Day-Ahead Daily Market Watch Metric Catalog

Version 1.2

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VERSION HISTORY

Date	Version	Description	Author
9/9/2009	1.0	Creation of document	Zhu Liang
9/25/2009	1.1	Revised version of CRR metrics	Guillermo Bautista Alderete
7/27/15	1.2	2015 Update and new logo	Jennie Sage

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Introduction

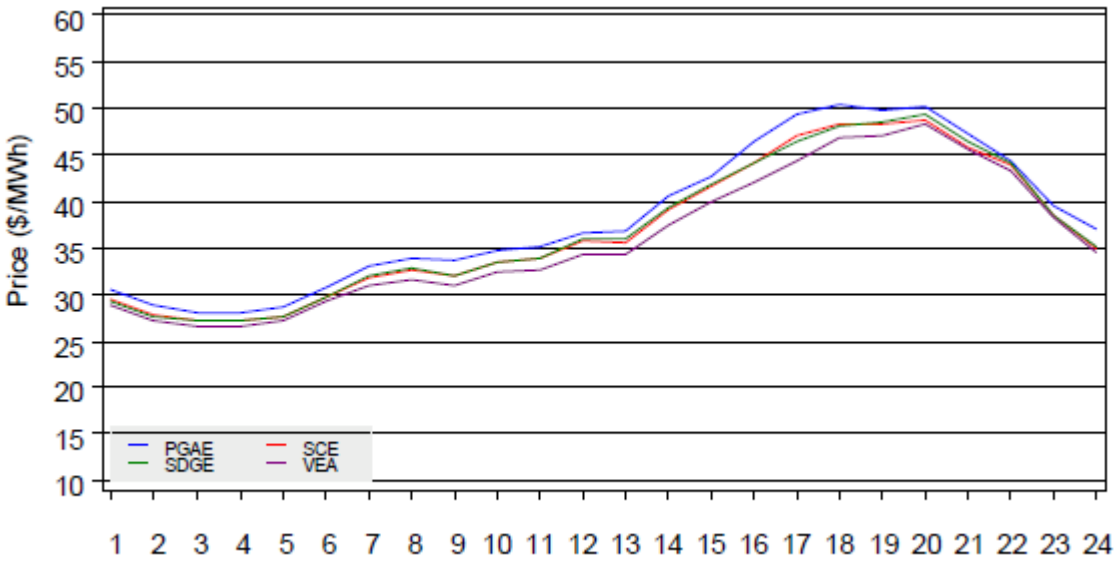
The Market Quality and Renewable Integration division publishes a Day-Ahead and a Real-Time Daily Market Watch (DMW) for each trading day. These reports contain various graphs and tables pertinent to the trading day. The Day-Ahead DMW Metric Catalog provides a description of all the graphs published in the Day-Ahead DMW.

For any questions regarding the Day-Ahead DMW reports or the Day-Ahead DMW Metric Catalog please send an email to **Market_issues@caiso.com**

IFM Default LAP LMPs

Figure 1 shows the hourly Integrated Forward Market (IFM) Locational Marginal Prices (LMPs) for the default Load Aggregation Points (LAPs) PGAE, SCE, SDGE and VEA for all trading hours.

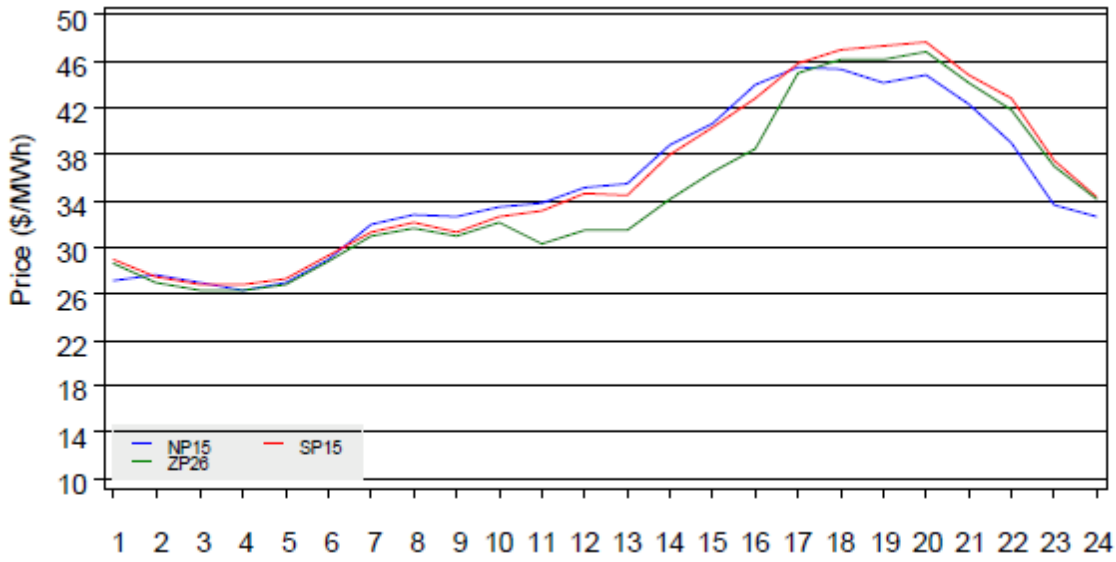
Figure 1: IFM Default LAP LMPs



IFM Trading Hub LMPs

Figure 2 shows the hourly IFM LMPs for three trading hubs: NP15, SP15 and ZP26.

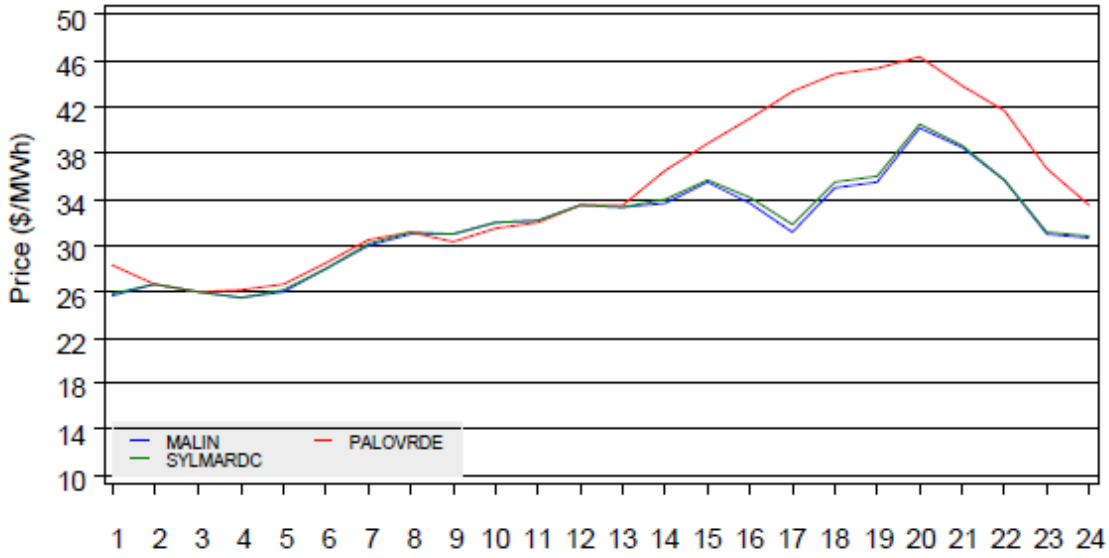
Figure 2: IFM Trading Hub LMPs



Selected IFM Tie Point LMPs

Figure 3 shows the hourly IFM LMPs for three tie points: Malin, Palo-Verde and Sylmar DC which highlight the LMPs at the PACI, Palo Verde and NOB interties, respectively. These tie-points are chosen for this graph because on average more than 50% of imports into the CAISO area are scheduled on them. Please note that Pnode names in the Full Network Model (FNM) for Malin and Sylmar DC scheduling points are MALIN_5_N101 and SYLMARDC_2_N501, respectively. The APnode name for the Palo Verde intertie is PALOVRDE_ASR-ANDE.

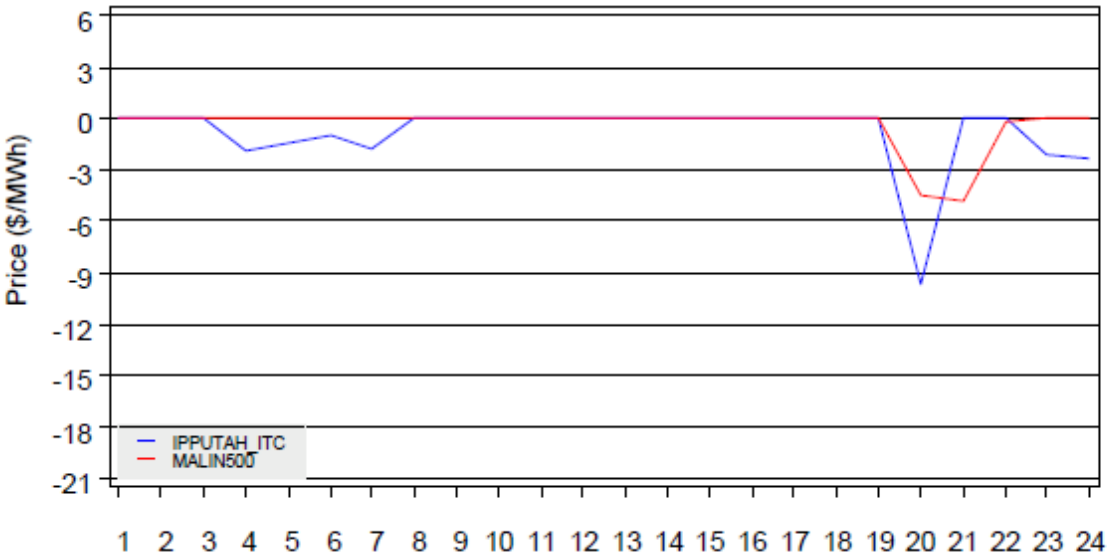
Figure 3: Selected IFM Tie Point LMPs



Selected IFM Intertie Shadow Prices

Figure 4 shows the hourly IFM shadow prices by Intertie for all trading hours. At most four Interties are displayed in this graph based on the methodology explained in **Appendix I**.

Figure 4: Selected IFM Intertie Shadow Prices



Selected IFM Intertie Congestion Rents

Table 1 shows the daily IFM total congestion rents and the IFM total rent percentage by intertie. The daily congestion rent for an intertie is the sum of the hourly intertie congestion rents for all trading hours. The hourly intertie congestion rent is the product of the hourly shadow price and the hourly flow limit. The total rent percentage for an intertie is the ratio of the daily total congestion rent for this intertie to the daily total congestion rents for all interties. This table displays the top four contributors to the daily total intertie congestion rents.

Table 1: Selected IFM Intertie Congestion Rents

Inter-Tie	Import Rent	Export Rent	Total Rent	Total Rent Percent
PALOVRDE_ITC	$47,405.31	$0.00	$47,405.31	54.53%
SILVERPK_ITC	$0.00	$39,522.07	$39,522.07	45.47%

IFM LMP Statistics for On-Peak and Off-Peak Hours ($/MWh)

Table 2 shows the maximum, mean and minimum of the IFM LMPs for three default LAPs and three Trading Hubs by on-peak and off-peak hours. Peak hours are defined as Monday through Saturday, excluding North American Electric Reliability Council (NERC) holidays, from the hour ending 7 to the hour ending 22. All other hours are off-peak hours.

Table 2: IFM LMP Statistics for On-Peak and Off-Peak hours ($/MWh)

	NP15			SP15			ZP26			PGAE			SCE			SDGE			VEA		
	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min
OFF	33.62	28.76	26.31	37.45	29.77	26.75	36.99	29.36	26.25	39.44	31.39	27.96	38.41	30.34	27.17	38.60	30.33	27.16	38.32	29.82	26.59
ON	45.49	38.76	31.96	47.75	39.14	31.21	46.81	37.38	30.21	50.50	41.57	33.01	48.80	40.14	31.84	49.30	40.28	31.95	48.34	38.91	30.99

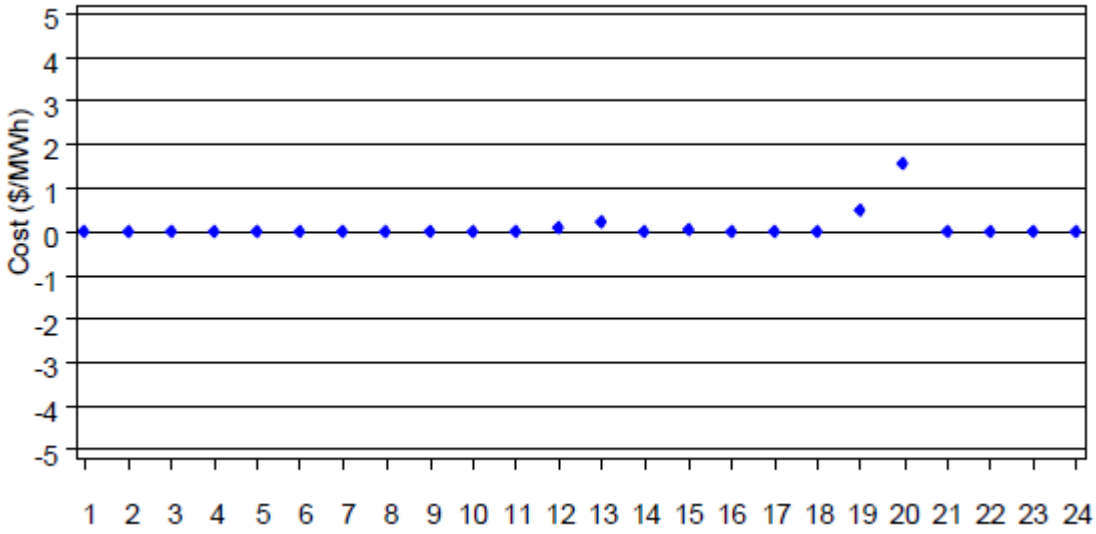
RUC Cost to Underscheduled Load

Figure 5 shows the ratio of the total RUC cost to underscheduled load, which represents the average RUC cost. It can be calculated as the following:

$$\frac{\sum_i \sum_j \text{RUC\_LMP}_{ij} \times \text{RUC\_Award}_{ij}}{\sum_i \sum_j \text{RUC\_Capacity}_{ij}}$$

where *i* indicates individual resource and *j* indicates trading hour (from 1 to 24).

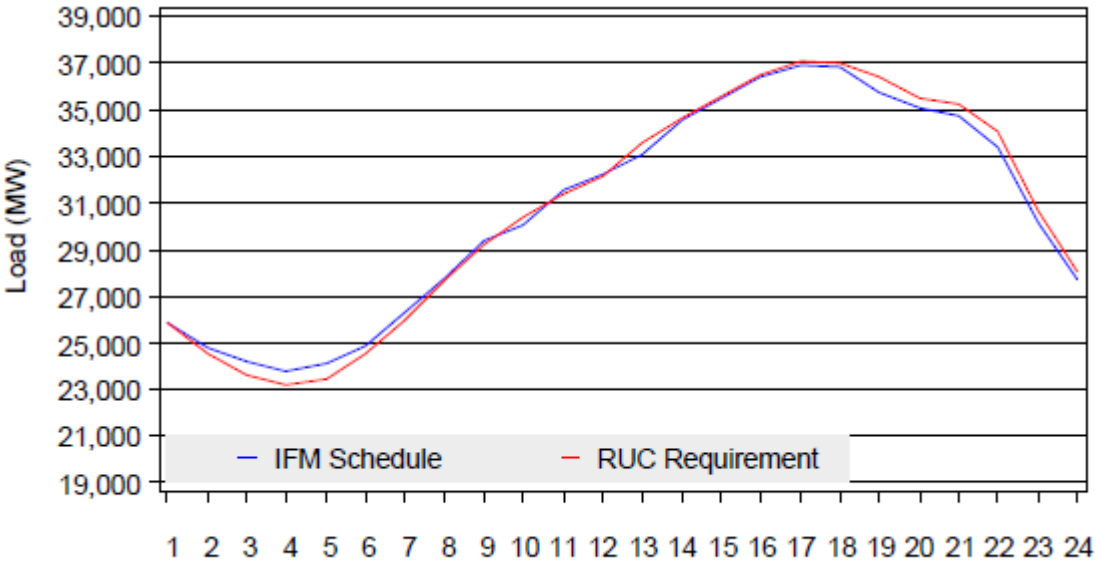
Figure 5: RUC Cost to Underscheduled Load



IFM Cleared Quantity and RUC Requirement

Figure 6 below shows the IFM cleared quantity and RUC requirement. The RUC requirement is based on the Day-Ahead CAISO load forecast, and it is calculated as CAISO region load forecast – ∑(MSS load forecast – MSS IFM cleared load). The MSS subtraction is done for all non-participating MSS.

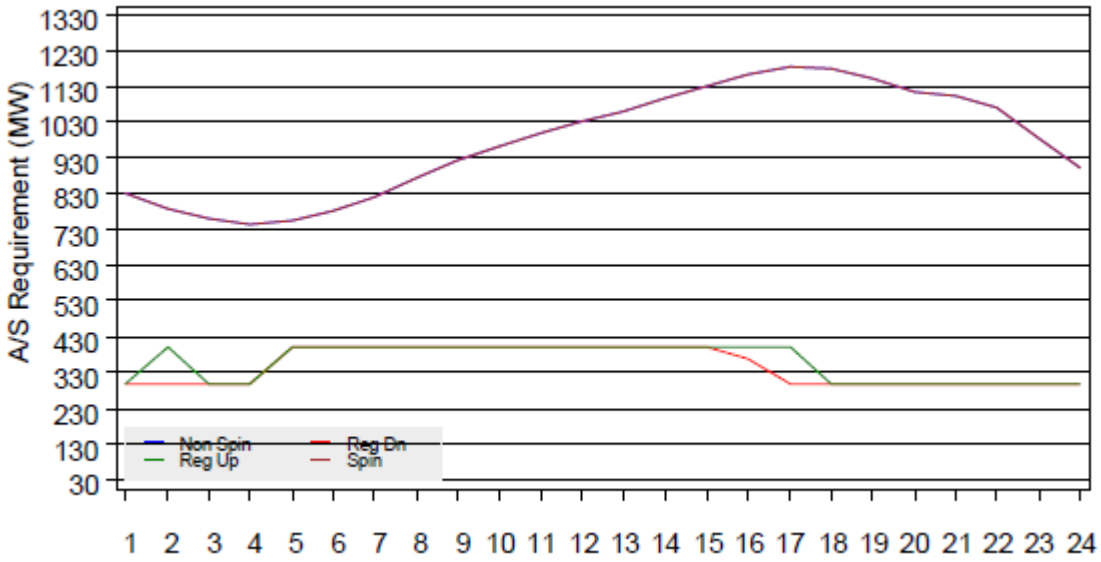
Figure 6: IFM Cleared Quantity and RUC Requirement



A/S System Requirement

Figure 7 shows the Day-Ahead hourly Ancillary Service requirements for Regulation Up, Regulation Down, Spin and Non-Spin for the CAISO expanded region.

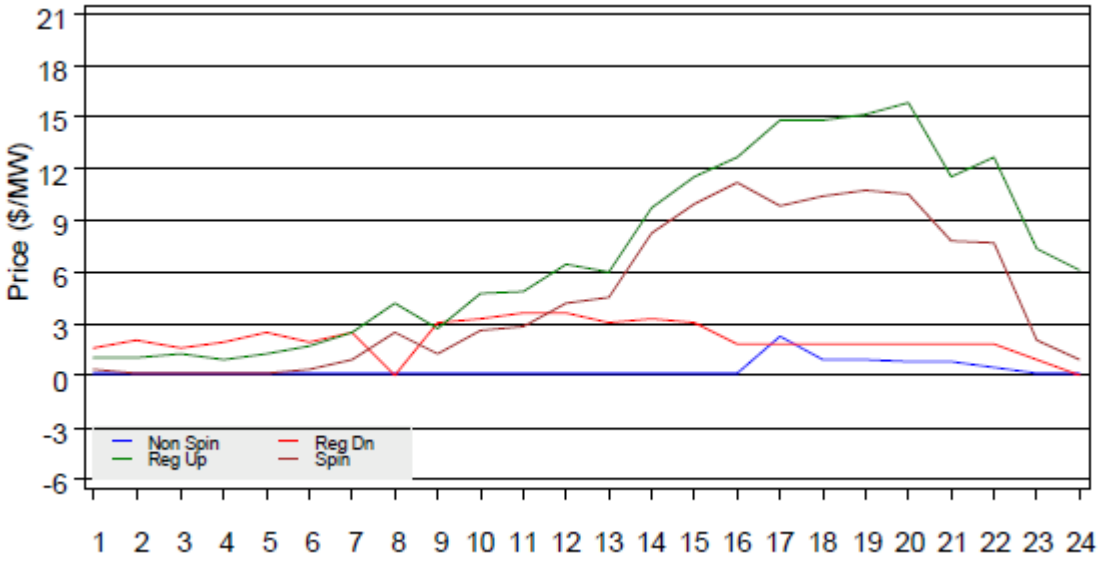
Figure 7: A/S System Requirement



A/S Average Price

Figure 8 shows the hourly average price for all four types of Ancillary Services. The hourly average price for a particular type of Ancillary Service is the ratio of total hourly cost of procuring non-self scheduled Ancillary Service to the total non-self scheduled procured quantity.

Figure 8: A/S Average Price



CRR Revenue Adequacy

In the IFM, congestion is priced accordingly through a marginal congestion component (MCC). For any given hour of the trading day, demand (including exports) is charged the scheduled MW times the MCC, and supply (including imports) is paid the scheduled MW times the MCC. The MCC is at the applicable Pnodes, APnodes or Scheduling Points. The surplus collected by the CAISO is the congestion rents. Congestion rents may also arise from provision of Ancillary Services over interties. Due to the dual nature of Pump Storage (PS) units, they can be treated as supply or demand within the computation of congestion rents.

In addition, CRR holders are paid the source/sink price difference for their entitlements. A CRR payment is defined as the CRR award times the difference (sink minus source) of the MCCs for every hour of the IFM market. A positive value indicates that the CRR holder is paid. On an hourly basis another factor affecting CRR revenue adequacy is the fact that holders of existing rights (TOR, ETC, CVR) are exempt from IFM congestion charges in accordance with the perfect hedge provisions of the ISO tariff. The perfect hedge reduces the net IFM congestion revenues available for paying CRR holders, and therefore the expected impact of the perfect hedge on CRR revenue adequacy.

Revenue adequacy for CRRs shown in Figure 9 reflects the extent to which the hourly net congestion rents collected from the IFM are sufficient to cover the hourly net payments to CRR holders. This metric does not include the extra cost to honor the perfect hedge of ETC, TOR and CVRs. A Positive value indicates that there is a surplus and a negative value indicates there is a shortfall.

Figure 9: CRR Revenue Adequacy

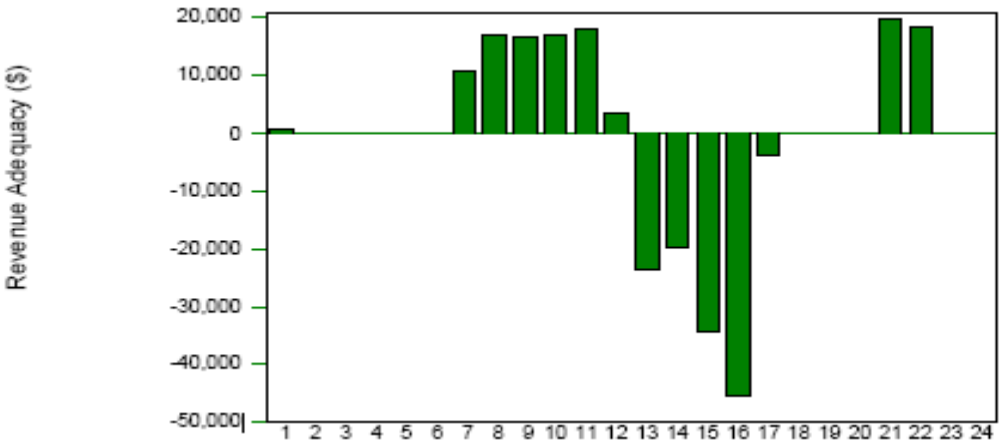


Table 3 lists a summary of the revenue adequacy for a given trading date, summing the values across all trading hours. This table also has the cumulative values for the calendar month. This monthly cumulative is listed because the CRR settlement is cleared on a monthly basis to determine the net CRR revenue

adequacy, even though the CRR settlement is done for each trading hour of the month.

Definitions for the concepts listed in Table 3 are as follows:

- Congestion Rent is the surplus collected in the IFM from pricing congestion –see description above,
- CRR Payment is the money used to pay the CRR entitlements-see description above,
- Perfect Hedge is the cost of honoring the perfect hedge.
- CRR Adequacy is equal to congestion rents minus CRR payments minus perfect hedge,
- Adequacy Ratio is the proportion of the money collected from the IFM to the money paid to the CRR entitlements and cost of perfect hedge.

Table 3: CRR Statistics

	24SEP2009	Cumulative
CONGESTION RENT	$1,196,428.72	$16,157,068.91
CRR PAYMENT	$1,628,503.72	$20,996,818.01
PERFECT HEDGE	.	$448,838.09
CRR ADEQUACY	-$432,075.00	-$5,288,587.19
ADEQUACY RATIO	73.47%	75.34%

The cumulative cost of perfect hedge is between 01SEP2009 and 17SEP2009

Usually, the cost of the perfect hedge of a given trading date will be available for the statistics five days after. Therefore, the item of the perfect hedge for the corresponding trade date will always be empty and only the cumulative will be updated on a daily basis with available data. As a reference for the reader, the period for which the perfect hedge cost is computed will be specified in a footnote as shown above.

Appendix I

Figure 4 displays shadow prices of binding constraints on interties. On any given day, there could be anywhere between no binding constraints to more than 10 binding constraints. This report highlights only important market events. As a result, this graph does not show more than four binding constraints. The top four binding constraints are selected based on their congestion rents as explained below.

$$C_{ij} = (Hourly \quad \underline{Shadow} \quad \text{Price} * HourlyFlow\text{limit})$$

C_{ij} is the hourly congestion rent for binding constraint i in hour j

i = 1 to K, where K is the total number of binding constraints for a particular trade date.

$$D_i = \sum_{j=1}^{H} C_{ij}$$

Where D_i = Daily total congestion rent for binding constraint i.

H = Total number of trading hours for a particular trade date

$$T = \sum_{i=1}^{K} D_i$$

Where T = Total congestion rent for binding constraints on interties.

$$P_i = \frac{D_i}{T}$$

Where P_i is the percentage of congestion rent for binding constraint i.

Figure 4 shows the top four binding constraints based on the percentages.