future will entail even greater diversity of nodal pricing with LMP driven down to the distribution level to accommodate efficient pricing of demand response, storage and electric vehicles. CAISO's proposal will greatly decrease the granularity of the CRR auction, thereby making it much harder if not impossible for market participants to hedge specific localized congestion risk.

All of this means that whether a market participant is predominantly a load, a power producer or a marketer, or some combination of the three, each market participant will have its own unique exposure to congestion risk. These market participants may want to purchase a set of CRRs that match the specific nature of their own congestion risks. This means that these market participants may be better able to manage their congestion risk by purchasing generator-to-generator CRRs so that they achieve an overall exposure to congestion in their CRR portfolio that matches their individual company's needs. This is not to say that all generator to generator paths must be allowed. Many ISOs limit bidding within specific generation groups to avoid the potential for arbitrage of certain day-ahead market congestion between related generators (such as at the same plant) which cannot be easily modelled in the CRR or FTR auctions. CAISO, which currently has no such restrictions, should assess whether these types of restrictions might improve the CAISO market. The instant proposal, however, bans all generator to generator CRRs, even if the specific plants are very distant from each other. This will prevent market participants from developing a portfolio of CRRs that match their specific congestion risks and it will distort the market for congestion. By limiting CRRs to only ones that source from generators and to sink at loads, CAISO would be forcing flows on to select pre-determined (by the available generator to load paths) transmission that would likely lead to higher artificial congestion within the auction while simultaneously underutilizing the actual capacity of the transmission network.

Restriction on Load Zone to Load Zone CRRs

Trading between load zones is done actively in the futures markets and restricting trading between load zones in the CRR market is unnecessary and distortionary. In well-functioning CRR markets such as NYISO's, trading between load zones ensures that prices in the auction are very close to the futures market. Furthermore, the use of targeted paths sinking at generators helps the FTR auction price the correct constraints.

We believe that instead of undertaking an unproven radical market design, CAISO should look to other well-functioning CRR markets such as NYISO and PJM for guidance on more incremental improvements that will address CAISO's concerns while maintaining a liquid market for CRRs. For example, most other ISO's use multi round auctions in their annual processes and have balance of period auctions. This greater number of auctions facilitates price discovery and transparency helping to more accurately align auction prices with congestion settlements. Both PJM and NYISO also do restrict bidding between certain nodes that they deem too electrically similar, but allow all active generation buses to be candidates for CRRs sinks. PJM and MISO each have a very successful system of allocating auction revenue rights (ARRs) and allowing market participants to convert their ARRs in CRRs if they so choose. Additionally, other ISOs have also adjusted their processes to not oversell their capacity and as such underfunding is greatly diminished. These incremental improvements will likely address CAISO's concerns while maintaining the competitive and open market for transmission necessary for open access and retail competition.

Appendix

Appian Way Energy Partners Comments on CRR Auction Analysis Report and Future Policy Steps

Abram W Klein & Tal Levy

January 4, 2018

Appian Way appreciates the opportunity to comment on CA-ISO's initiative to consider reforms to the CRR market.

CRRs are an essential aspect of the nodal market design in CA-ISO, and other ISO markets in the United States. CRRs are a necessary component of the system of locational pricing (LMP) in competitive markets and as such support the broader public policy objectives regarding non-discriminatory open access and the existence of competition in electricity markets. However, the operation of the CRR market in CA-ISO has some market design flaws and challenges that have led to overselling the system and revenue inadequacy. The most important steps the ISO should take to addressing this problem are:

1) Representation and communication of transmission outages in CRR auctions

The CAISO CRR Auction Analysis Report highlights that transmission outages are inadequately communicated and represented in the CRR auctions

2) Modelling of nomograms and line de-rates

It is essential that nomograms and line de-rates be represented not only in the CRR auctions, but also in the initial allocation of CRRs to LSEs.

Appian Way believes outage planning and modelling represents a significant opportunity for improvement that should be a priority in the policy stage of this initiative.

3) Assessment of infeasible allocations

The CRR Auction reports, while outstanding, did not assess the extent to which revenue inadequacy may be deriving from over-allocation of CRRs to LSEs.

We understand that the task for the ISO was to specifically focus on the auction. However, any comprehensive look at CRR market flaws needs to assess whether too many CRRs exist on specific paths. If there are too many CRRs for a specific transmission flowgate, it does not matter whether they are auctioned or allocated. CA-ISO needs to better understand the problem. Many other ISOs have the problem of infeasible transmission rights and MISO in particular developed a sophisticated process for ensuring that infeasible allocated transmission rights do not cause revenue inadequacy.

4) Do not undermine the financial integrity of auctioned CRRs

CRR are auctioned in a competitive process that ensures that those most willing to pay are allocated the rights. This process maximizes the value of the CRR auction for customers. Moreover, the value of the CRR as a hedge and a financial instrument depends on its financial integrity. If auctioned CRRs are assessed a de-rate due to

revenue inadequacy, market participants will be less willing to pay for them and the auction prices will be reduced. I.e. LSEs will pay regardless. Because the de-rate is uncertain, there will be an even further risk premium placed on them, as CRR bidders incorporate the cost of underfunding in their bids. This is very inefficient, bad for customers and bad market design. FERC held a docket (EL16-6) and technical conference on February 4, 2016 addressing this issue. The ISO should avoid making mistakes that other ISOs have already learned from.¹

Full funding of CRR obligations is an important market design element and should not be compromised. The solution to revenue inadequacy is to avoid overselling the system, not to devalue auctioned CRRs.

Why Open-Access to CRRs is Important and in the Public Interest

CRRs are an essential aspect of the nodal market design that supports broader public policy objectives regarding the introduction of competition into markets. CRRs provide the liquidity to allow market participants to manage basis risk under the LMP/nodal market design and in doing so, allow for reduced risk premia in forward contracting and trading. As such, FTRs are a critical aspect of the system of locational pricing that underpins the market design of competitive wholesale electricity markets.

That nodal pricing is the right answer for competitive spot market design is settled public policy now, but it was not always so. Opponents of this design argued that the complexity of having so many different prices under an LMP system would reduce market liquidity and make it impossible for generators and load to contract to cover the idiosyncratic risk associated with their individual specific location. This alternative approach prevailed in the market design that precipitated the California Energy Crisis in 2000.

The answer from Nodal Pricing advocates is how the market has now evolved: forward trading can occur at ISO-established trading hubs and zones, while the risk of specific locations can be managed with CRRs. Indeed, while some forward contracting can go on at specific generator and load locations, the limited liquidity for each location does create a barrier, which is where CRRs come in to fill the gap. Indeed, the mere existence of a functioning CRR market (with “well-defined settlement obligations that minimize uncertainty”) provides a contestable market alternative that disciplines and tempers the risk premia required by financial intermediaries to trade at those less liquid locations. And moreover, the CRR market and the annual auction process for CRRs creates a critical market mechanism – a competitive one -- for setting forward market expectations and reducing overall risk premia for forward trading even at the more liquidly traded hubs and zones that are transacted in the futures markets over exchanges, or that are transacted directly among market participant through swaps and contracts-for-differences (CFDs).

Over time, LSEs, generators, retail providers and financial intermediaries in US ISO electricity markets have all become increasingly sophisticated at using the FTR/CRR markets side-by-side with financial futures markets to manage congestion and market price risks. LSEs receive rights to transfer

¹ In particular, CAISO should focus on the comments and filings of the MISO and New York market monitor, David Patton, who testified in the technical conference for EL16-6.

capability and may choose to convert these rights to CRRs to help manage financial risk in their portfolios, or they may choose to participate in the CRR market on a contingent basis, or they may choose to forego trading CRRs altogether, instead relying on financial intermediaries or “standard offer service” auctions as the means to manage the financial risk of serving load. But even LSEs that choose to forego the CRR markets benefit from a well-functioning FTR market because financial intermediaries with whom they are transacting are themselves in need of a mechanism to efficiently manage their basis risk.

When CRR markets function poorly as a tool for managing basis risk – when there is limited liquidity or when the financial certainty of the product is compromised – the risk premia paid by ultimate customers in purchasing hedging instruments from marketers or other financial intermediaries is increased. The FERC has recognized this fact in its EL16-6 order supporting the essential role of FTRs in the wholesale market competitive design.

Market Design Principle for CRRs: Physical = Financial; Do Not Oversell the System

CA-ISO clearly has a problem with revenue adequacy. The financial obligation from the CRRs either allocated or auctioned by the ISO consistently exceed the congestion rents collected by the ISO. This is in violation of an important market design principle with respect to CRRs: the revenue adequacy theorem. As long as financial rights do not exceed the physical capacity of the system, then the ISO will always collect enough “congestion rents” from the operation of the spot market to fund them.

In the PJM market, the goal of having revenue adequate FTRs is embedded in its tariff and operating agreement.

“The goal of the simultaneous feasibility determination shall be to ensure that there are sufficient revenues from Transmission Congestion Charges to satisfy all Financial Transmission Rights Obligations for the auction period under expected conditions and to ensure that there are sufficient revenues from the annual Financial Transmission Right auction to satisfy all Auction Revenue Rights Obligations.”

Revenue inadequacy can come from: a) overselling the system and overallocation of congestion rights (CRRs) and/or b) factors that reduce physical capacity on the system in the spot market below the amount allocated. The latter can occur due to transmission outages or loop flows. Or it can occur due to transmission constraints that exist in the DA market that are not modelled in the CRR allocation and auction (“model differences”).

Assessing Whether Infeasible CRRs are Being Allocated

Appian Way applauds the CA-ISO for conducting a thorough analysis of the CRR auction. The report does an excellent job of highlighting many examples of operational issues that cause CRR underfunding, and in identifying the specific constraints where model differences are responsible for inadequacy. However, because the report focuses only on the CRR auction, there is an important deficiency in the analysis. That is, the report does not address or identify the extent to which revenue inadequacy may come from over-allocation of CRRs in the first place. I.e. to what extent is the revenue inadequacy occurring on

constraints that had additional transfer capacity auctioned? And to what extent is revenue inadequacy associated with allocation of infeasible CRRs and grandfathered rights? The ISO should easily be able to conduct this supplemental analysis: the ISO can calculate the CRR market flows for allocated and auctioned CRRs on the DA binding constraints using the daily DA shift factors. The report already calculated the revenue inadequacy by constraint. The information that would be useful is what is the percentage of allocated vs. auctioned CRRs on the constraints contributing to inadequacy where CRR flows > actual transfer capacity.

If revenue inadequacy comes from allocation of CRRs over transfer capability, it is important for the ISO to know this. Some market participants and the DMM point out that revenue inadequacy would not exist if there were no auctioned CRRs. However, it is possible and likely that allocation of infeasible CRRs may occur, but the impact is masked by congestion rents going to auctioned CRRs (i.e. there is potential for cross-subsidization).

With the analysis above, the ISO could then categorize revenue inadequacy into:

- 1) Infeasible allocated CRRs, as above
- 2) Transmission outages causing transfer capacity to decrease
- 3) Model differences between the CRR auction and DAM. I.e. nomograms not modeled in CRR market, etc.
- 4) Etc. (whatever else the ISO might find an important category)

The proper public policy response is different for each category. The ISO's goal should be to work toward getting the models to align better and avoid having a different CRR market model from the actual day-ahead market, and to ensure that no CRRs are allocated more than physical transfer capacity.

Consistency between the Day-ahead and CRR Markets

Constraint Matching and Consistency of auction model and Day-ahead market – Even separate from the outage modeling problems identified by the report, there remains a significant challenge of inconsistency between the CRR model and the Day-Ahead model. For instance, this month for December 2017, the CRR model had only 96 contingencies in the model. Historically, over 500 have bound in the Day-Ahead and Real-Time markets. Likewise, the CRR auction monitored list of constraints is incomplete compared to what exists in the market. It will be worth evaluating the extent to which these model inconsistencies contribute to underfunding. It is worthwhile noting that the report shows the specific constraint mismatches in each month between the auctions and the market. However, care must be taken not to make too much of this information. There may be constraints in the auction that act as proxies for similar effective constraints in the market. The monthly tables may show more of a mismatch than is in fact occurring.

Use of Nomograms – Appian Way remain concerned about the extent of operational use of, and potential over-reliance on, nomograms by the ISO. When CAISO has an outage, operators may decide that the market software is inadequate and will study the outage and create a nomogram. These nomograms are often deployed just before the outage starts so often are not modeled in the CRR auction. The nomograms can incorporate gen drops, so the use of a nomogram instead of normal contingency analysis to secure the system should result in higher transfer capacity. However, the nomograms often seem to be more restrictive than normal contingency analysis, worsening the impact on revenue adequacy. Sometimes the nomograms can be associated with very explosive congestion and

subsequently large underfunding. We wonder if operators are using nomograms as a proxy to dispatch specific preferred units. Also, if the nomogram is attempting to address a voltage issue and is not designed precisely, it may inadvertently send an incorrect high price signal to a unit that is exacerbating the voltage problem, resulting in the uncontrolled real-time congestion. We believe that the ISO should trust the software to properly monitor contingencies, especially when the limiting facility is a thermal constraint. Nomogram should allow for less restrictive transmission limits over an interface by accounting for the potential for gen drops.

Competitiveness of CRR Markets and the Unique Path Fallacy

The CRR Auction Analysis Report raises the question of whether the CRR market is sufficiently competitive, especially given the number of “unique paths” that have only a single buyer. The nature of the nodal market design means that each node represents a unique node for pricing. With 1,113 valid nodes in the CRR auction model, there are approximately $1,113^2$ or ~\$1.2 MM potentially unique paths. Figures 7 and 8 show that there are over 6000 unique paths in the annual auction and even more in the monthly auctions. Figure 9 shows that 45% of these paths represented paths with a single unique source/sink combination clearing.

The report suggests that the existence of many unique paths calls into question the liquidity and competitiveness of the CRR market. However, this formulation represents a misunderstanding of what happens in the CRR auctions. That there are many unique paths is irrelevant – what matters is that each of these paths is competing in the CRR auction model for a pre-defined and limited amount of **transfer capacity**. Paths that may have different sources and different sinks nevertheless may be in competition with one another for the limited transfer capacity available. If instead, the analysis looked at specific constraints that bind in the market, the analysis would likely show many different unique CRR paths competing to buy or sell transfer capacity over each constraint. If the ISO wanted to assess competitiveness, it should use the auction model shift factors to assess both auctioned and allocated CRRs and count the MW-equivalent flow of each market participant on the relevant constraint. Such an analysis could be useful in assessing the competitiveness of the CRR market and would likely find that the market is extremely competitive for known constraints and most of the system.

Responding to the DMM’s Flawed Contention that the Purpose of CRRs is Exclusively Returning Congestion Rents to LSEs

The argument being made by the DMM against CRR auctions is, essentially, a collateral attack against competitive electricity markets. CRR auctions are flawed, not because of over-allocation or model discrepancies or revenue inadequacy, but simply because CRRs appear to be subjectively “too profitable.” If buyers of CRRs are making money, consumers must be losing that money. Moreover, those who pay for the grid (i.e. consumers, mostly) are entitled to the value of the financial right to move physical power from low-priced to high-priced locations on the electric grid. Therefore, the CRR market should be redesigned to ensure that those who pay for the grid get all the congestion rents, and any auctioned CRR is a potential loss to rate-payers. Willing buyers/sellers can make their own arrangements for bilateral financial basis swaps at whatever locations they chose. The current construct, this logic goes, essentially forces LSEs to be the default counterparty to the sales of transmission

capacity in auction that is not used in the CRR allocation. Moreover, ratepayers are forced to offer any excess capacity over and above that committed in the allocation process “for free.” They are regulatorily restricted from participating and must rely on auction participant bids to set the auction fair market value.

The thinking outlined above represents a threat to the very construct of competitive electricity markets. Appian Way agrees that an electricity market design principle is to have those who paid for the grid -- transmission ratepayers -- receive the value of the financial right to the physical transfer capacity on the electric grid, but we believe that a better-designed CRR auction process would accomplish this. And there are also other important principles that the DMM proposals would compromise such as providing a market mechanism for managing congestion, supporting liquidity, transparency, open access and non-discrimination that are crucial to any well-functioning market. Especially in markets that rely more on competition, the liquidity and transparency of the auctions helps market participants understand and price congestion, which reduces risk premia for illiquid locations paid by load.

There should be a balance between having the congestion rents go to the transmission ratepayers vs. the benefit of facilitating a market for congestion, added liquidity and transparency and the essential role of CRRs in LMP market design. While congestion rents and CRR revenues represents only a very small percentage of the overall wholesale electricity market in terms of dollar value, the ISO has an essential role in facilitating the market for congestion, which includes both hedging and speculation that helps price discovery. Thus, it is important for the CA-ISO to maintain the CRR market.

The DMM focus on CRR profitability being a loss to ratepayers misses several additional important points. First, the notion that LSEs are prevented from participating in the auction is belied by the fact that the clear majority of CRRs go to LSEs in the form of allocated CRRs. LSEs do participate, by being allocated large amounts of CRRs. Second, the existence of congestion rents is dependent on and a function of the LMP market design. Pre-LMP markets, there were no congestion rents. Congestion costs are, in a sense, “found money” for the loads. In the previous bilateral market design, Utilities had generation, transmission and distribution load customers bundled together. The right to move power over the line was no less attributable to the generation plant than to the distribution load. Think of a thought experiment where there is no congestion and a new generator locates upstream of a constraint, lowering costs for load but also causing congestion. Who should be entitled to the congestion rent? Appian Way believes that allocation of the financial rights to load is appropriate, but that requiring the load to auction the rights to the highest bidder has a further benefit of creating a market and allocating the scarce resource to the participant that values the right the most.

Submitted by,

Abram Klein & Tal Levy

Managing Partner & Principal

Appian Way Energy Partners

Phone: 617-899-5022

Email: aklein@appianwayenergy.com & tlevy@appianwayenergy.com