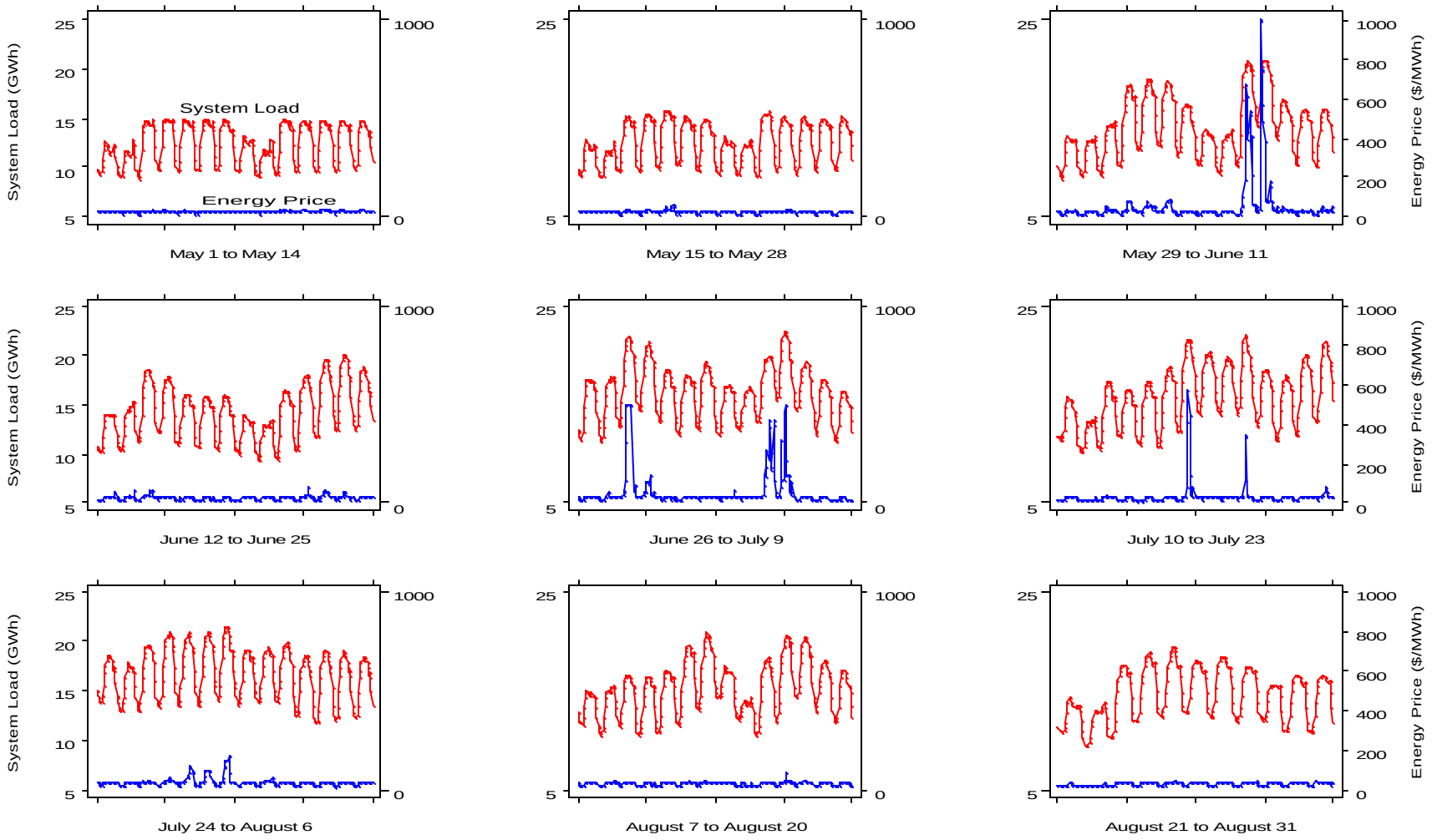
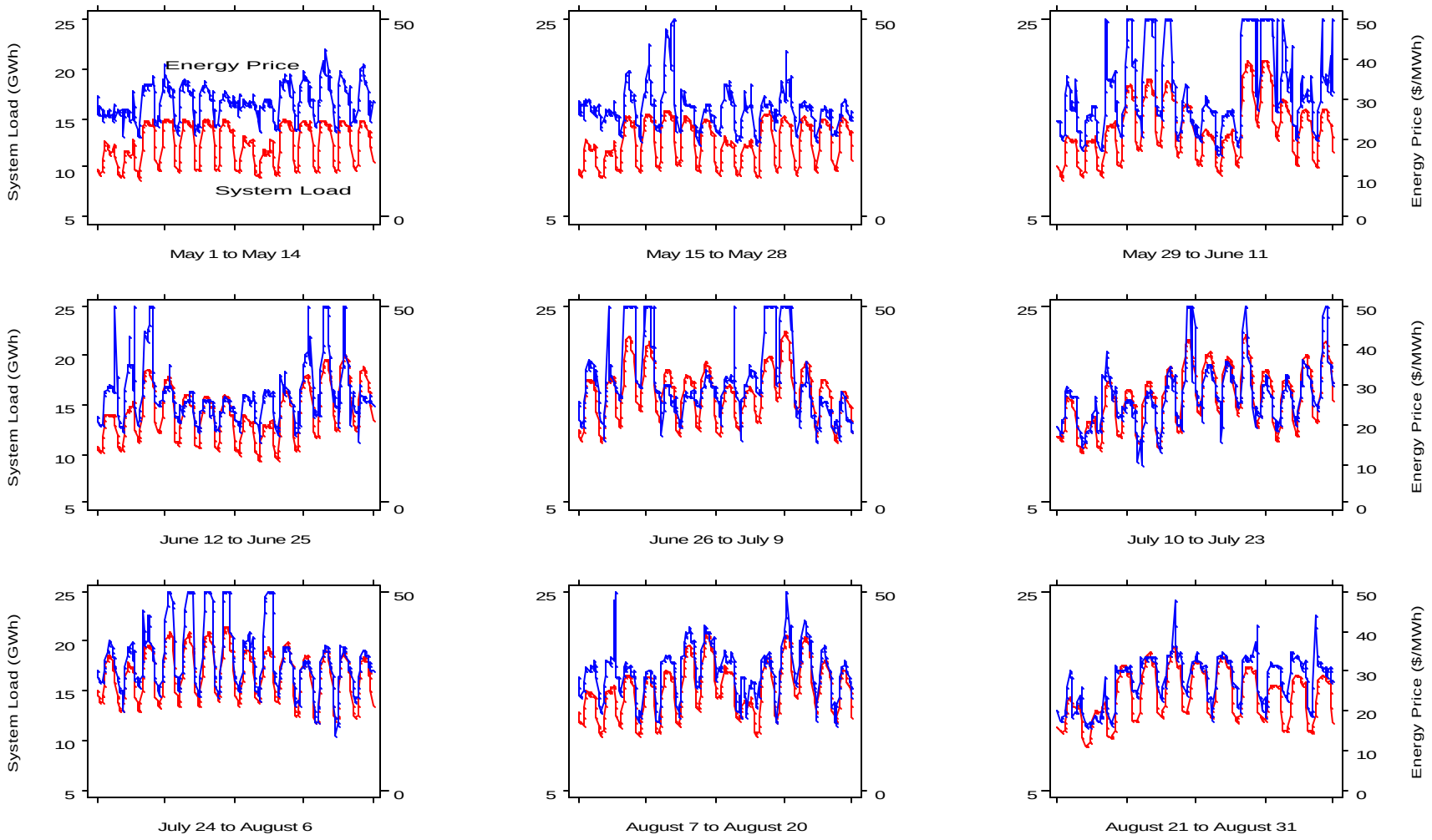
Figure 1



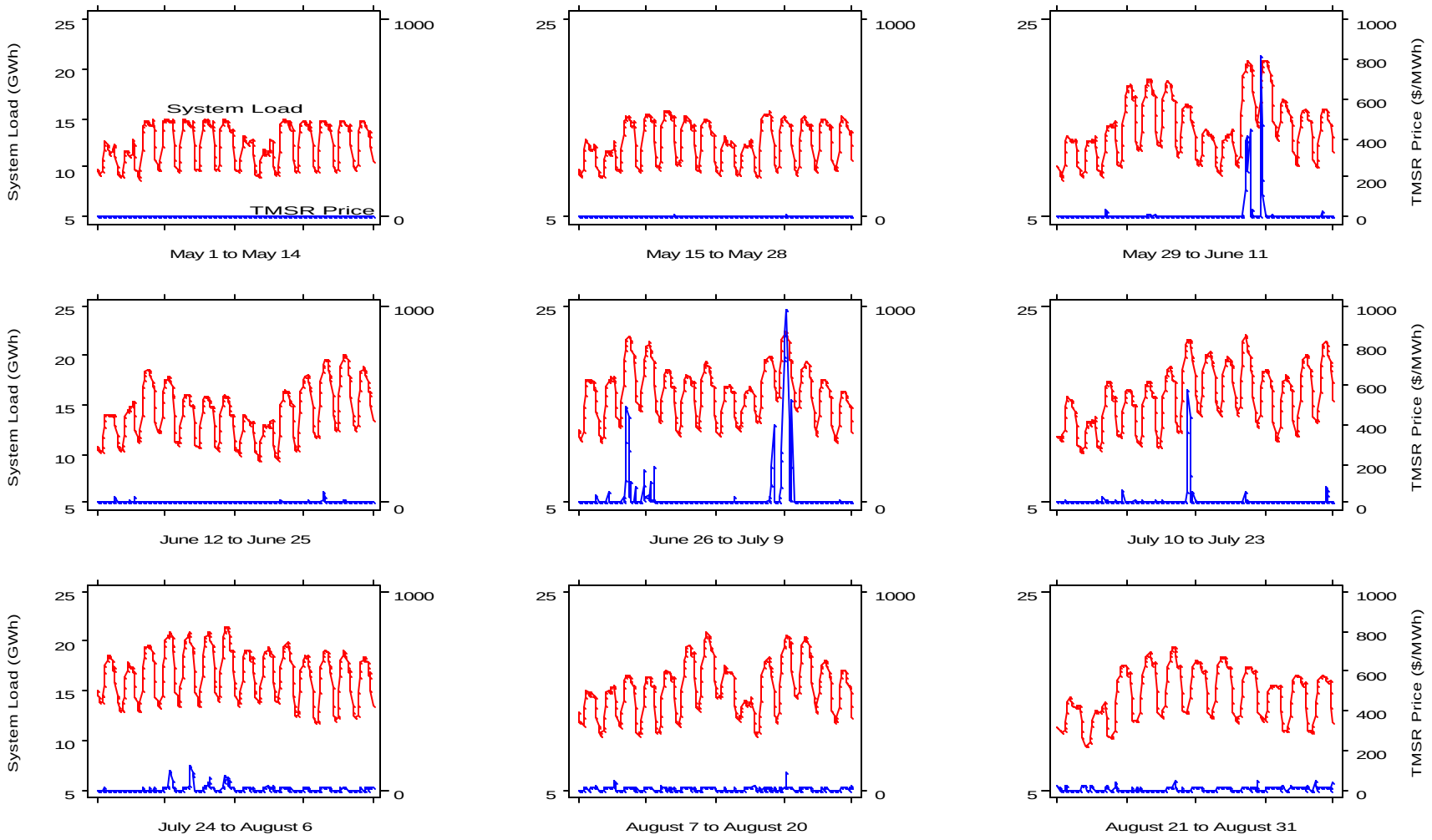
Energy Clearing Price and System Load: May to August

Figure 2



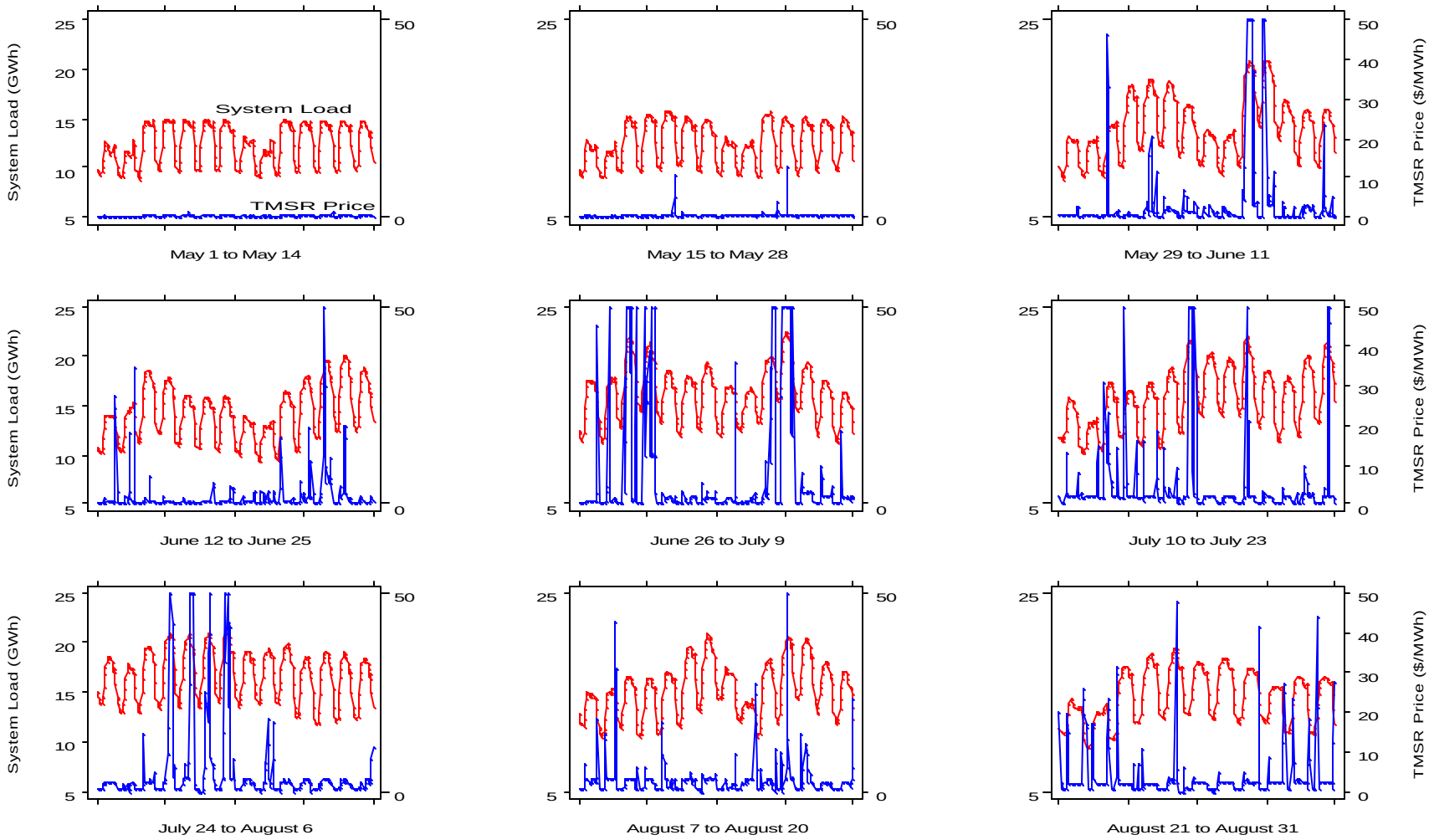
Energy Clearing Price and System Load: May to August

Figure 3



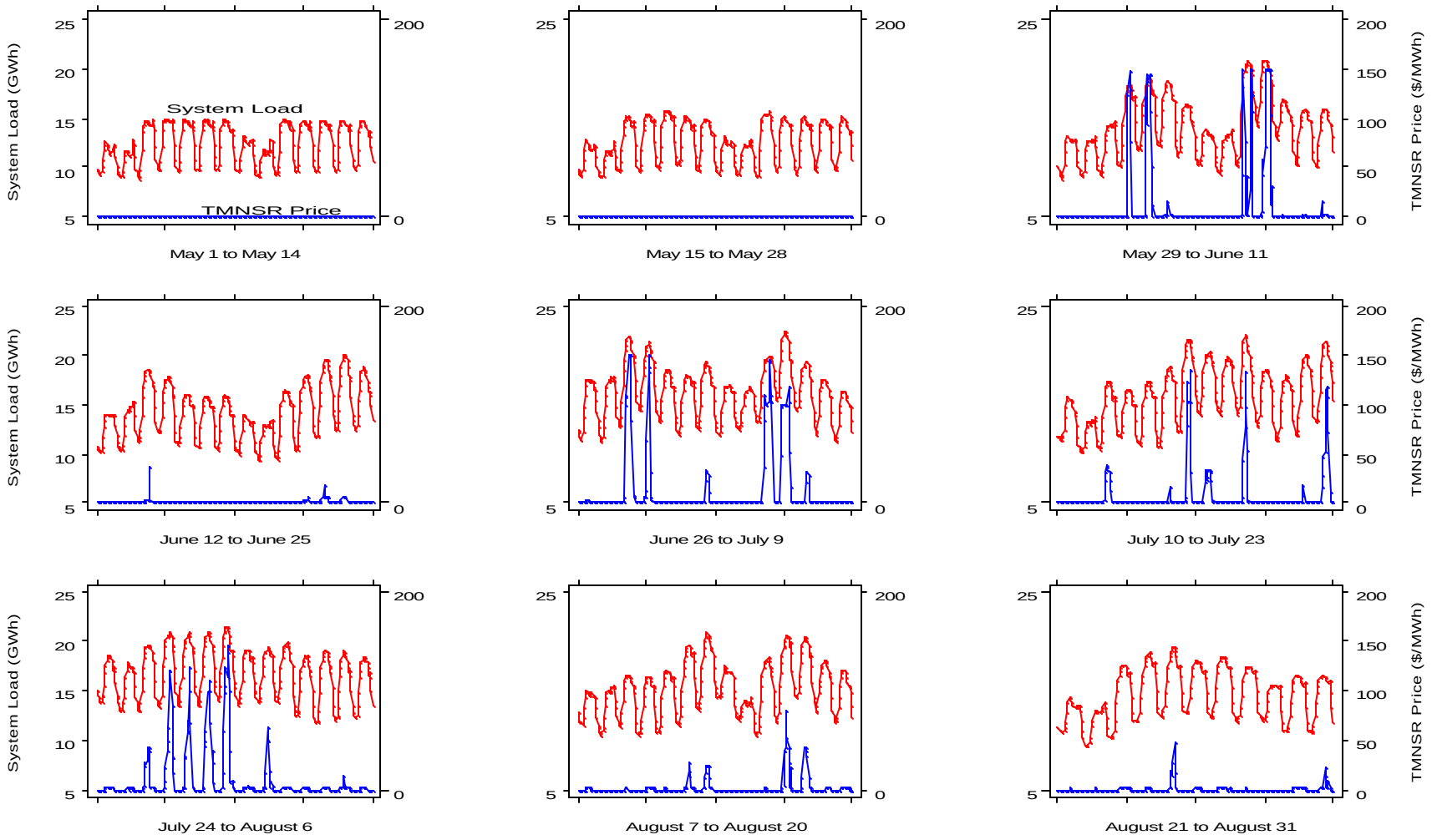
TMSR Clearing Price and System Load: May to August

Figure 4



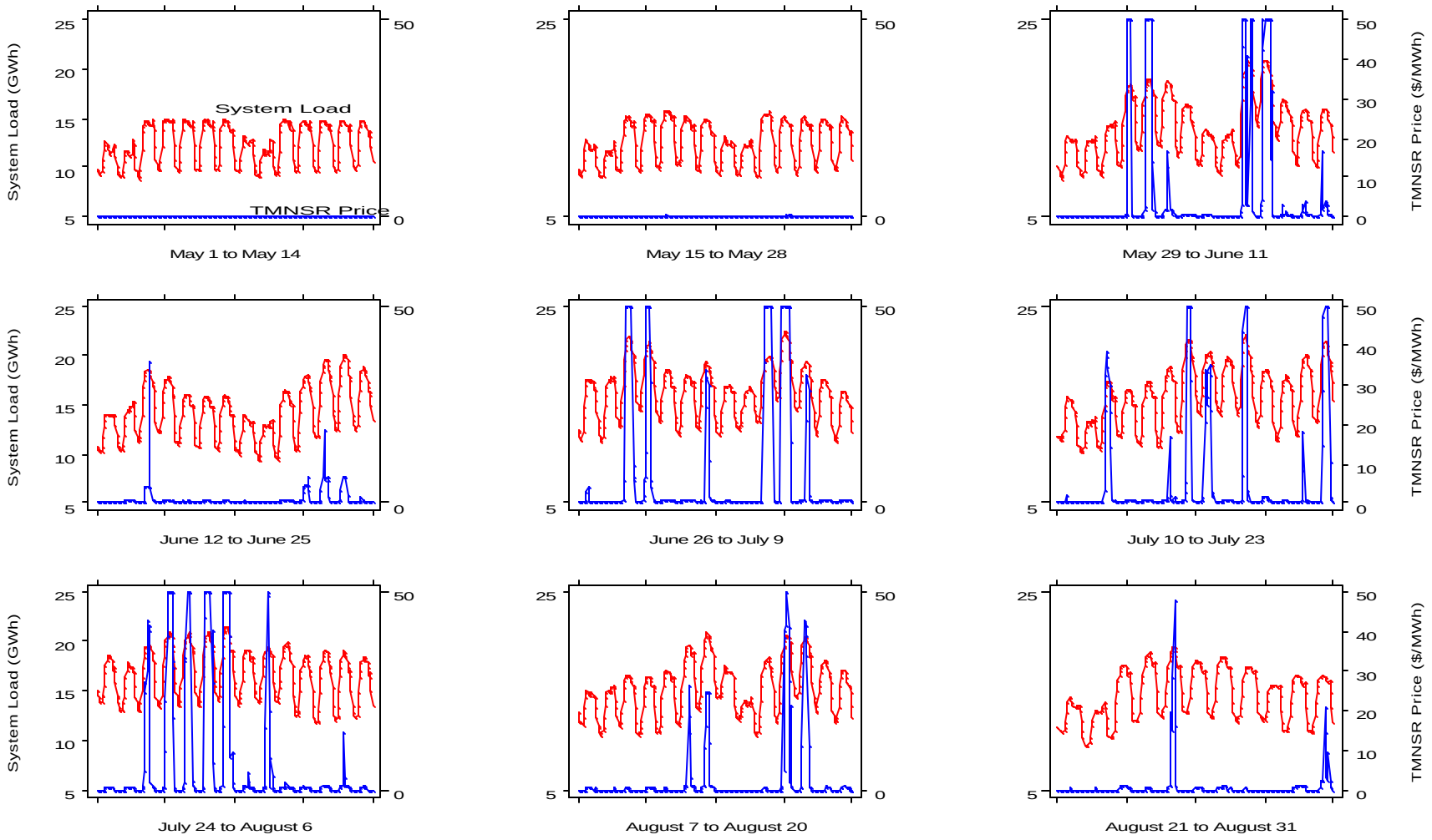
TMSR Clearing Price and System Load: May to August

Figure 5



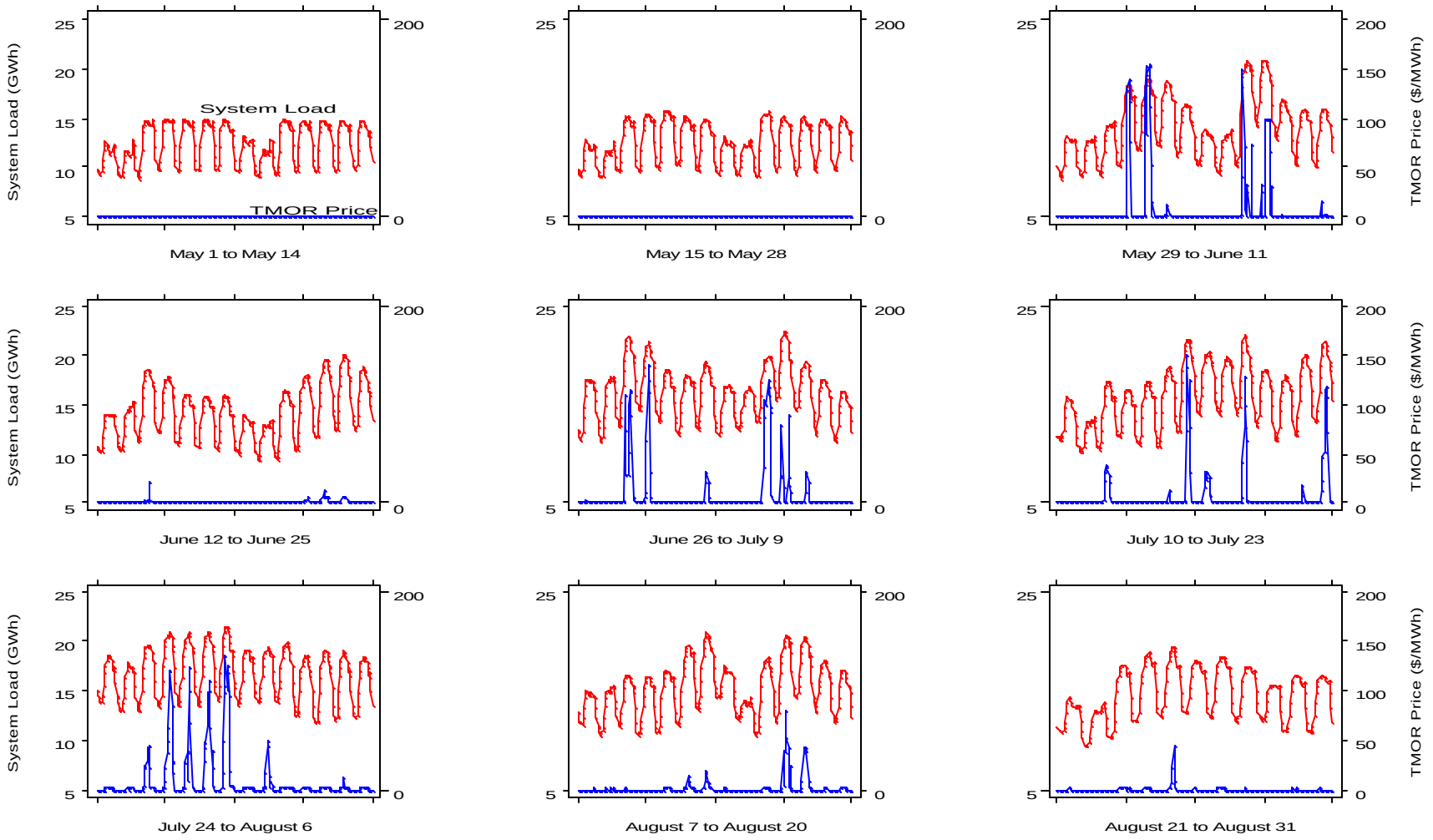
TMNSR Clearing Price and System Load: May to August

Figure 6



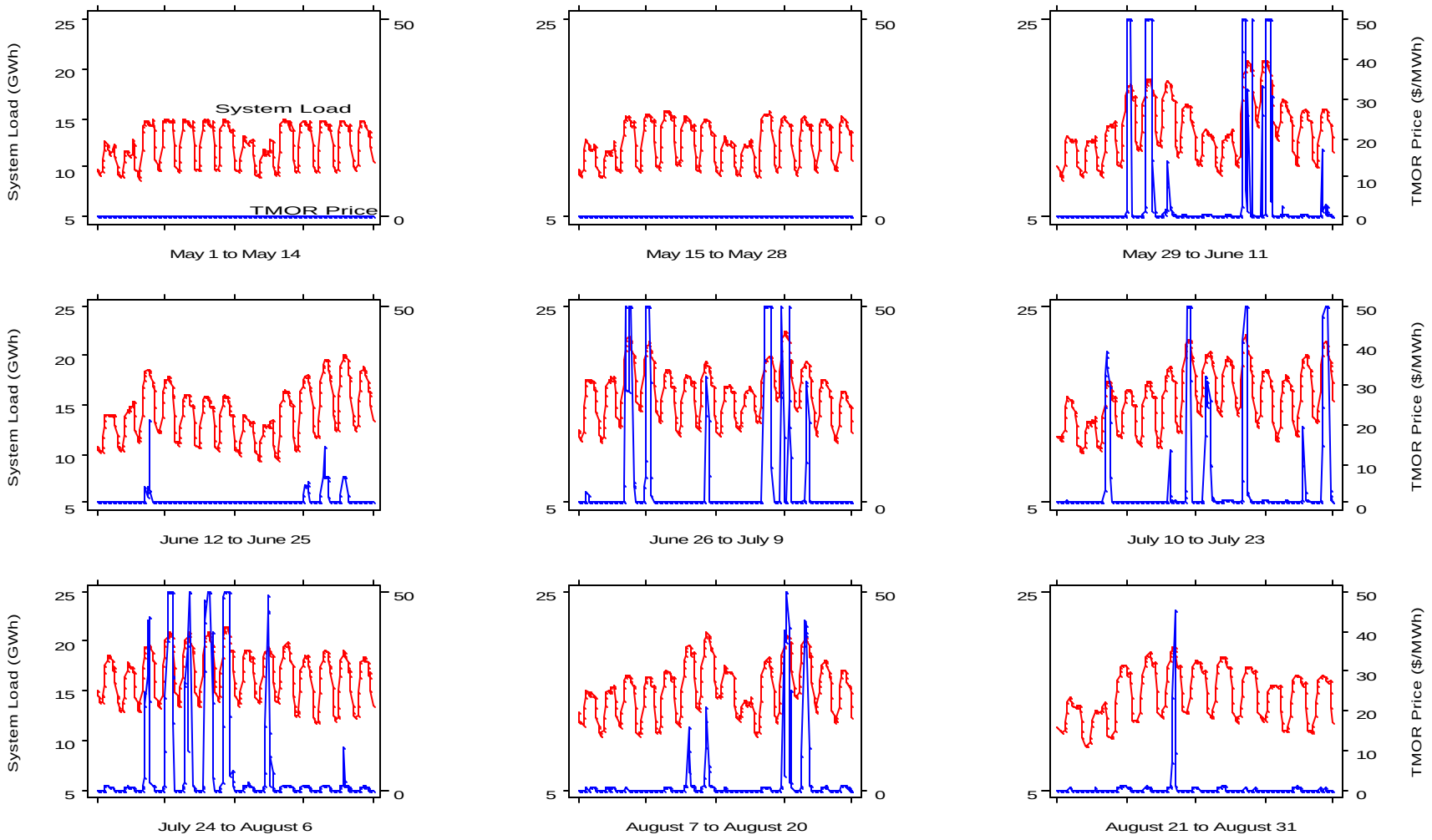
TMNSR Clearing Price and System Load: May to August

Figure 7



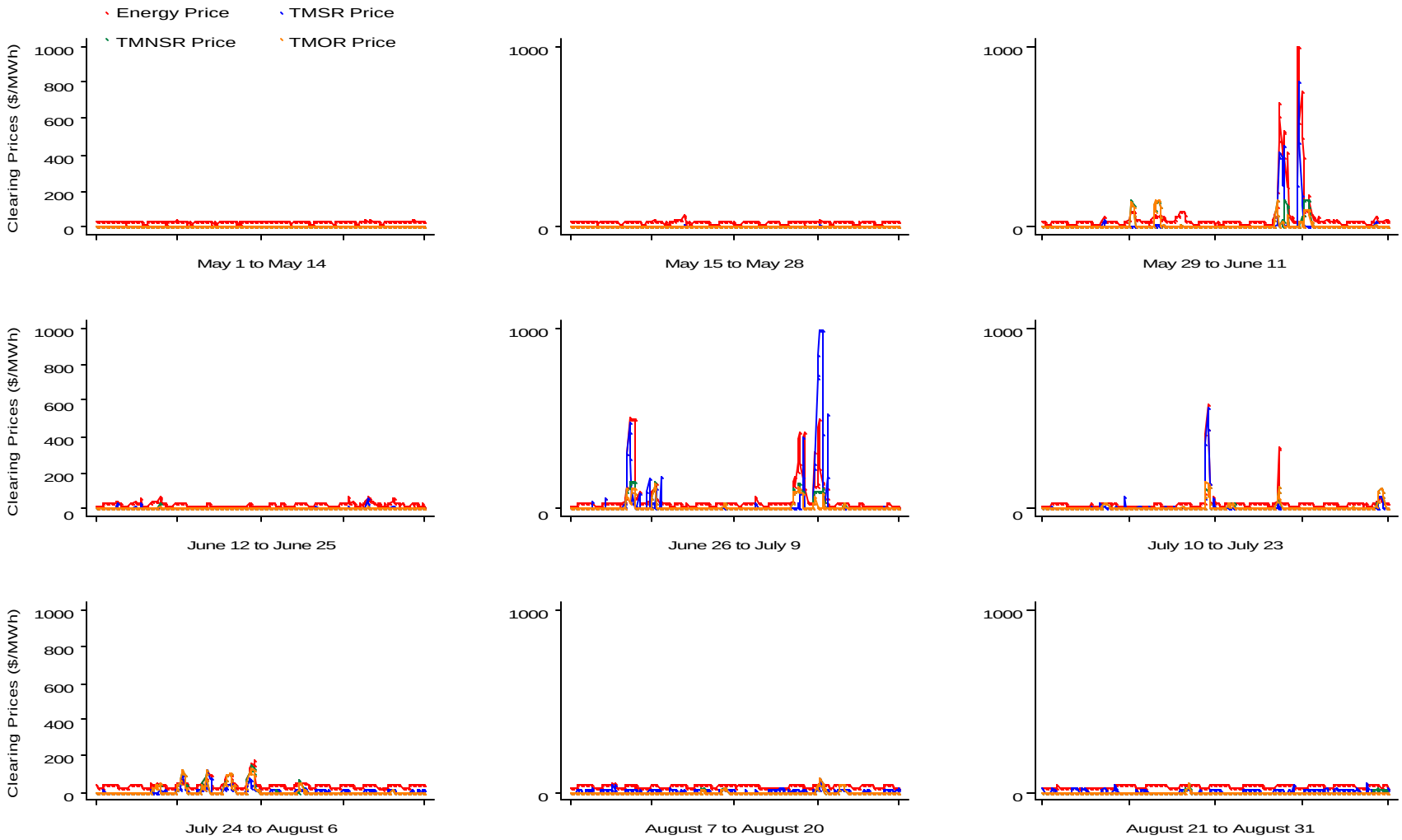
TMOR Clearing Price and System Load: May to August

Figure 8



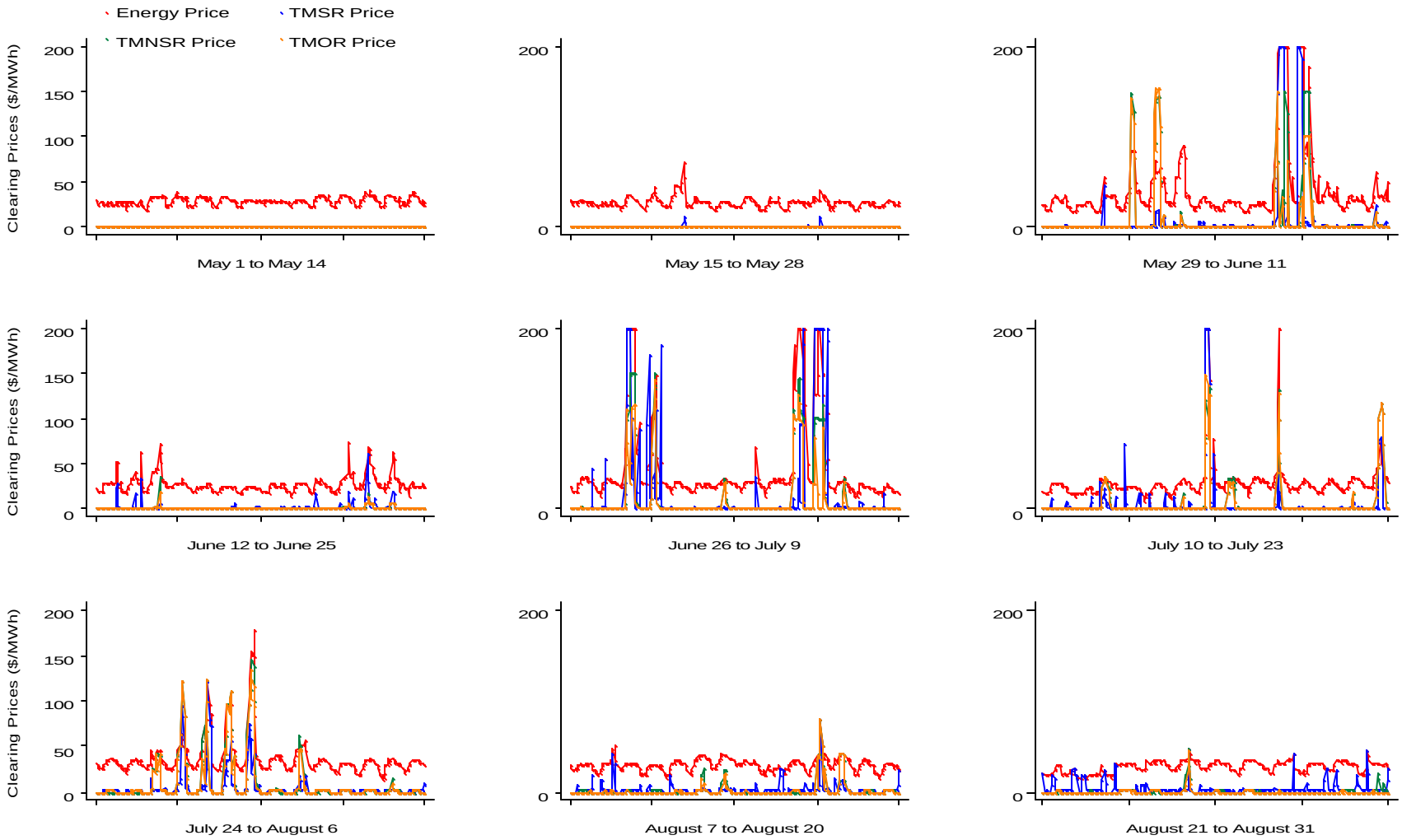
TMOR Clearing Price and System Load: May to August

Figure 9



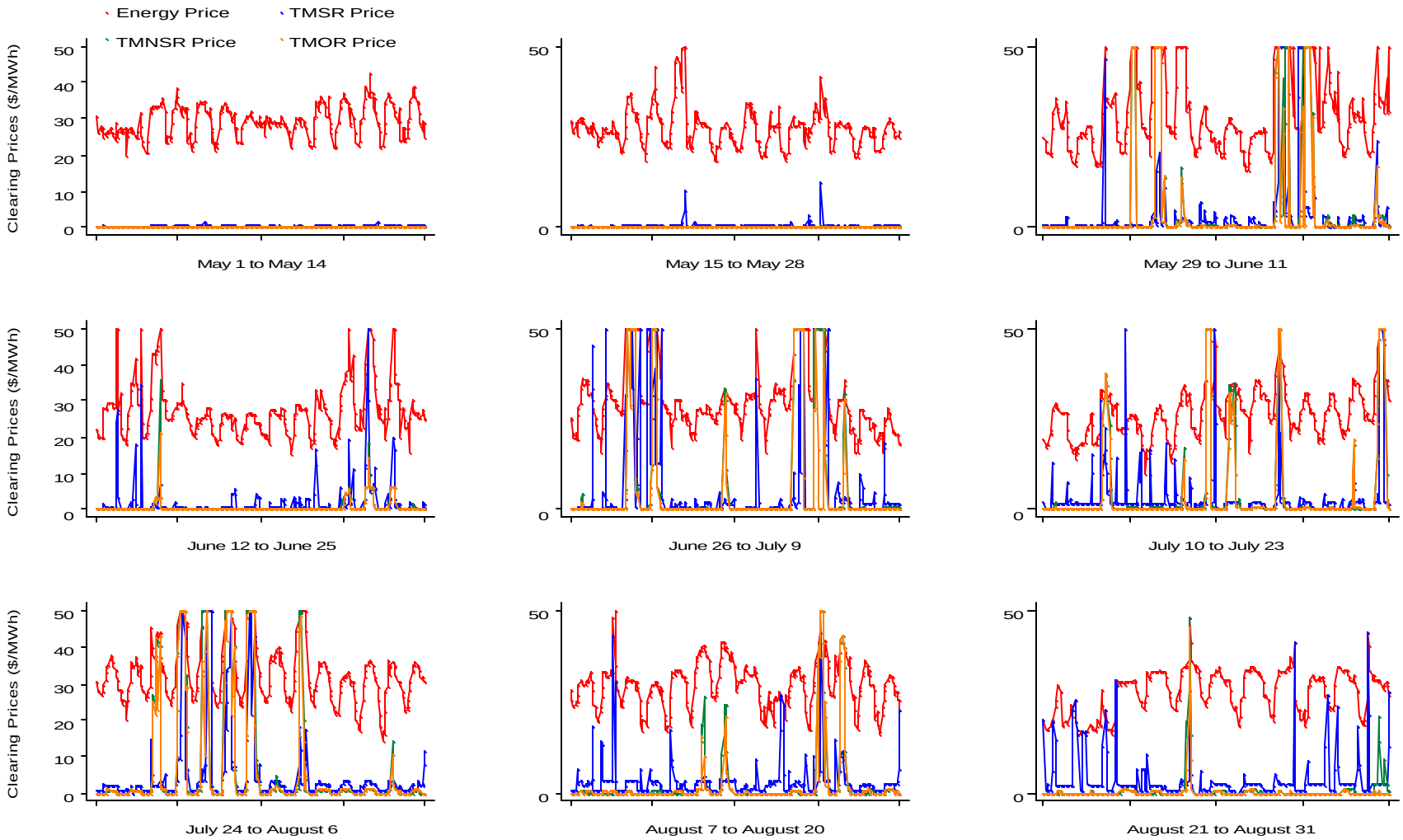
Clearing Prices: May to August

Figure 10



Clearing Prices: May to August

Figure 11



Clearing Prices: May to August

Figure 12

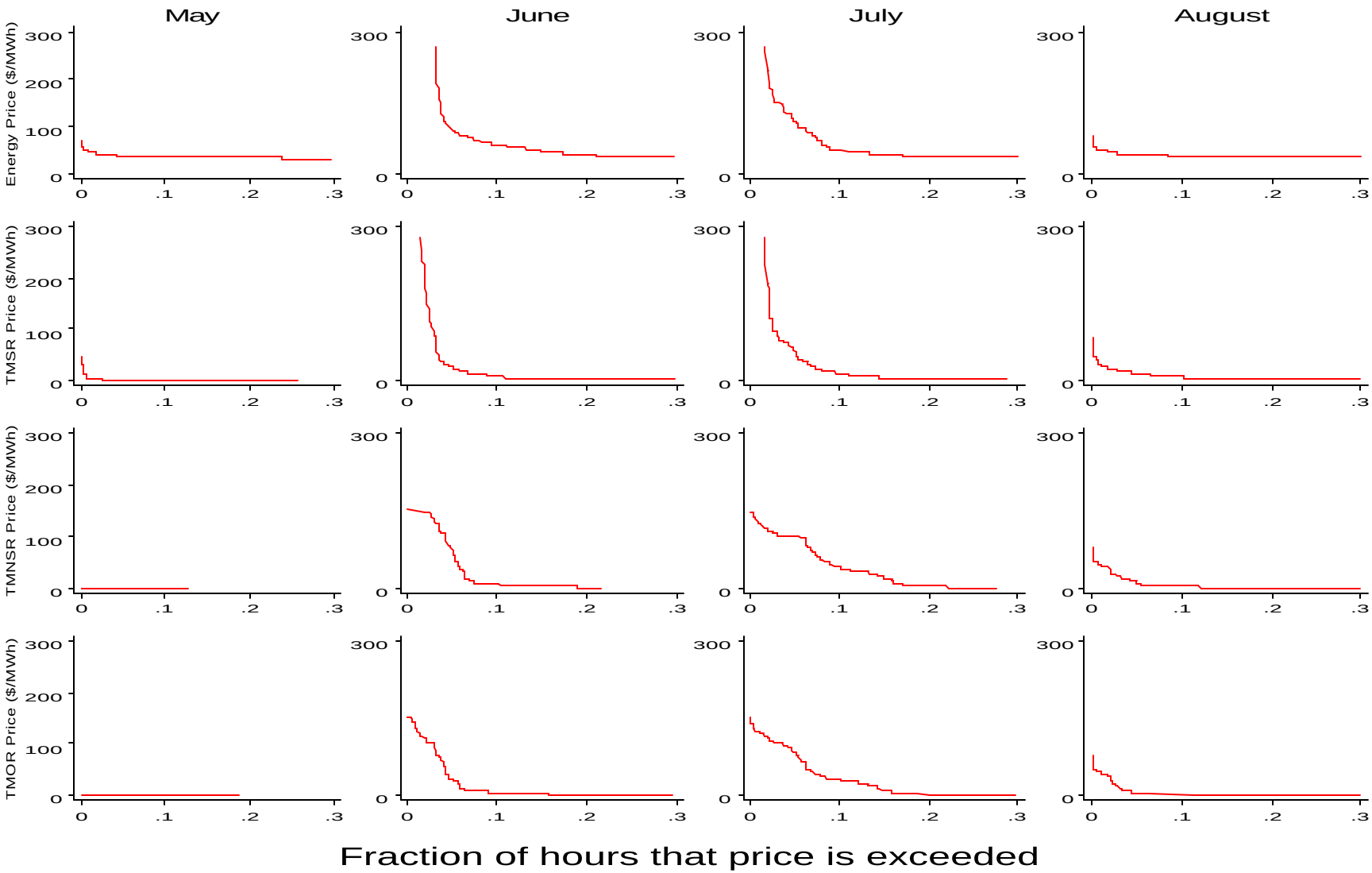

May
June
July
August
Energy Price ($/MWh)
TMSR Price ($/MWh)
TMNSR Price ($/MWh)
TMOR Price ($/MWh)
0
100
200
300
0
.1
.2
.3
Fraction of hours that price is exceeded

Figure 13

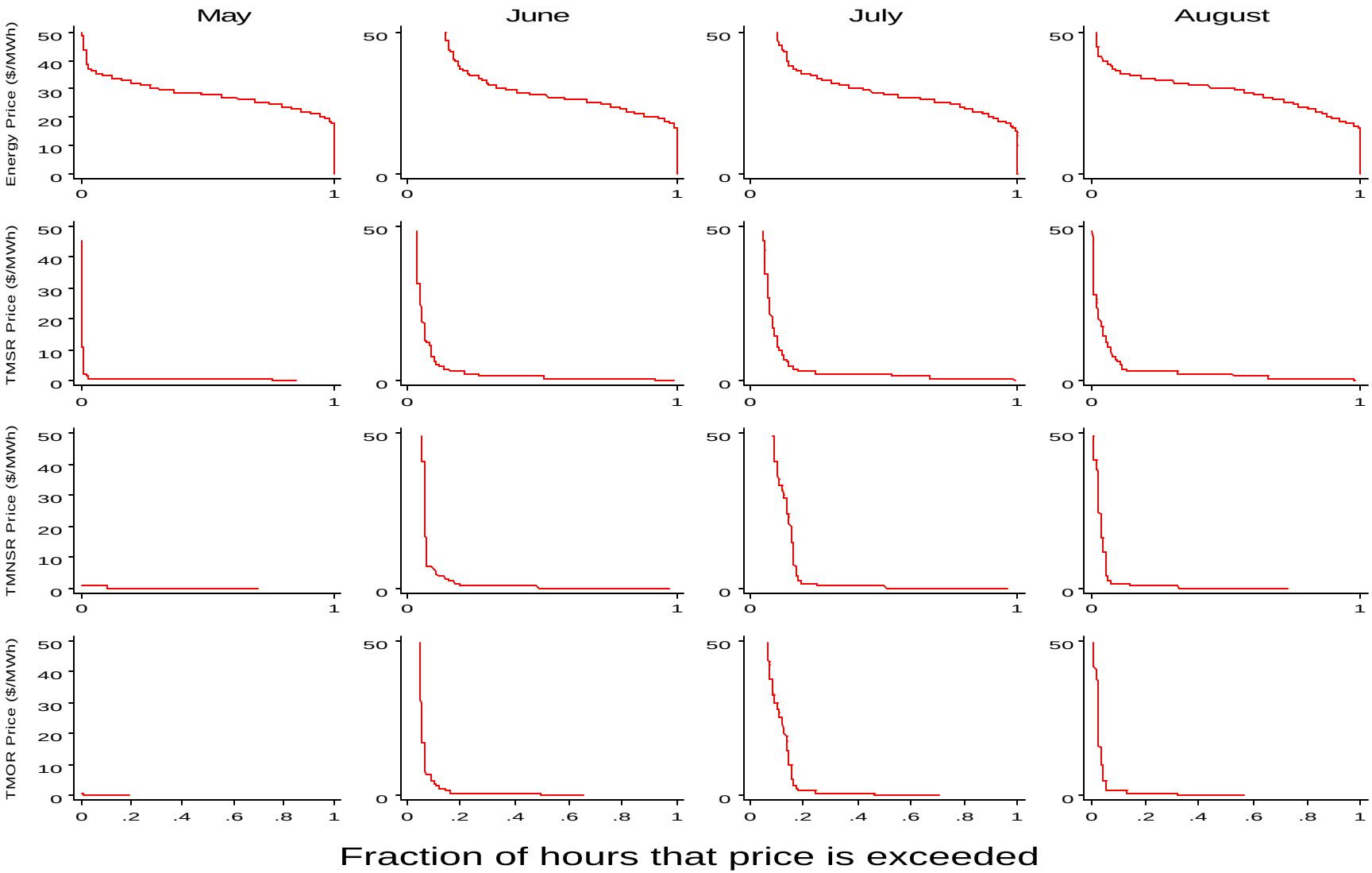

May
June
July
August
Energy Price ($/MWh)
TMSR Price ($/MWh)
TMNSR Price ($/MWh)
TMOR Price ($/MWh)
0
10
20
30
40
50
0
.2
.4
.6
.8
1
Fraction of hours that price is exceeded

Figure 14

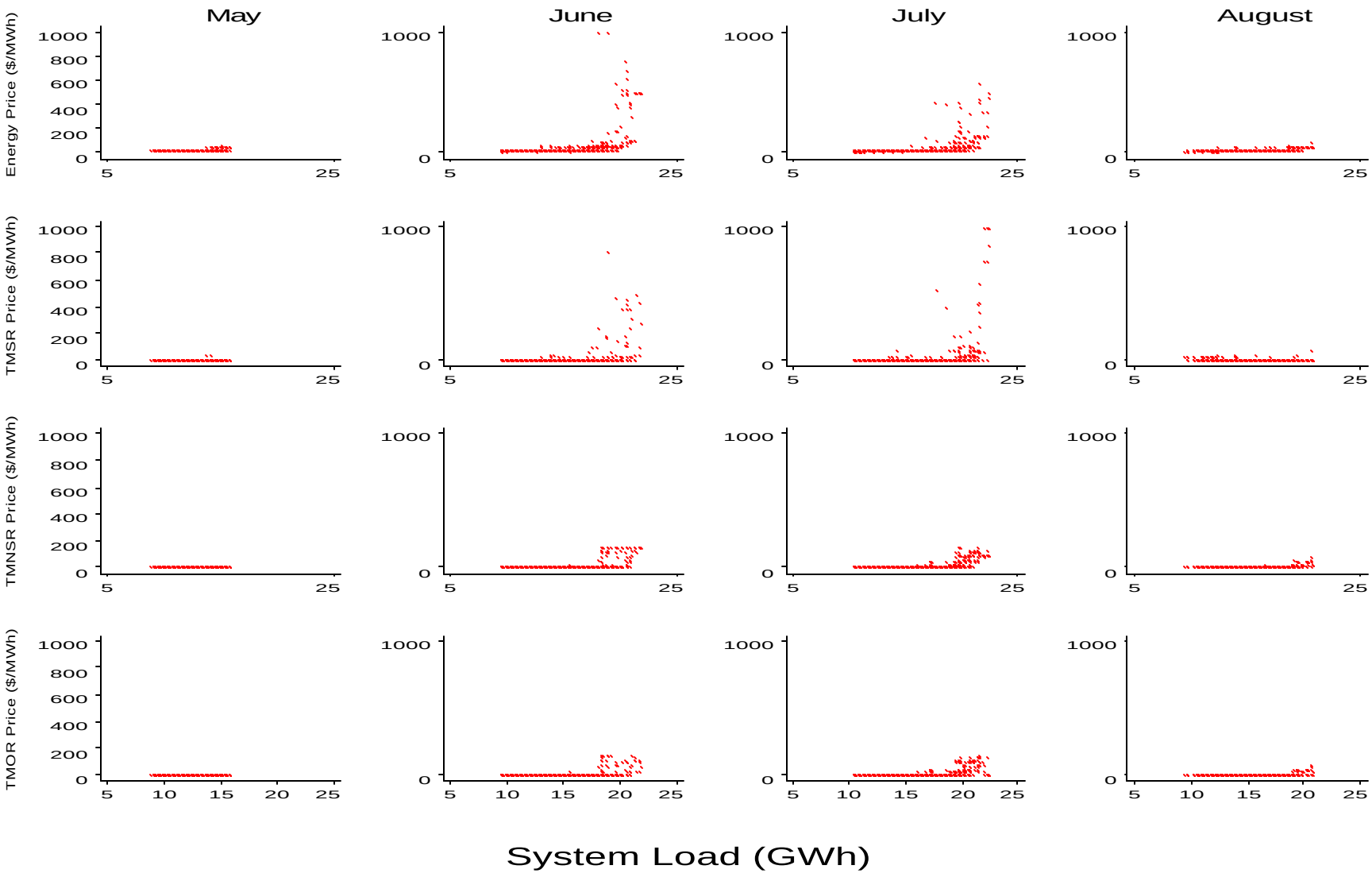

May
June
July
August
Energy Price ($/MWh)
TMSR Price ($/MWh)
TMNSR Price ($/MWh)
TMOR Price ($/MWh)
0
200
400
600
800
1000
5
10
15
20
25
System Load (GWh)

Figure 15

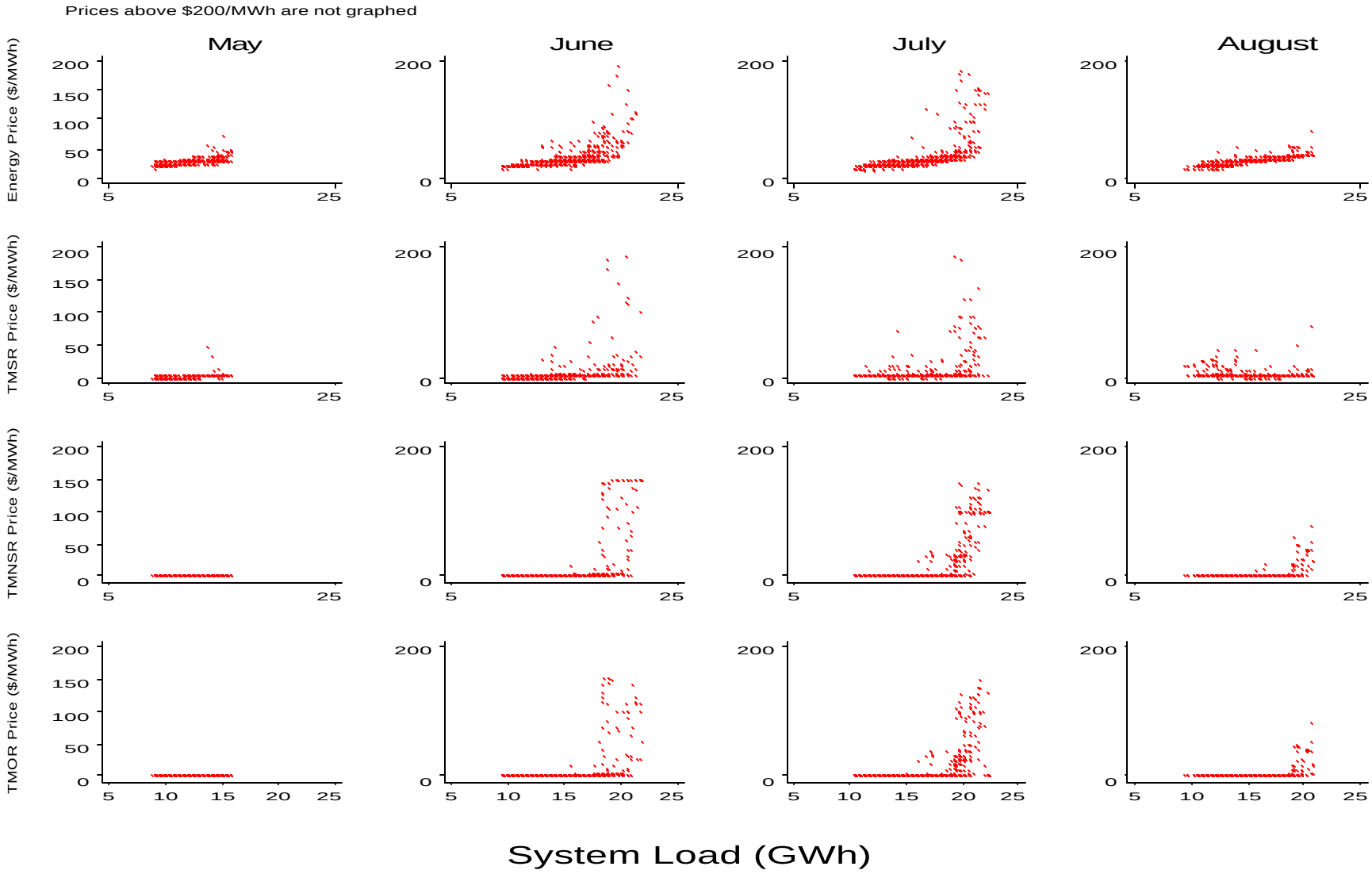

Prices above $200/MWh are not graphed
May
June
July
August
Energy Price ($/MWh)
TMSR Price ($/MWh)
TMNSR Price ($/MWh)
TMOR Price ($/MWh)
0
50
100
150
200
5
10
15
20
25
System Load (GWh)

Figure 16

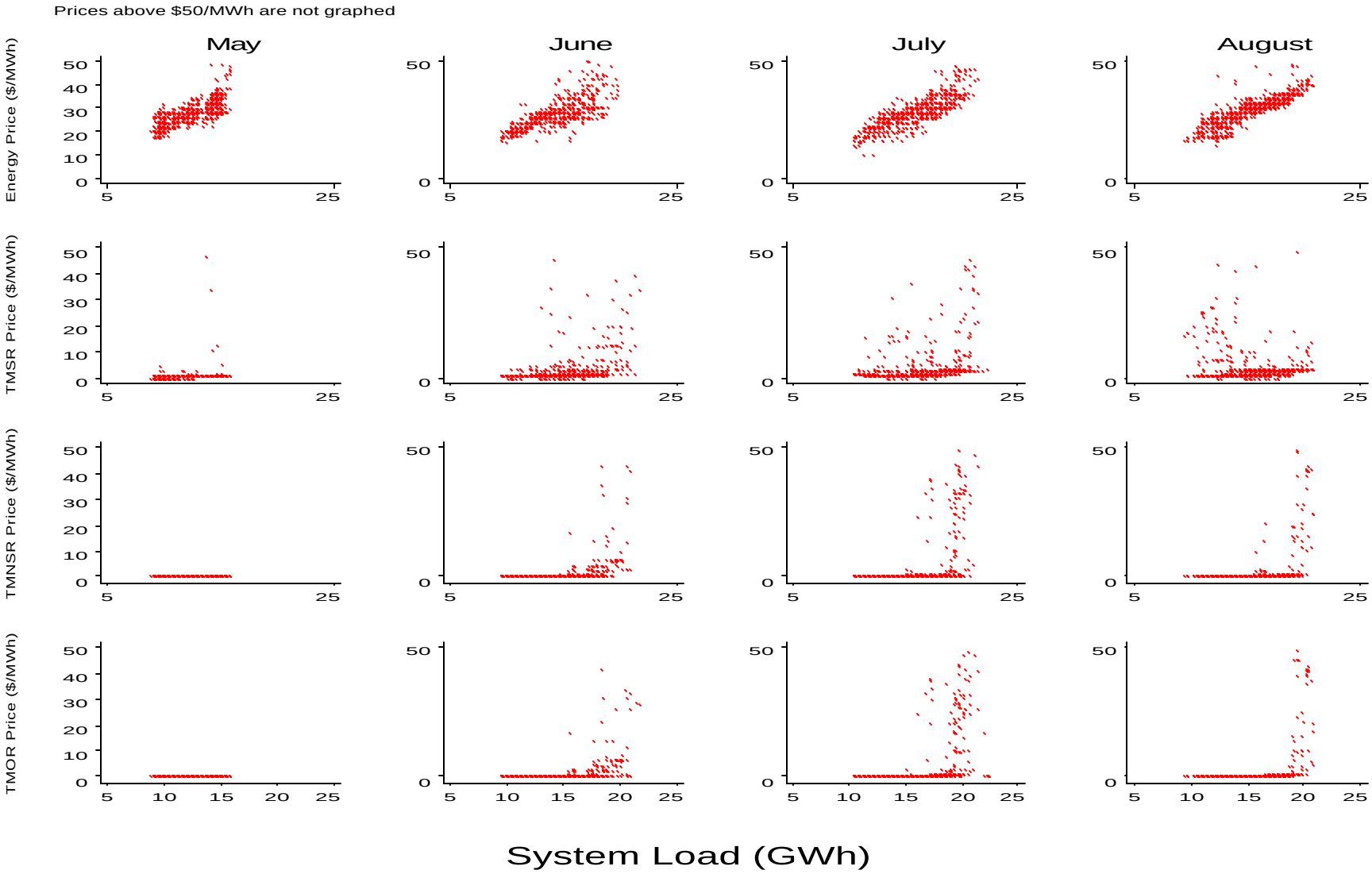

Prices above $50/MWh are not graphed
May
June
July
August
Energy Price ($/MWh)
TMSR Price ($/MWh)
TMNSR Price ($/MWh)
TMOR Price ($/MWh)
0
10
20
30
40
50
5
10
15
20
25
System Load (GWh)

Figure 17

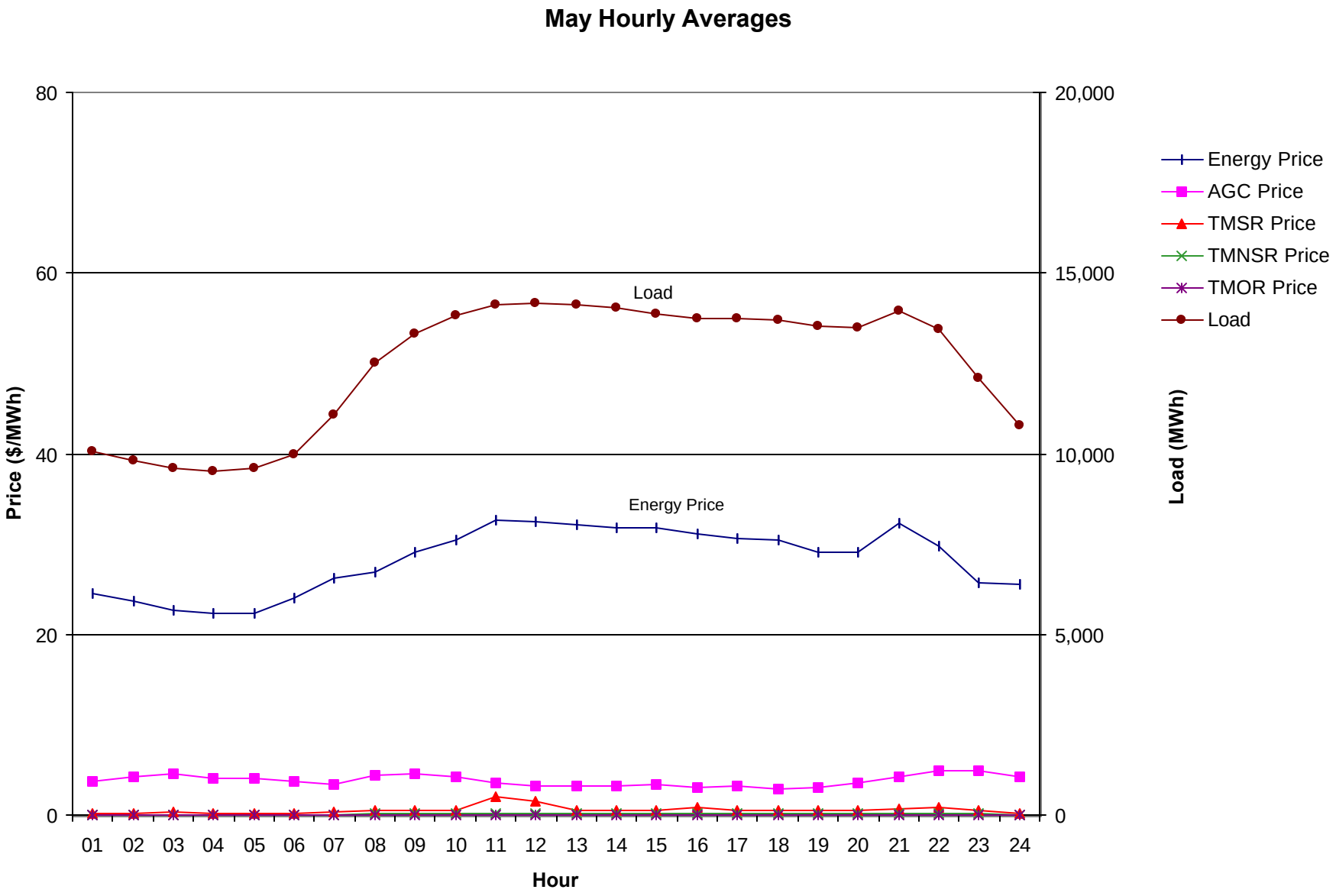

May Hourly Averages
80
60
40
20
0
20,000
15,000
10,000
5,000
0
Price ($/MWh)
Load (MWh)
Load
Energy Price
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour
Energy Price
AGC Price
TMSR Price
TMNSR Price
TMOR Price
Load

Figure 18

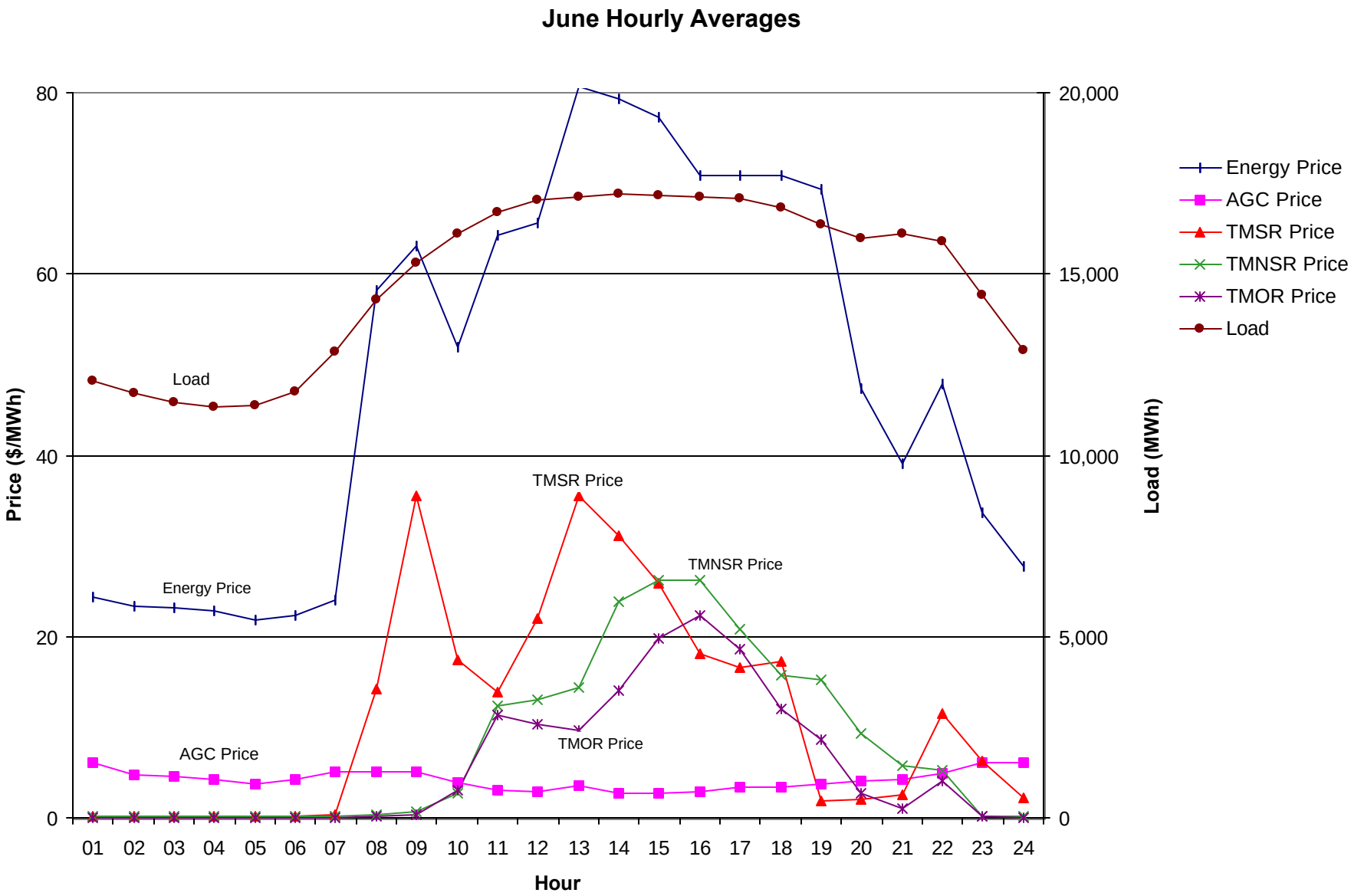

June Hourly Averages
Price ($/MWh)
Load (MWh)
Hour
80
60
40
20
0
20,000
15,000
10,000
5,000
0
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Load
Energy Price
TMSR Price
TMNSR Price
TMOR Price
AGC Price
Energy Price
AGC Price
TMSR Price
TMNSR Price
TMOR Price
Load

Figure 19

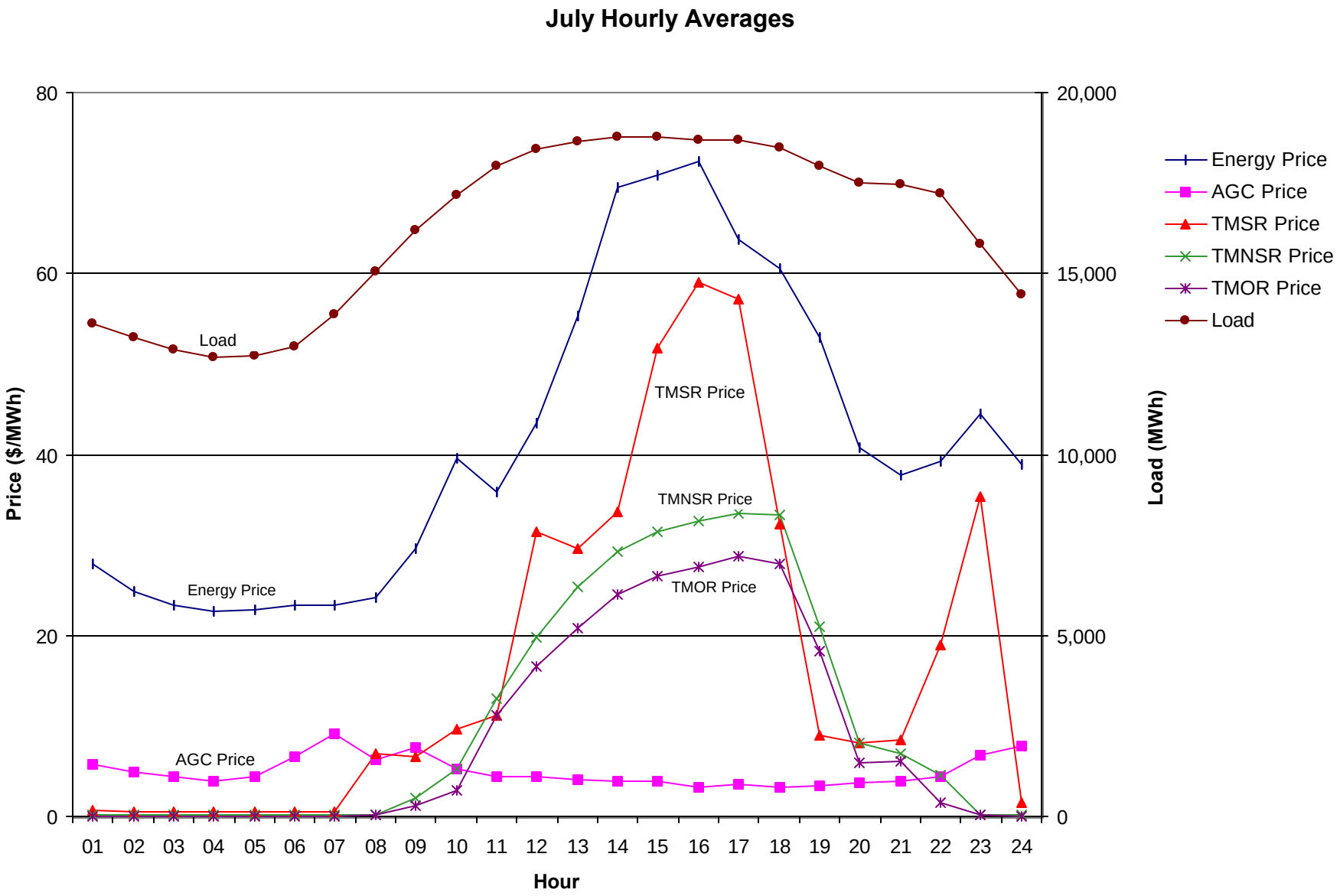

July Hourly Averages
80
60
40
20
0
20,000
15,000
10,000
5,000
0
Price ($/MWh)
Load (MWh)
Hour
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Load
Energy Price
AGC Price
TMSR Price
TMNSR Price
TMOR Price
Energy Price
AGC Price
TMSR Price
TMNSR Price
TMOR Price
Load

Figure 20

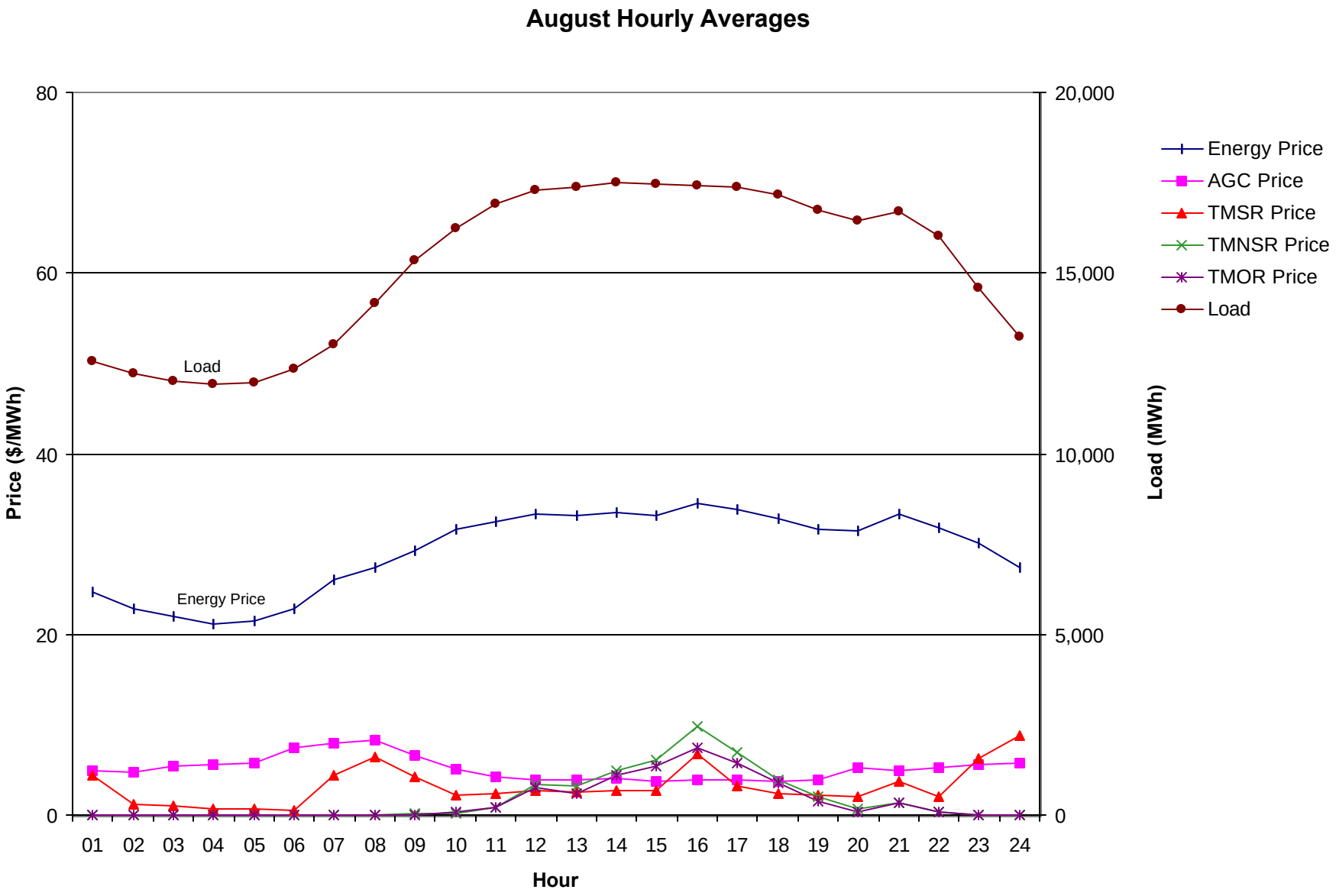

August Hourly Averages
80
60
40
20
0
20,000
15,000
10,000
5,000
0
Price ($/MWh)
Load (MWh)
Load
Energy Price
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Hour
Energy Price
AGC Price
TMSR Price
TMNSR Price
TMOR Price
Load

Figure 21

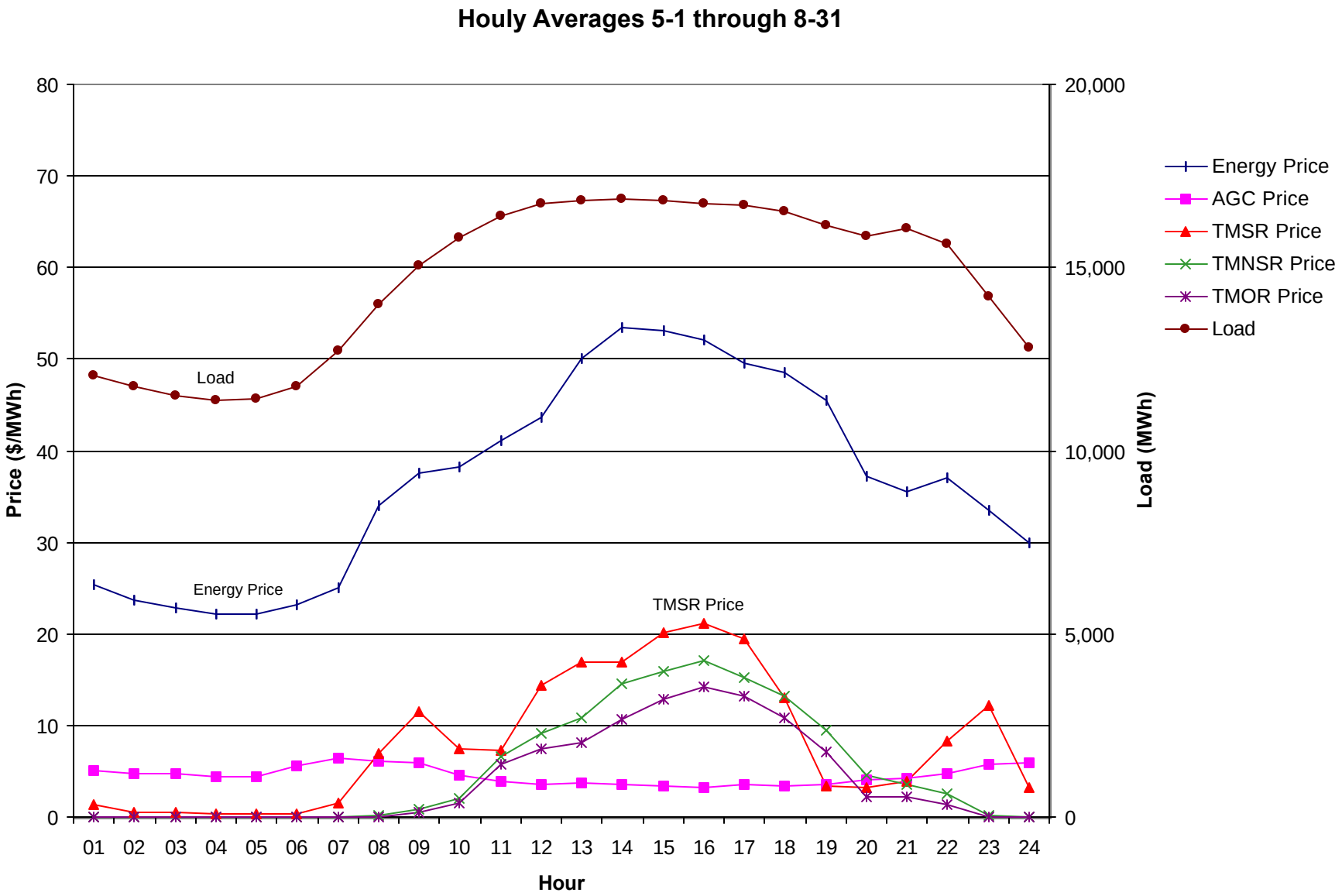

Houly Averages 5-1 through 8-31
Price ($/MWh)
Load (MWh)
Hour
Energy Price
AGC Price
TMSR Price
TMNSR Price
TMOR Price
Load
Load
Energy Price
TMSR Price
80
70
60
50
40
30
20
10
0
20,000
15,000
10,000
5,000
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Table 22

Count of hours for which condition is satisfied

	Total Hours	Energy Price = 0	TMSR Price = 0	TMNSR Price = 0	TMOR Price = 0	Energy Price > 100	TMSR Price > 100	TMNSR Price > 100	TMOR Price > 100	Load < 12000	Load > 20000
All Hours	2952	0	141	474	1398	73	40	64	41	619	127
All Hours in May	744	0	115	225	606	0	0	0	0	317	0
All Hours in June	720	0	6	17	247	33	21	31	17	144	37
All Hours in July	744	0	8	27	223	40	19	33	24	60	72
All Hours in August	744	0	12	205	322	0	0	0	0	98	18
Peak Hours (09 to 22)	1722	0	15	99	370	68	37	64	41	63	127
Peak Hours in May	434	0	4	44	301	0	0	0	0	58	0
Peak Hours in June	420	0	5	4	6	32	20	31	17	3	37
Peak Hours in July	434	0	1	8	3	36	17	33	24	1	72
Peak Hours in August	434	0	5	43	60	0	0	0	0	1	18
Off Peak Hours (23 to 08)	1230	0	126	375	1028	5	3	0	0	556	0
Off Peak Hours in May	310	0	111	181	305	0	0	0	0	259	0
Off Peak Hours in June	300	0	1	13	241	1	1	0	0	141	0
Off Peak Hours in July	310	0	7	19	220	4	2	0	0	59	0
Off Peak Hours in August	310	0	7	162	262	0	0	0	0	97	0

Table 23

Summary Statistics

	Maximum Energy Clearing Price	Minimum Energy Clearing Price	Average Energy Clearing Price	Maximum TMSR Clearing Price	Minimum TMSR Clearing Price	Average TMSR Clearing Price	Maximum TMNSR Clearing Price	Minimum TMNSR Clearing Price	Average TMNSR Clearing Price
All Hours	1003.21	9.56	36.84	986.07	0	8.08	150	0	5.26
All Hours in May	72.04	17.1	28.20	46.44	0	0.56	0.63	0	0.10
All Hours in June	1003.21	15.56	49.18	807.34	0	11.48	150	0	8.03
All Hours in July	572.54	9.56	41.14	986.07	0	17.26	145.71	0	11.15
All Hours in August	80.39	13.76	29.25	80.39	0	3.15	80.39	0	1.84
Peak Hours (09 to 22)	1003.21	16.23	44.47	986.07	0	11.92	150	0	8.96
Peak Hours in May	72.04	20.79	30.93	46.44	0	0.75	0.63	0	0.15
Peak Hours in June	1003.21	20.49	64.19	807.34	0	17.94	150	0	13.67
Peak Hours in July	572.54	16.23	50.80	986.07	0	26.21	145.71	0	19.04
Peak Hours in August	80.39	16.74	32.59	80.39	0	2.97	80.39	0	3.12
Off Peak Hours (23 to 08)	999.04	9.56	26.17	521.59	0	2.72	1.98	0	0.08
Off Peak Hours in May	34.08	17.1	24.39	3.89	0	0.29	0.22	0	0.04
Off Peak Hours in June	999.04	15.56	28.17	234.26	0	2.43	1.98	0	0.13
Off Peak Hours in July	425.93	9.56	27.62	521.59	0	4.74	1.04	0	0.12
Off Peak Hours in August	50.26	13.76	24.56	44.22	0	3.40	0.3	0	0.04

	Maximum TMOR Clearing Price	Minimum TMOR Clearing Price	Average TMOR Clearing Price	Maximum System Load	Minimum System Load	Average System Load	Average TMSR Designations	Average TMNSR Designations	Average TMOR Designations
All Hours	154	0	4	22,428	8,843	14,665	505	736	500
All Hours in May	0.41	0	0.01	15,799	8,843	12,419	418	628	372
All Hours in June	153.96	0	5.76	21,840	9,387	14,836	532	777	502
All Hours in July	149.45	0	9.17	22,428	10,273	16,234	538	760	549
All Hours in August	80.39	0	1.51	20,819	9,357	15,180	533	780	577
Peak Hours (09 to 22)	154	0	7	22,428	10,638	16,304	551	820	515
Peak Hours in May	0.41	0	0.02	15,799	10,638	13,792	477	694	406
Peak Hours in June	153.96	0	9.85	21,840	11,098	16,568	572	832	530
Peak Hours in July	149.45	0	15.70	22,428	11,293	18,001	591	852	545
Peak Hours in August	80.39	0	2.59	20,819	11,381	16,862	564	902	580
Off Peak Hours (23 to 08)	1	0	0	18,558	8,843	12,356	441	619	479
Off Peak Hours in May	0.06	0	0.00	14,174	8,843	10,490	336	537	325
Off Peak Hours in June	0.58	0	0.04	18,199	9,387	12,412	477	700	463
Off Peak Hours in July	0.95	0	0.03	18,558	10,273	13,728	465	630	554
Off Peak Hours in August	0.39	0	0.01	17,239	9,357	12,809	488	609	573

Figure 24

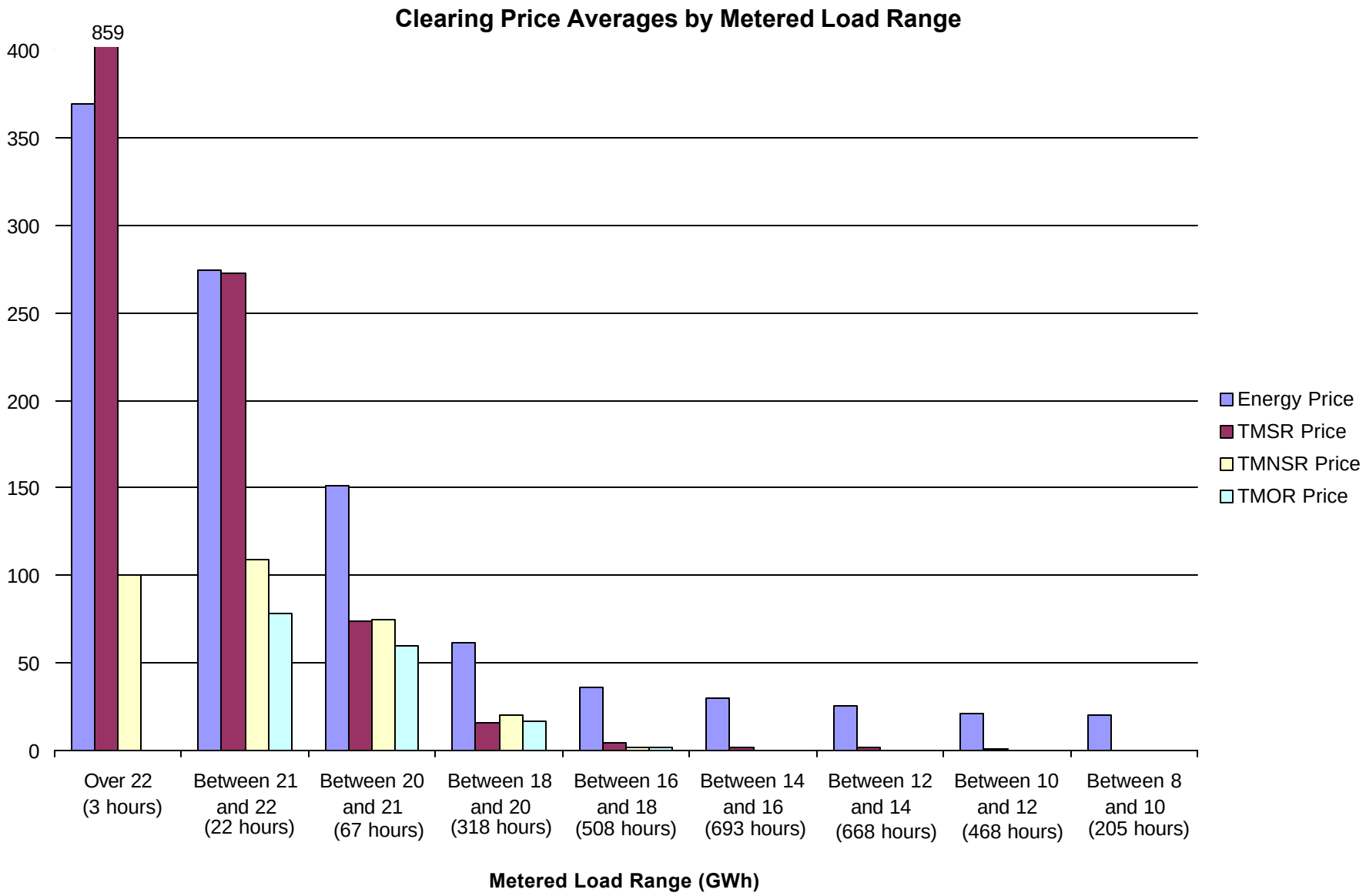

Clearing Price Averages by Metered Load Range
859
400
350
300
250
200
150
100
50
0
Energy Price
TMSR Price
TMNSR Price
TMOR Price
Over 22 (3 hours)
Between 21 and 22 (22 hours)
Between 20 and 21 (67 hours)
Between 18 and 20 (318 hours)
Between 16 and 18 (508 hours)
Between 14 and 16 (693 hours)
Between 12 and 14 (668 hours)
Between 10 and 12 (468 hours)
Between 8 and 10 (205 hours)
Metered Load Range (GWh)

Figure 25

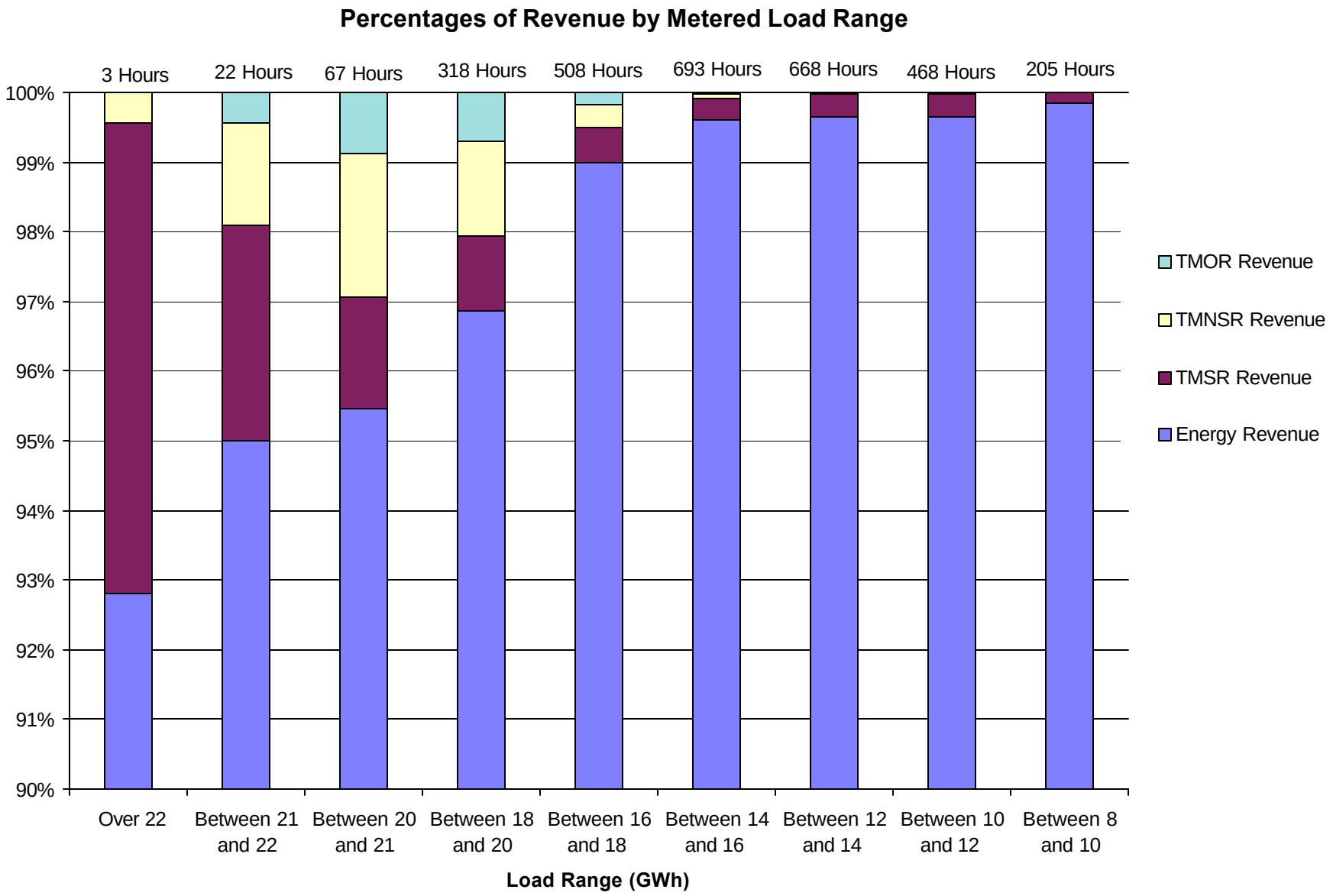

Percentages of Revenue by Metered Load Range
3 Hours
22 Hours
67 Hours
318 Hours
508 Hours
693 Hours
668 Hours
468 Hours
205 Hours
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
TMOR Revenue
TMNSR Revenue
TMSR Revenue
Energy Revenue
Over 22
Between 21 and 22
Between 20 and 21
Between 18 and 20
Between 16 and 18
Between 14 and 16
Between 12 and 14
Between 10 and 12
Between 8 and 10
Load Range (GWh)

Table 26

Number of Hours that Reserve Prices Equaled the Energy Price*

DAY	TMSR Price = Energy Price	TMNSR Price = Energy Price	TMOR Price = Energy Price
27-Jun-99	1		
28-Jun-99	1		
02-Jul-99		1	2
05-Jul-99	2		
12-Jul-99		4	5
14-Jul-99	1		
17-Jul-99			2
19-Jul-99			1
23-Jul-99		2	2
26-Jul-99		2***	1
27-Jul-99		1	1
28-Jul-99			2
29-Jul-99		1	3
30-Jul-99			1
01-Aug-99			1
15-Aug-99	1		
16-Aug-99	1		
17-Aug-99	1	4	4
18-Aug-99		5	4
20-Aug-99	1		
21-Aug-99	4		
22-Aug-99	8		
23-Aug-99	1***		
25-Aug-99	1		1
28-Aug-99	1		
29-Aug-99	1		
30-Aug-99	1		
31-Aug-99	2		
Total	28	20	30

*Most of the hours in this table represent hours when the bid cap limited the reserve prices. When the bid cap was first implemented it applied to five-minute prices, not hourly prices. If the cap was not binding for every five minute interval in an hour the reserve price averaged out to less than the energy price, so these hours are not counted in this table.

Number of Hours that Reserve Prices Exceeded the Energy Price**

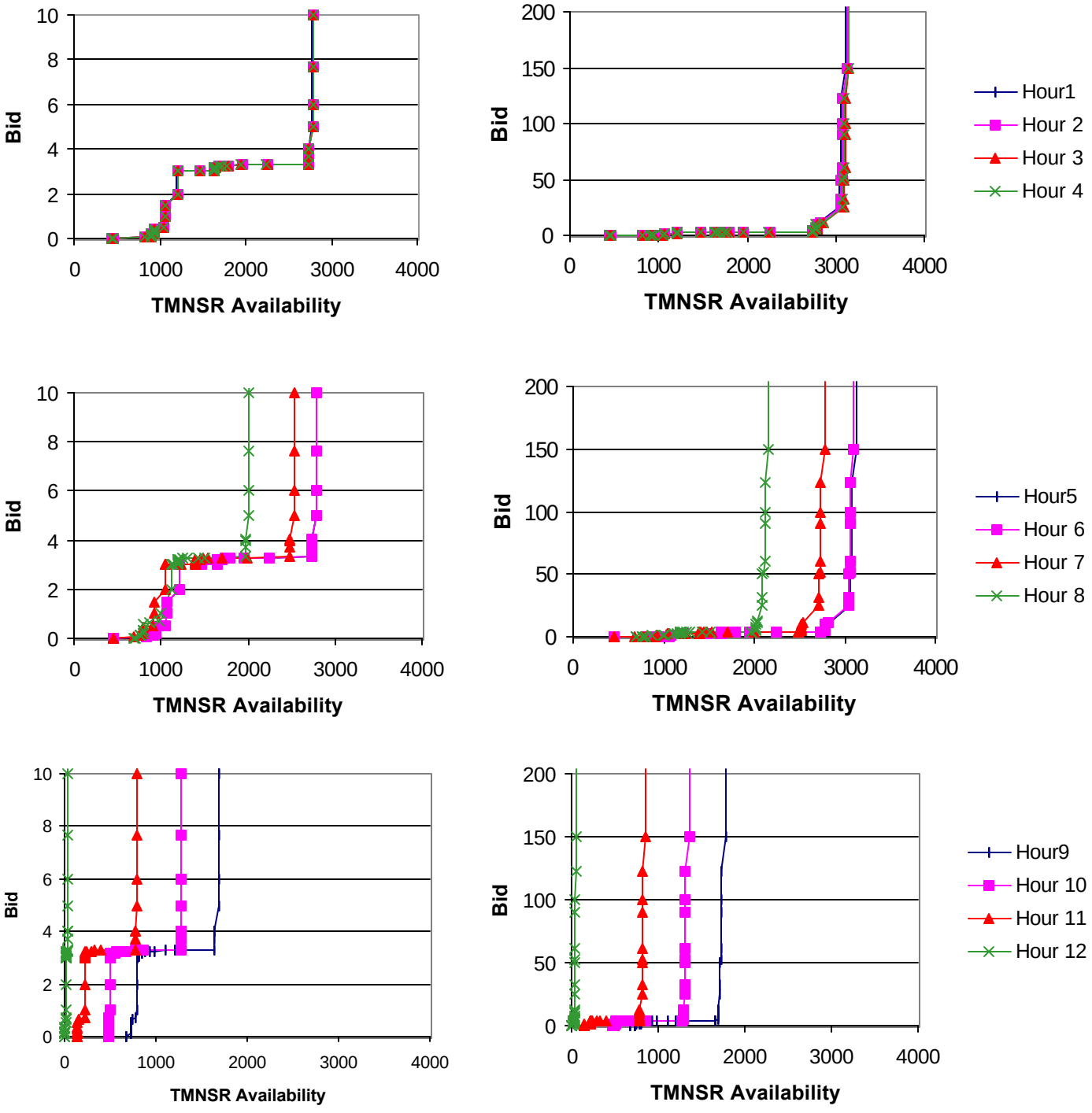
DAY	TMSR Price > Energy Price	TMNSR Price > Energy Price	TMOR Price > Energy Price
01-Jun-99		3	3
02-Jun-99		8	8
07-Jun-99		1	1
08-Jun-99		5	4
23-Jun-99	1		
26-Jun-99	1		
29-Jun-99	3	3	2
06-Jul-99	10		
13-Jul-99	1		
19-Jul-99		1	1
23-Jul-99	2	5	5
27-Jul-99	3	5	5
28-Jul-99	1	2	2
29-Jul-99		2	2
01-Aug-99		1	
Total	22	36	33

**Some hours in this table occur after the bid cap was implemented on June 27. Occasionally the ISO revised energy prices downward to correct for effects of external transaction on the clearing price. If such a revision took place more than 5 days after the close of the market then the ISO was unable to revise reserve prices downward accordingly.

***Reserve prices that were one cent more than the energy price due to rounding error have been included in the reserve price equals energy price table.

Figure 27

Estimated Aggregate Bids into the TMNSR Market 6/7/1999 Hours 1-12



Available quantity bid for each participant is found by taking HOL - Generation - TMSR Designation.
The bids of participants that rarely are given TMNSR designations despite bids lower than the clearing price are excluded.

Figure 28

Estimated Aggregate Bids into the TMNSR Market 6/7/1999 Hours 13-24

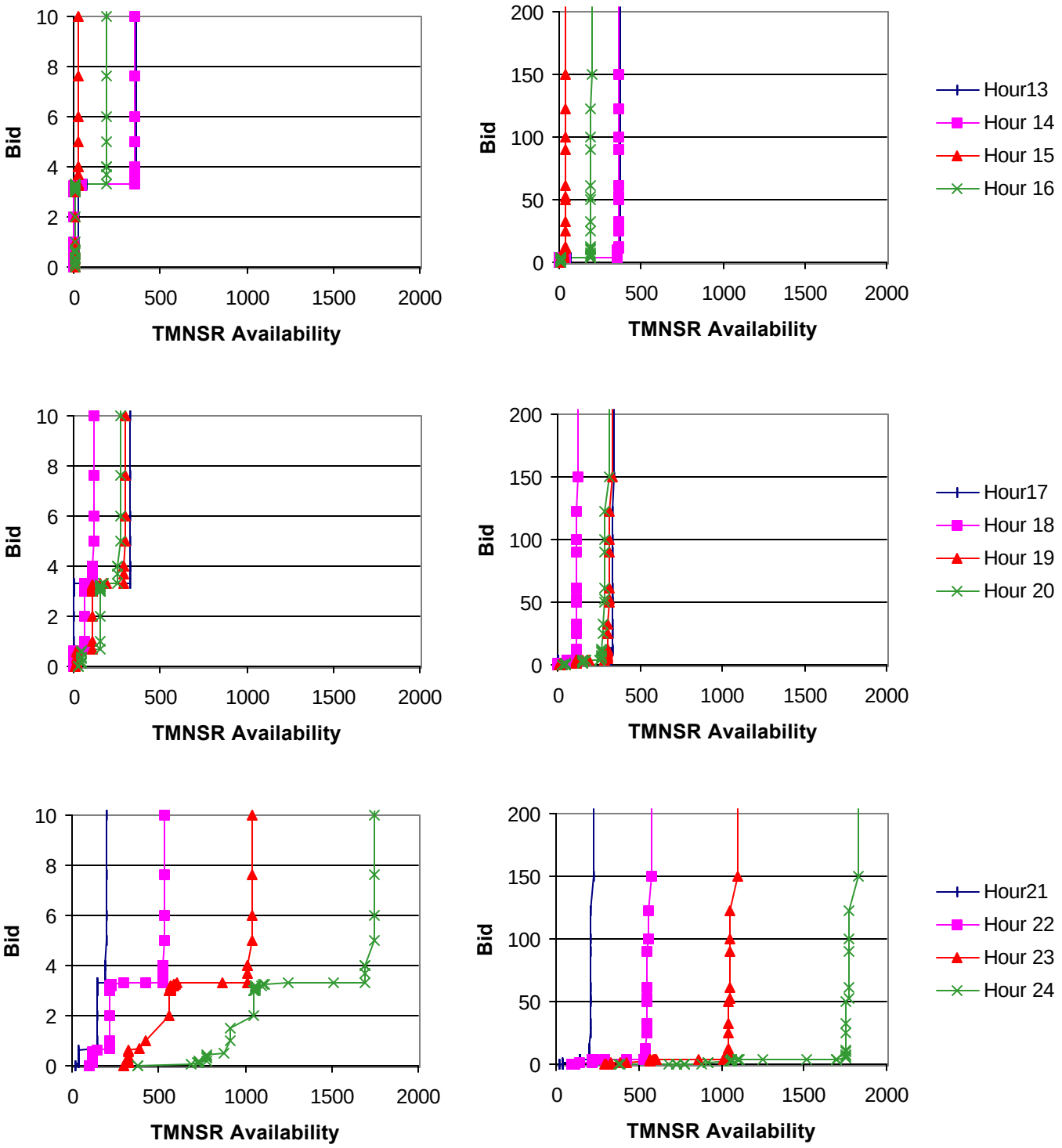


Figure 29

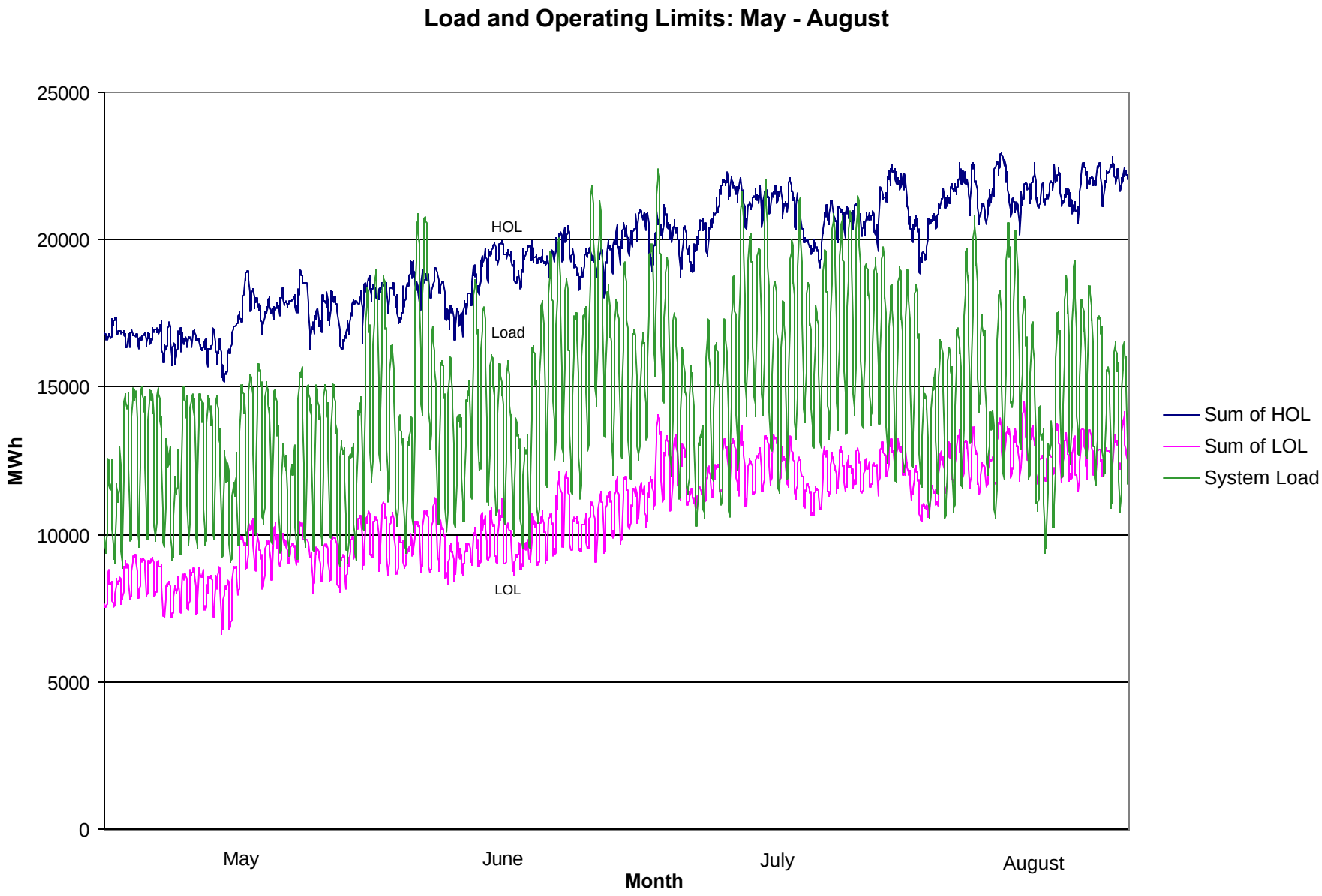

Load and Operating Limits: May - August
25000
20000
15000
10000
5000
0
MWh
HOL
Load
LOL
May
June
July
August
Month
Sum of HOL
Sum of LOL
System Load

Table 30

Quantity Designated in TMNSR and TMOR markets by asset type

Asset Type	Total TMNSR designations (MWh)	TMNSR designations when TMNSR bid is at least TMNSR price (MWh)	Share of total TMNSR designations when TMNSR bid is at least TMNSR price	TMNSR designations when TMNSR bid = 0 (MWh)	Share of total TMNSR designations when bid = 0
Coal and Coal/Oil	4,882	638	0.13	559	0.11
Composite	956	203	0.21	2	0.00
Diesel Oil	38,274	2,469	0.06	14,426	0.38
Hydro: Non-Run	226,124	89,162	0.39	5,347	0.02
Hydro: Run of River	3,838	815	0.21	422	0.11
Jet Fuel	1,013,102	47,064	0.05	803,368	0.79
Nuclear	0	0		0	
Oil, Gas, and Oil/Gas	828,196	35,762	0.04	736,816	0.89
Wood/Refuse	162	4	0.02	103	0.63
Not labled	51,023	1,890	0.04	48,599	0.95
Total	2,166,557	178,007	0.08	1,609,641	0.74

Asset Type	Total TMOR designations (MWh)	TMOR designations when TMOR bid is at least TMOR price (MWh)	Share of total TMOR designations when TMOR bid is at least TMOR price	TMOR designations when TMOR bid = 0 (MWh)	Share of total TMOR designations when bid = 0
Coal and Coal/Oil	42,299	765	0.02	40,517	0.96
Composite	852	76	0.09	610	0.72
Diesel Oil	7,398	588	0.08	1,407	0.19
Hydro: Non-Run	119,772	40,866	0.34	852	0.01
Hydro: Run of River	945	381	0.40	8	0.01
Jet Fuel	471,221	5,755	0.01	427,136	0.91
Nuclear	0	0		0	
Oil, Gas, and Oil/Gas	813,202	22,769	0.03	713,815	0.88
Wood/Refuse	1,178	8	0.01	1,037	0.88
Not labled	15,077	67	0.00	14,840	0.98
Total	1,471,944	71,275	0.05	1,200,222	0.82

Table 31

Revenue* in TMNSR and TMOR markets by asset type

Asset Type**	Share of total TMNSR revenue when TMNSR bid is at least TMNSR Price	Share of total TMNSR revenue when TMNSR bid = 0	Share of total TMOR revenue when TMOR bid is at least TMOR price	Share of total TMOR revenue when TMOR bid = 0
Coal and Coal/Oil	0.08	0.00	0.07	0.60
Composite	0.35	0.00	0.35	0.17
Diesel Oil	0.17	0.22	0.17	0.04
Hydro: Non-Run	0.15	0.01	0.14	0.00
Hydro: Run of River	0.38	0.01	0.53	0.00
Jet Fuel	0.04	0.70	0.04	0.59
Oil, Gas, and Oil/Gas	0.02	0.76	0.09	0.42
Wood/Refuse	0.02	0.01	0.02	0.05
Not labled	0.62	0.13	0.22	0.00
Total	0.09	0.40	0.11	0.23

*Revenue is estimated by assuming that all bidders who are given designations despite bids higher than the clearing price receive uplift.

**Nuclear units did not receive any revenue in either market

Table 32

Revenue* in TMNSR and TMOR markets by Lead Participant

Bidder Number	Share of TMNSR revenue when TMNSR bid is at least TMNSR price	Number of hours when TMNSR bid is at least TMNSR price (out of 2952)**	Share of TMOR revenue when TMOR bid is at least TMOR price	Number of hours when TMOR bid is at least TMOR price (out of 2952)**
1	0.46	379	0.55	658
2	0.05	1006	0.01	800
3	0.05	40	0.36	37
4	0.00	642	0.00	65
5	0.63	293	0.52	339
6	0.03	404	0.00	3
7	0.00	0	0.00	0
Others	0.14	816	0.07	969
Total	0.19	3580	0.16	2871

*Revenue is estimated by assuming that all bidders who are given designations despite bids higher than the clearing price receive uplift.

**In some hours multiple participants who bid at least the clearing price are given designations, while in other hours the highest accepted bid is below the clearing price. Due to the averaging of 5 minute clearing prices into a single hourly clearing price a bidder may be setting the price for a portion of an hour despite having a bid that is less than the final clearing price.