Briefing on FERC Order 764 market design pricing and interchange

Fifteen Minute Market Discussion

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Market Surveillance Committee

General Session

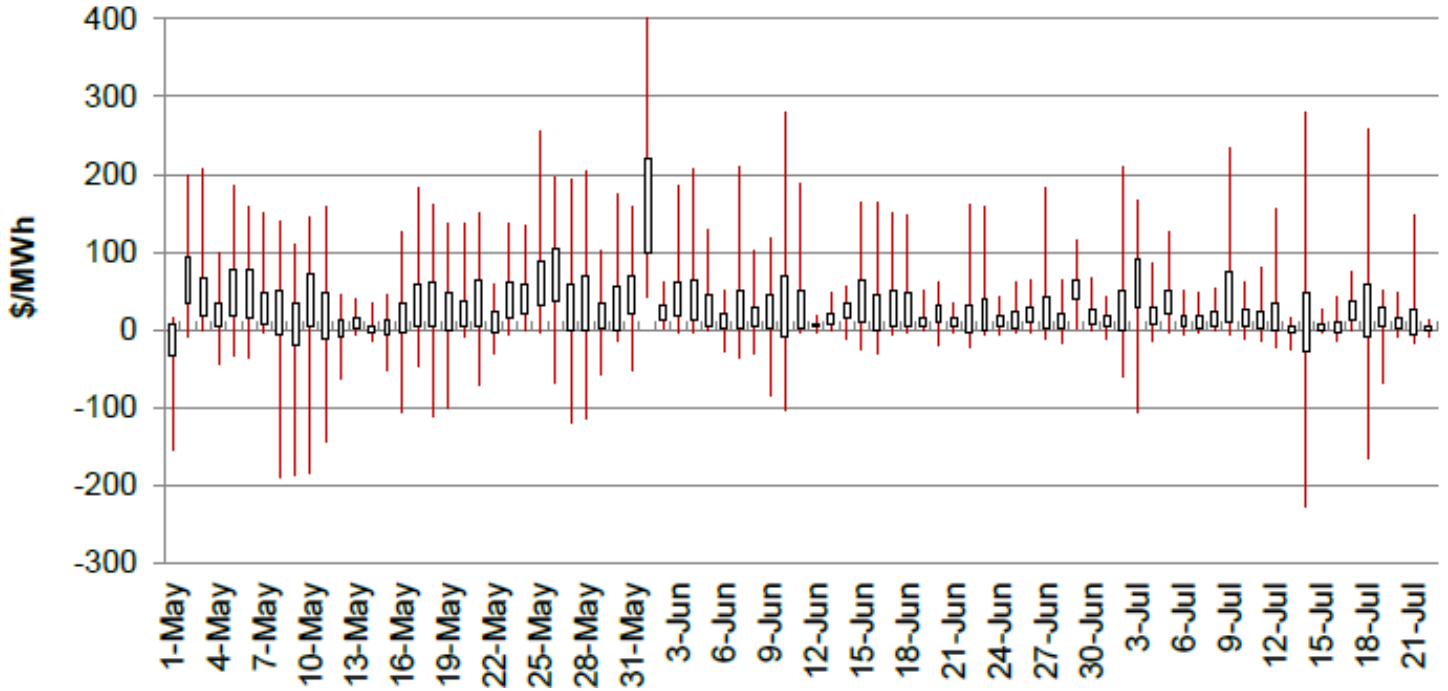
August 22, 2014

TOPICS

- HASP Scheduling and Fifteen Minute Prices
- Fifteen Minute Interchange Scheduling
- Transmission Pricing

HASP SCHEDULING

Over the first few months, the HASP price has not on average provided a very good forecast of the fifteen minute price used to settle interchange transactions at Malin.

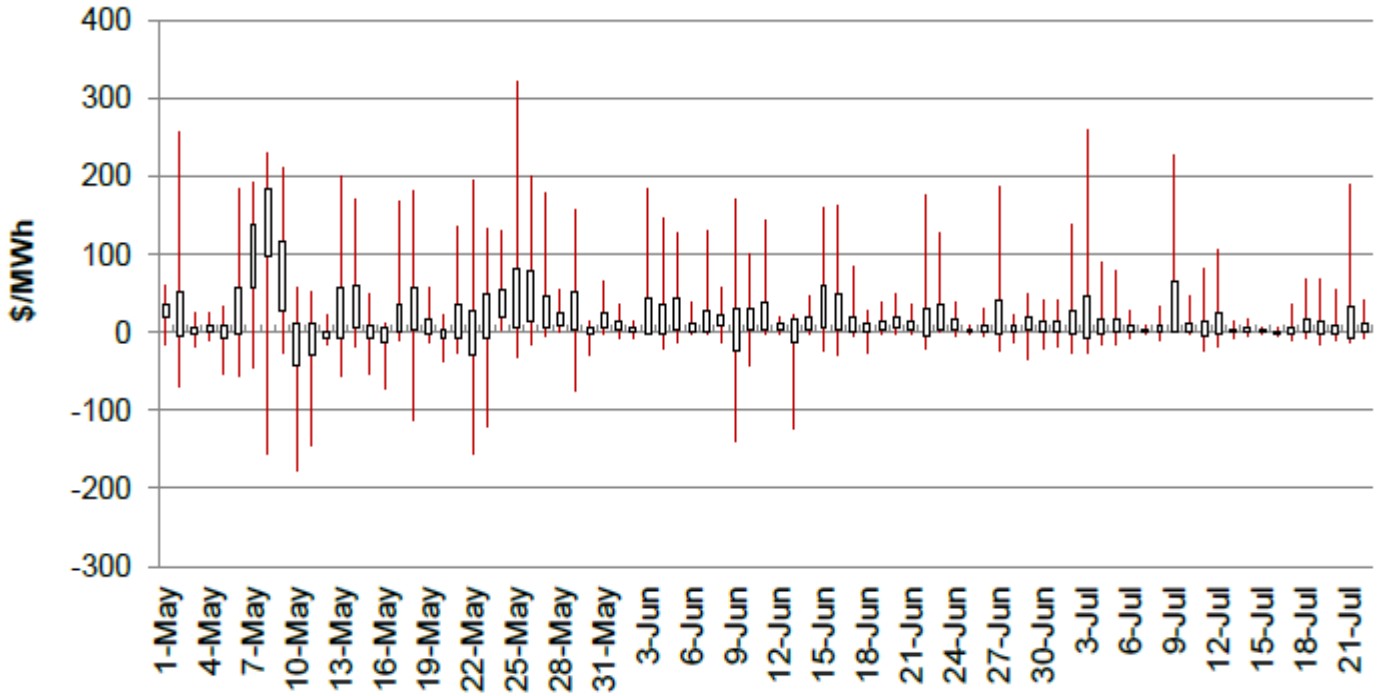


Source: California ISO, Market Performance and Planning Forum, July 29, 2014, p.22.
Bar shows 1 standard deviation band around mean for day. Lines show the full range in outcomes for the day.

FTI CONSULTING

HASP SCHEDULING

HASP has also not provided a very good forecast of the Palo Verde fifteen minute price.



Source: California ISO, Market Performance and Planning Forum, July 29, 2014, p.23.
Bar shows 1 standard deviation band around mean for day. Lines show the full range in outcomes for the day.

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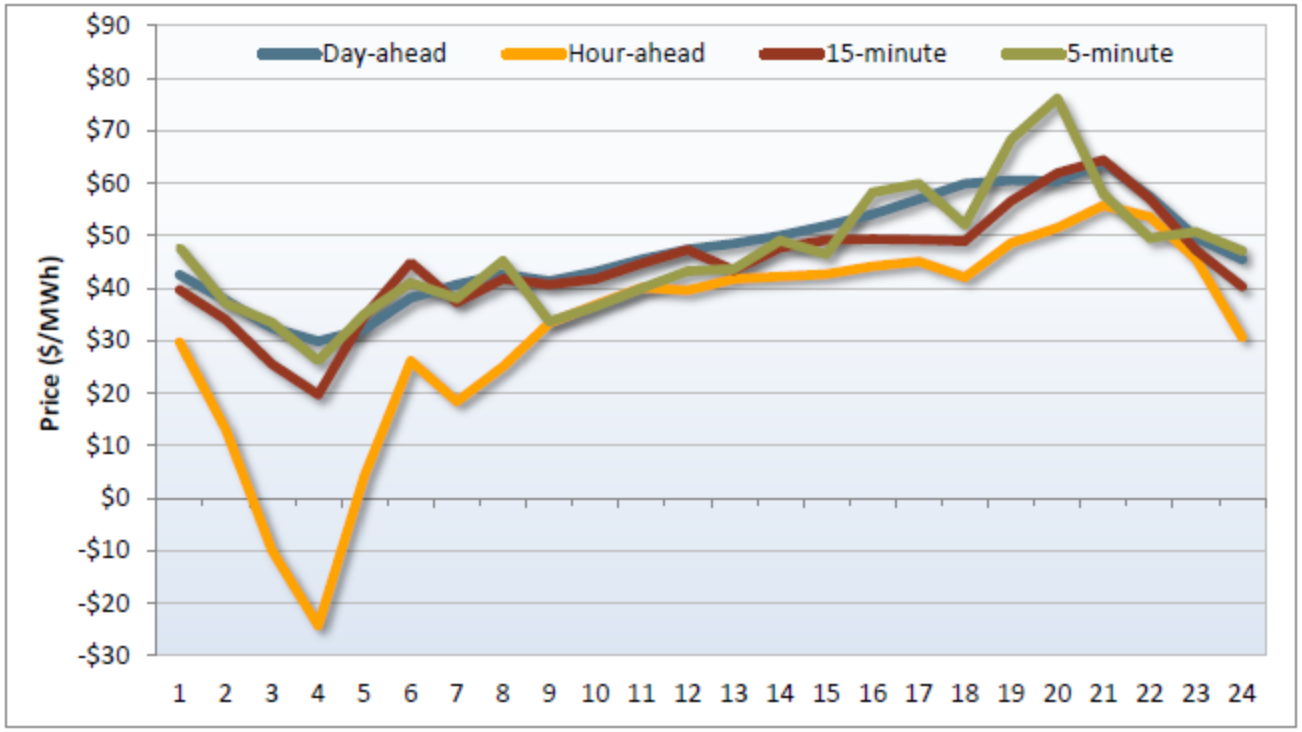
HASP SCHEDULING

Data compiled by the Department of Market Monitoring allows us to look at the pattern of price differences by hour of the day.



Source: California ISO, Department of Market Monitoring, “Q2 2014 Report on Market Issues and Performance,” August 18, 2014 Figure 2.3 p. 22.

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HASP SCHEDULING

The Department of Market Monitoring data shows that the difference between the HASP and 15 minute price has been largest during the night, and those differences appear to have declined in August.

	May	June	July	August 1-17
1	-10.88	-9.02	-2.44	-0.32
2	-18.20	-23.67	-3.91	-4.06
3	-29.96	-41.25	-16.31	-5.04
4	-36.86	-51.43	-25.68	-2.67
5	-26.62	-33.99	-10.05	-1.08
6	-19.96	-17.59	11.23	-2.61
7	-24.30	-13.46	-22.09	-2.82
8	-14.84	-18.56	8.72	-3.52
9	-7.75	-7.03	14.18	-2.55
10	-6.58	-3.17	-1.46	0.46
11	-5.86	-3.28	-4.16	0.68
12	-8.61	-6.83	17.13	-1.51
13	0.27	-3.66	-3.67	-1.50
14	-3.39	-7.78	-1.83	-3.10
15	-4.04	-8.93	-0.33	-1.25
16	-0.11	-10.54	-4.42	-1.54
17	-4.50	-3.83	-11.90	-13.48
18	-11.94	-1.62	-8.54	-0.38
19	-9.61	-6.30	-9.34	-2.00
20	-14.78	-5.85	-8.61	-4.96
21	-11.56	-5.63	-5.61	-5.24
22	-1.31	-5.56	-1.97	1.03
23	-0.47	-3.17	-0.88	-0.71
24	-9.65	-9.76	-0.90	-2.67
averages				
HE 1-24	-11.73	-12.58	-3.87	-2.53
HE 1 to 8	-22.70	-26.12	-7.56	-2.76
HE 9-19	-5.65	-5.72	-1.30	-2.38
HE 20-24	-7.55	-5.99	-3.59	-2.51

Source data provided by California ISO Department of Market Monitoring.

HASP SCHEDULING

The Department of Market Monitoring data also shows that the 15 minute price averaged quite a bit below the RTD price in May, tended to slightly exceed the RTD price in June and July and has averaged fairly close in August. These averages, however, mask large differences in individual hours.

	May		June		July		August 1-17
1	-11.42		-4.68		-0.49		1.63
2	-6.71		0.48		0.26		0.01
3	-15.44		-0.37		-4.98		0.51
4	-11.64		-1.13		3.49		-0.31
5	-1.98		0.94		2.78		-1.33
6	1.86		5.86		1.95		0.96
7	-8.94		7.45		-2.60		-0.26
8	-11.28		4.18		10.58		6.70
9	3.69		10.54		3.69		6.34
10	3.91		6.57		2.91		6.48
11	-0.06		9.50		1.05		3.01
12	0.77		7.38		5.12		-0.37
13	-2.87		2.47		4.25		2.94
14	-8.51		5.89		4.35		4.21
15	-4.05		9.53		2.63		-2.81
16	-23.84		6.35		7.51		-14.74
17	-10.61		-10.52		14.50		0.70
18	-7.93		1.11		5.71		-5.84
19	-29.44		5.92		-3.88		-15.96
20	-25.90		-2.56		-0.17		-19.67
21	7.94		4.85		7.29		5.51
22	7.01		7.97		4.61		2.96
23	-7.42		0.84		2.10		1.43
24	-14.41		0.96		0.56		4.04
averages							
HE 1-24	-7.39		3.31		3.05		-0.58
HE 1 to 8	-8.19		1.59		1.37		0.99
HE 9-19	-7.18		4.98		4.35		-1.46
HE 20-24	-6.56		2.41		2.88		-1.15

Source: Data provided by California ISO Department of Market Monitoring.

HASP SCHEDULING

The Department of Market Monitoring data also shows that the HASP price has tended to move more in line with the RTD price since May, but these averages can mask large differences in individual hours.

	May	June	July	August 1-17
1	-22.30	-13.70	-2.93	1.31
2	-24.91	-23.19	-3.64	-4.05
3	-45.41	-41.62	-21.29	-4.53
4	-48.50	-52.56	-22.19	-2.98
5	-28.60	-33.05	-7.27	-2.41
6	-18.10	-11.73	13.18	-1.65
7	-33.24	-6.01	-24.68	-3.07
8	-26.12	-14.37	19.30	3.18
9	-4.06	3.52	17.87	3.78
10	-2.67	3.40	1.45	6.94
11	-5.92	6.22	-3.11	3.69
12	-7.84	0.55	22.25	-1.87
13	-2.60	-1.18	0.58	1.44
14	-11.90	-1.90	2.52	1.11
15	-8.09	0.61	2.29	-4.06
16	-23.95	-4.19	3.09	-16.29
17	-15.11	-14.34	2.60	-12.78
18	-19.87	-0.51	-2.83	-6.21
19	-39.05	-0.38	-13.22	-17.96
20	-40.67	-8.41	-8.77	-24.63
21	-3.62	-0.78	1.68	0.26
22	5.70	2.41	2.64	3.99
23	-7.89	-2.33	1.22	0.72
24	-24.07	-8.81	-0.33	1.37
averages				
HE 1-24	-19.12	-9.26	-0.82	-3.11
HE 1 to 8	-30.90	-24.53	-6.19	-1.78
HE 9-19	-12.82	-0.75	3.05	-3.84
HE 20-24	-14.11	-3.58	-0.71	-3.66

Source: Data provided by California ISO Department of Market Monitoring.

HASP SCHEDULING

Finally, the Department of Market Monitoring data also shows that the IFM price exceeded the 15 minute price by several dollars on average in May but the difference has declined in subsequent months.

	May	June	July	August 1-17
1	2.71	3.08	1.49	2.85
2	4.19	3.09	3.39	0.81
3	8.81	5.03	7.17	-1.87
4	12.27	7.96	5.01	1.46
5	-4.09	-0.68	-0.86	-0.25
6	-8.68	-4.82	-2.47	-2.64
7	7.43	-0.73	9.81	-0.28
8	1.69	0.16	-6.80	-1.99
9	2.50	-1.22	-0.63	-1.02
10	2.40	0.36	-0.34	-1.59
11	1.97	-0.46	-1.56	2.38
12	3.07	-3.01	-2.68	1.71
13	9.68	0.41	-1.90	-0.08
14	6.71	-2.26	0.13	-1.91
15	8.77	-3.43	-0.35	1.62
16	12.71	-3.63	-2.19	1.61
17	11.07	4.19	-4.43	-7.05
18	12.94	8.89	6.70	10.17
19	5.28	2.54	-1.45	5.27
20	-6.67	3.92	3.49	1.10
21	-3.02	1.97	0.70	-2.81
22	1.33	-0.39	4.15	5.32
23	2.87	1.69	2.82	2.95
24	6.60	3.70	4.83	3.51
averages				
HE 1-24	4.27	1.10	1.00	0.80
HE 1 to 8	3.04	1.64	2.09	-0.24
HE 9-19	7.01	0.22	-0.79	1.01
HE 20-24	0.22	2.18	3.20	2.01

Source: Data provided by California ISO Department of Market Monitoring.

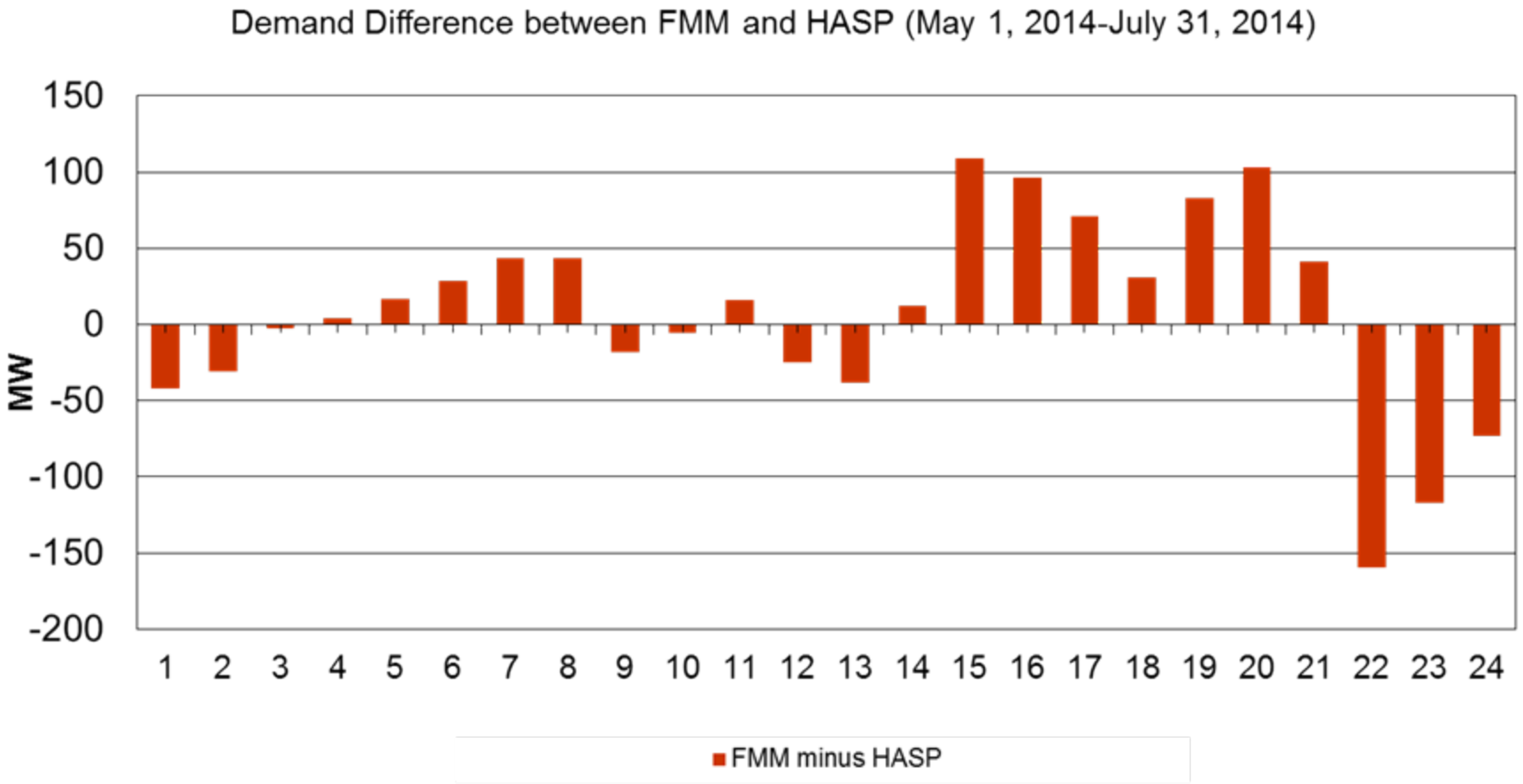
HASP SCHEDULING

Other questions to ask in analyzing HASP and RTPD price differences:

- What is the distribution of the price differences, is the higher average price in RTPD driven by a few outliers or is the median price higher as well?
- To what extent are the price differences driven by misforecasting prices in the 3rd and 4th quarters of the hour in HASP?
- Are the price differences related to differences in congestion between HASP and subsequent RTPD runs?

HASP SCHEDULING

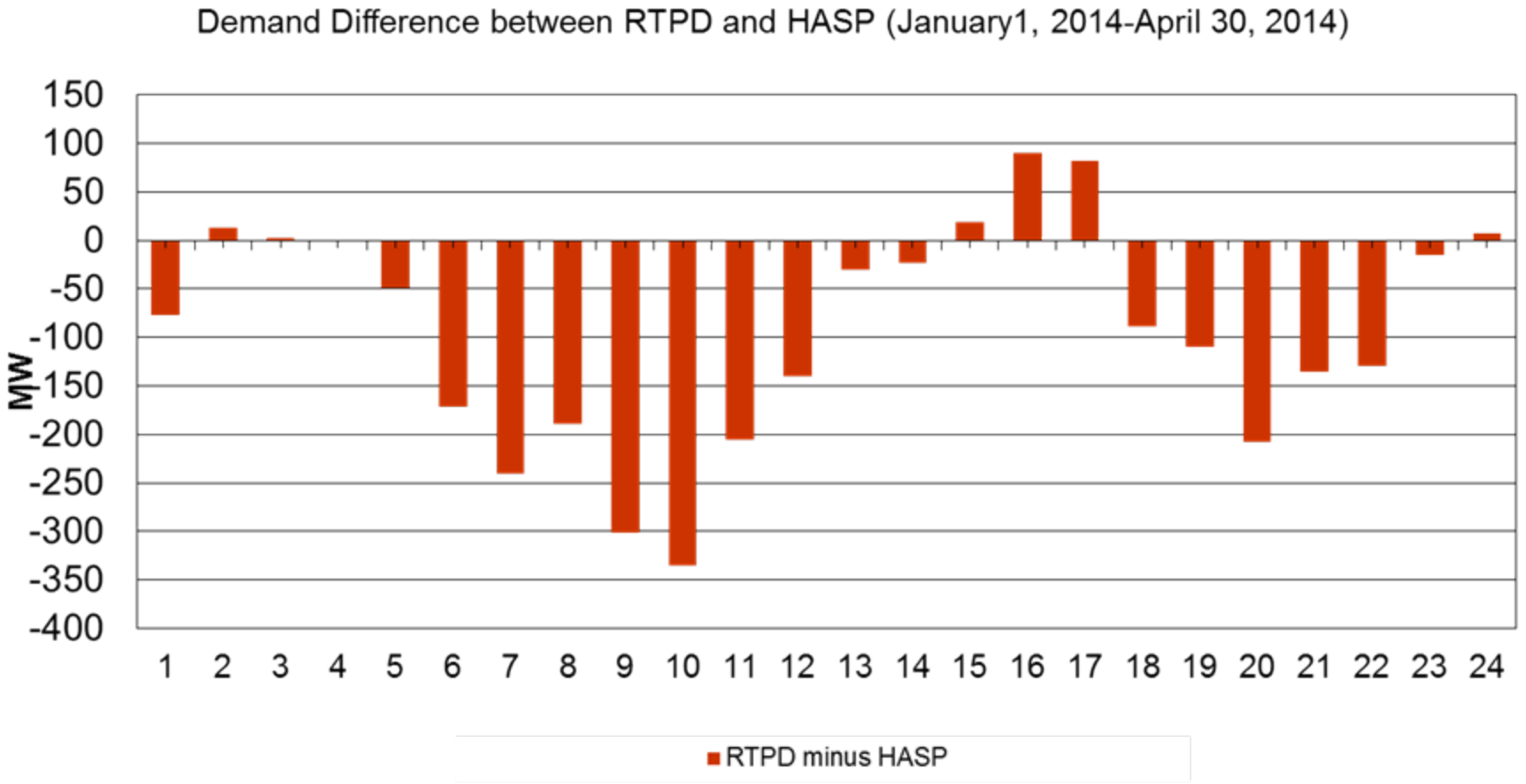
While there are some differences in load forecast between the HASP and subsequent RTPD runs, these differences do not appear to be obviously related to the price differences.



Source: Data provided by California ISO.

HASP SCHEDULING

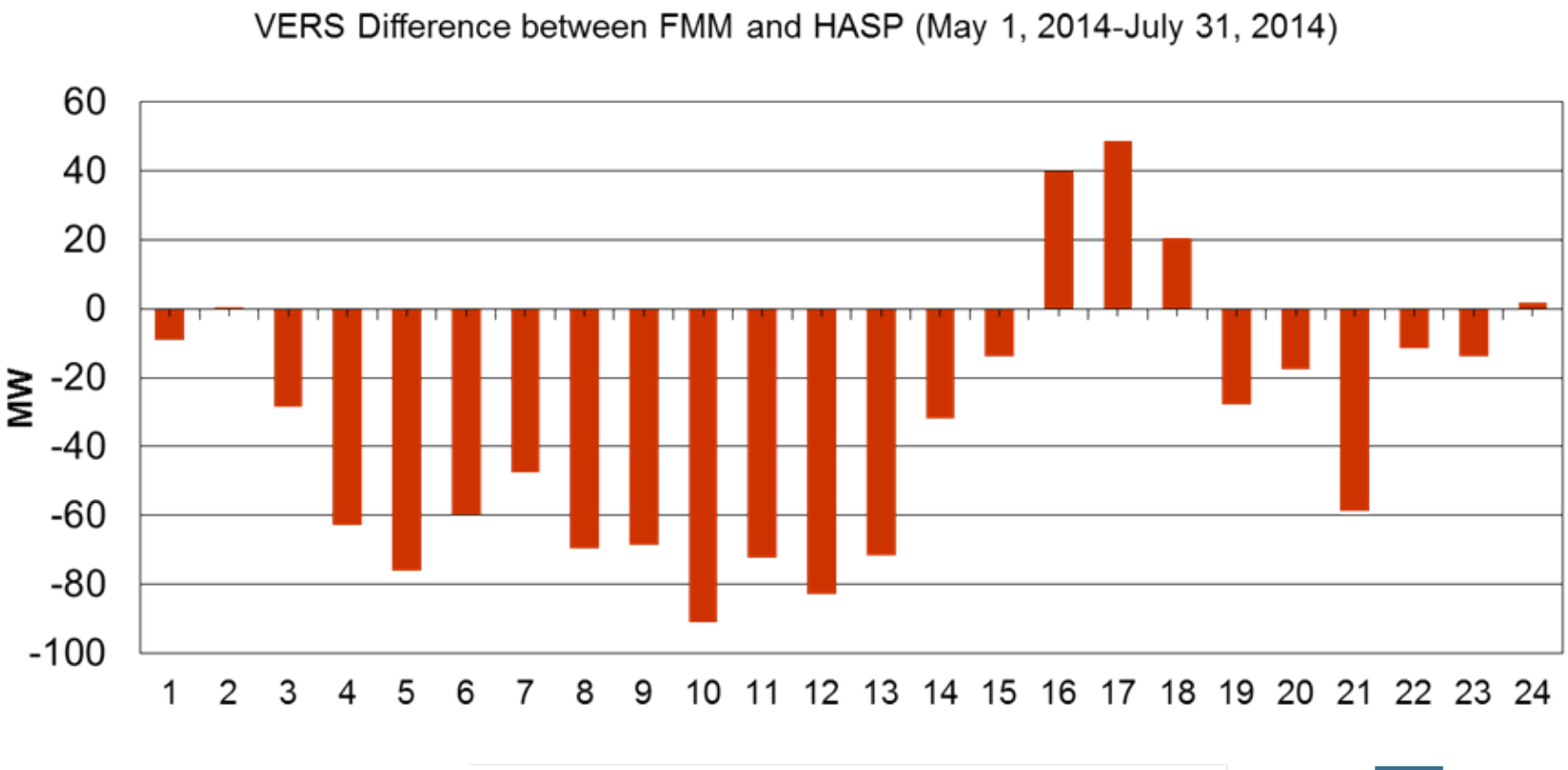
The load forecast differences also appear to be much smaller than in prior months.



Source: Data provided by California ISO.

HASP SCHEDULING

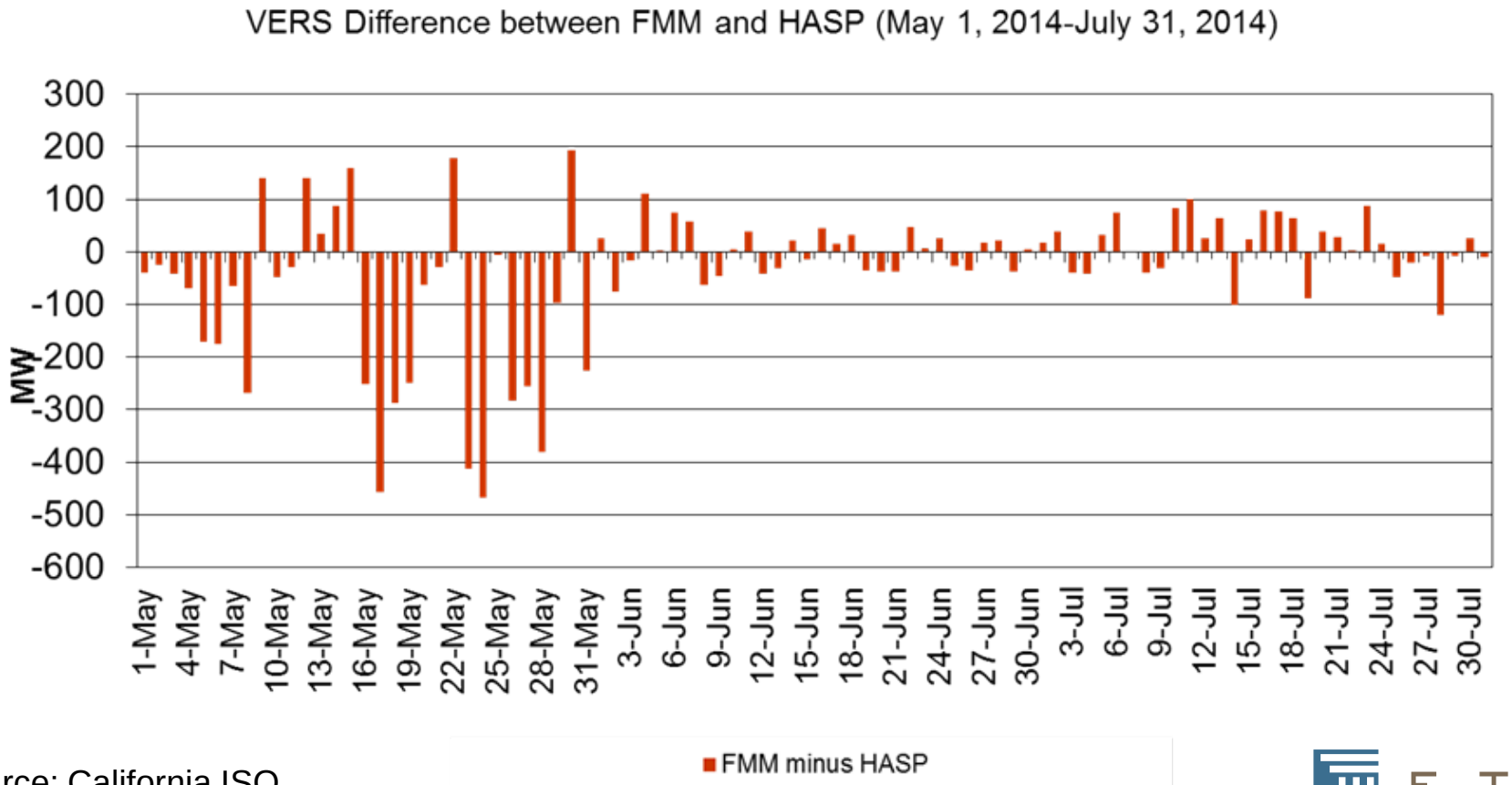
Are the price differences related to differences in net load forecasts between HASP and subsequent RTPD runs? There appear to have been large errors in forecasting intermittent output in HASP in many of the hours with large price divergences.



Source: California ISO

HASP SCHEDULING

Aggregate daily data suggests that these forecast errors for intermittent resource output appear to be getting better over time, but it is necessary to look at the patterns at the hourly level to fully assess progress.



Source: California ISO

HASP SCHEDULING

More questions:

- Are the price differences related to operator actions taken between HASP and subsequent RTPD runs?
- Are there big differences in flexiramp shadow prices between HASP and subsequent RTPD runs, either in general or in particular intervals of the HASP run?

HASP SCHEDULING

NYISO and PJM have made data public on their forward price projections discussions with their stakeholders relating to coordinated transaction scheduling. The PJM data for February through December 2013 shows the dispersion of predicted prices relative to the real-time price.

ITSCED_INTERVAL	CATEGORY	Winter	Spring	Summer	Fall
1	> $0 and <= $5	64.80%	66.08%	68.92%	75.65%
	> $5 and <= $10	10.03%	14.40%	12.07%	10.28%
	> $10 and <= $15	4.77%	5.91%	5.30%	4.14%
	> $15 and <= $20	2.81%	2.97%	3.08%	2.31%
	> $20	17.59%	10.63%	10.62%	7.63%
ITSCED_INTERVAL	CATEGORY	Winter	Spring	Summer	Fall
2	> $0 and <= $5	62.57%	65.25%	69.00%	75.54%
	> $5 and <= $10	10.90%	15.35%	11.88%	10.75%
	> $10 and <= $15	4.78%	6.18%	5.33%	4.08%
	> $15 and <= $20	3.44%	3.19%	3.01%	2.33%
	> $20	18.31%	10.03%	10.78%	7.31%
ITSCED_INTERVAL	CATEGORY	Winter	Spring	Summer	Fall
3	> $0 and <= $5	54.94%	59.54%	64.39%	71.79%
	> $5 and <= $10	11.84%	17.05%	13.70%	12.23%
	> $10 and <= $15	5.99%	7.26%	6.36%	4.53%
	> $15 and <= $20	3.73%	3.69%	3.57%	2.73%
	> $20	23.50%	12.46%	11.99%	8.72%
ITSCED_INTERVAL	CATEGORY	Winter	Spring	Summer	Fall
4	> $0 and <= $5	49.66%	53.61%	57.19%	67.57%
	> $5 and <= $10	12.71%	18.86%	15.34%	13.30%
	> $10 and <= $15	6.62%	8.24%	7.55%	5.21%
	> $15 and <= $20	4.41%	4.45%	4.25%	3.37%
	> $20	26.60%	14.85%	15.68%	10.54%

Source: Rebecca Carroll, PJM, "IT SCED Pricing Transparency and Accuracy," Market Implementation Committee, March 5, 2014, p. 6.

HASP SCHEDULING

PJM data for January and February 2013 show the dispersion of predicted prices relative to the real-time price.

IT SCED Interval	Mean	Median	Standard Deviation
1	6.38057	0.53167	55.4997
2	6.96919	0.48667	59.0518
3	2.72133	0.15667	72.4996
4	-0.22039	0.01667	78.9419

The 2nd Interval is the solution data that will be used in the CTS process

	% Occurrence by Interval			
$ Difference	1	2	3	4
>20	15	16	16	17
10 to 20	4	5	4	4
5 to 10	6	5	5	6
-5 to 5	56	54	47	42
-10 to -5	4	5	6	5
-20 to -10	4	4	5	6
< -20	11	11	17	20

Source: PJM and New York ISO, “Coordinated Transaction Scheduling (CTS) between NYISO and PJM,” June 25, 2013 p. 92.

HASP SCHEDULING

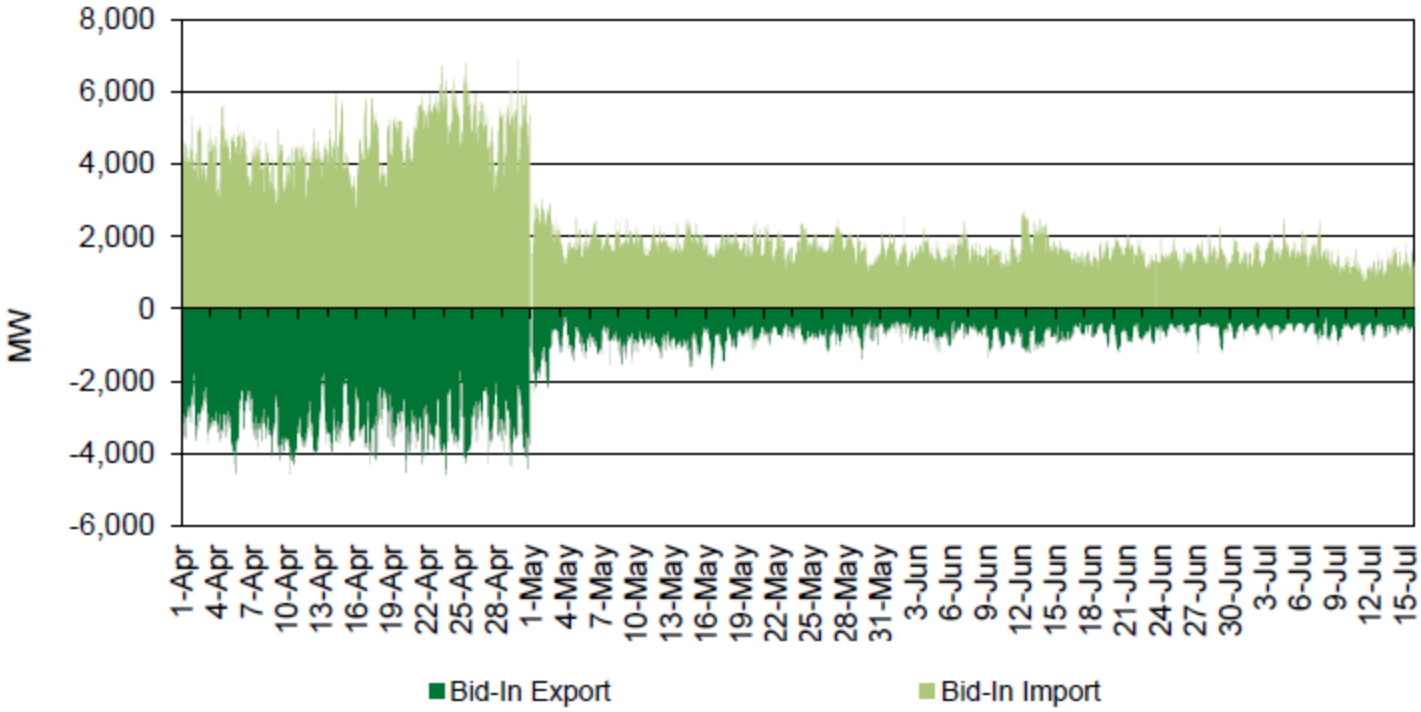
NYISO data for January through December 2013 shows a similar dispersion of RTC prices relative to the real-time price.

$ Difference	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
>20	6%	4%	2%	2%	2%	2%	5%	2%	2%	2%	6%	4%
10 to 20	5%	6%	5%	5%	3%	3%	4%	2%	3%	4%	5%	5%
5 to 10	6%	8%	8%	7%	7%	6%	6%	8%	7%	8%	6%	7%
-5 to 5	61%	65%	71%	68%	73%	72%	69%	73%	72%	67%	61%	69%
-10 to -5	6%	8%	7%	8%	6%	7%	7%	7%	5%	7%	8%	7%
-20 to -10	6%	5%	4%	7%	5%	6%	4%	4%	5%	5%	6%	4%
<-20	9%	5%	3%	4%	4%	4%	6%	4%	6%	7%	7%	4%

Source: Rebecca Carroll, PJM, “IT SCED Pricing Transparency and Accuracy,” Market Implementation Committee, March 5, 2014, p. 7.

FIFTEEN MINUTE SCHEDULING

There has been a marked drop in economic offers on the interties in HASP since May 1.



Source: California ISO, Market Performance and Planning Forum, July 29, 2014, p.10.

FIFTEEN MINUTE SCHEDULING

Questions

- What is the pattern of economic offers in HASP on ties which allow 15 minute scheduling compared to those which do not?
- How has the total volume of real-time imports changed since April relative to this time of year in prior years?
- What changes have there been in the proportion of IFM transactions that flow in real-time with the change in interchange pricing?
- Are there any clawback issues for transactions that have scheduled transmission so they can be dispatched?
- How are CRR clawback rules being applied to interchange schedule changes that are profitable at HASP prices but unprofitable if evaluated at 15 minute prices.

TRANSMISSION PRICING

PJM and New York ISO have 15 minute interchange scheduling and collect hourly transmission charges on a megawatt hour, not megawatt basis.

- PJM's Schedule 8 sets monthly, weekly and daily transmission charges on a megawatt basis, but hourly charges are on a megawatt hour basis.
- All NYISO tranmission charges are on a megawatt hour basis.
- Do western balancing authority areas with 15 minute scheduling charge for transmission on a megawatt or megawatt hour basis?
- What has been the change in economic offers on ties with balancing authority areas that allow 15 minute scheduling and charge for transmission on a megawatt hour basis?

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