



जुलाई, 2020 मासिक मार्केट मॉनिटरिंग रिपोर्ट

Monthly Market Monitoring Report

July, 2020



भारत सरकार/ Government of India

विद्युत मंत्रालय/ Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority

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REPORT FOR MONTH: JULY, 2020

OVERVIEW OF ELECTRICITY TRANSACTIONS ON POWER EXCHANGES IN INDIA

1. DAY AHEAD MARKET (DAM)

- 1.1. The total volume of electricity transacted on both the power exchanges, viz., IEX and PXIL in the Day Ahead Market (DAM) in the month of July, 2020 is **4,486.71 MU**. The total energy supplied in the country during the month of July, 2020 is **112,244 MU (Provisional)**. Thus, the volume of electricity transacted on the power exchanges in DAM was 4.0 % of the total energy supplied in the country. The total volume of electricity transacted in DAM during June, 2020 was **4,189.37 MU** which was **3.99 %** of the total energy supplied [**105,086 MU**] in the country during June, 2020. Similarly, the total volume of electricity transacted in DAM during July, 2019 was **4,800.72 MU** which was 4.12 % of the total energy supplied [**116,485 MU**] in the country during July, 2019.
- 1.2. The volume of electricity transacted on IEX during July, 2020 is **4,486.71 MU**, whereas no transaction happened on PXIL during July, 2020. The volume of electricity transacted on IEX and PXIL during June, 2020 are **4,174.34 MU** and **15.03 MU**, respectively, which means that the total volume transacted on IEX is 99.64 % of the total volume on power exchanges. Also, the total volume of electricity transacted during July, 2019 on IEX and PXIL was **4,800.37 MU** and **0.35 MU**, respectively, which means that the total volume transacted on IEX was 99.99 % of the total volume on the power exchanges.
- 1.3. The Average Market Clearing Price (MCP) on IEX during the month of July, 2020 is **Rs 2.47/kWh**, which shows an increase of **5.11 %** and decline of 26.92 % when compared with average MCPs for the month of June, 2020 and July, 2019, which were Rs 2.35/kWh and Rs 3.38/kWh, respectively. On PXIL, no transaction of electricity happened during the month July, 2020. Whereas on PXIL, the average MCP during the month of June, 2020 and July, 2019 were Rs 2.56/kWh and Rs 3.21/kWh, respectively.

2. SUMMARY OF THE MARKET CLEARING PRICE, AREA CLEARING PRICE AND FINAL SCHEDULED VOLUME IN THE POWER EXCHANGES

- 2.1. A comparison of the Minimum, Maximum and Average of Daily MCP during the month of July, 2020 with that of June, 2020 and July, 2019 is given in Table- 1A & 1B:

(a) July, 2020 vis- a -vis June, 2020

Daily MCP (Rs/kWh)	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Minimum	1.91	1.65	15.76	-	2.15	NA
Maximum	2.90	2.74	5.84	-	2.93	NA
Average	2.47	2.35	5.11	-	2.56	NA

- : No transaction happened

NA : Not Applicable

Table: 1A**(b) July, 2020 vis- a -vis July, 2019**

Daily MCP (Rs/kWh)	IEX			PXIL		
	July, 2020	July, 2019	% Change	July, 2020	July, 2019	% Change
Minimum	1.91	2.41	-20.75	-	3.14	NA
Maximum	2.90	4.38	-33.79	-	3.25	NA
Average	2.47	3.38	-26.92	-	3.21	NA

- : No transaction happened

NA : Not Applicable

Table: 1B

- 2.2. The maximum Area Clearing Price (ACP) of **Rs 5.17/kWh** in IEX was observed in all 13 regions during the time block **21:45-22:00 Hrs** on 18th July, 2020. As there was no congestion in transmission system, the MCP for this time-block was also **Rs 5.17/kWh**. However, the Daily MCP in IEX on pan India basis on 18th July, 2020 was **Rs 2.88/kWh**. On PXIL, no transaction happened in July, 2020.
- 2.3. The minimum ACP of **Rs 0.88/kWh** in IEX was observed in all 13 regions during the time block **04:45-05:00 Hrs** on 6th July, 2020. As there was no congestion in transmission system, the MCP for this time-block was also **Rs 0.88/kWh**. However, the Daily MCP in IEX on pan India basis on 6th July, 2020 was **Rs 2.11/kWh**. No transaction happened in July, 2020 on PXIL.
- 2.4. **A comparison of the Minimum and Maximum Area Clearing Price (ACP) during the months of July, 2020 with that of June, 2020 and July, 2019 is given in Table- 2A & 2B:**

(a) July, 2020 vis- a -vis June, 2020

ACP (Rs/kWh)	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Minimum	0.88	1.00	-12.00	-	1.80	NA
Maximum	5.17	4.11	25.79	-	3.50	NA

- : No transaction happened

NA: Not Applicable

Table: 2A

(b) July, 2020 vis- a- vis July, 2019

ACP (Rs/kWh)	IEX			PXIL		
	July, 2020	July, 2019	% Change	July, 2020	July, 2019	% Change
Minimum	0.88	1.05	-16.19	-	3.14	NA
Maximum	5.17	9.29	-44.35	-	3.25	NA

- : No transaction happened

NA: Not Applicable

Table: 2B

- 2.5. A comparison of the Minimum, Maximum and Average of Final Scheduled Volume (FSV) of electricity transactions happened on IEX and PXIL for a day during the months of July, 2020 with that of June, 2020 and July, 2019 is given in Table- 3A & 3B:

(a) July, 2020 vis- a- vis June, 2020

Final Scheduled Volume (MU)	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Minimum	114.05	86.28	32.19	-	0.05	NA
Maximum	181.17	173.52	4.41	-	3.08	NA
Average	144.73	139.14	4.02	-	1.16	NA

- : No transaction happened

NA: Not Applicable

Table: 3A**(b) July, 2020 vis- a- vis July, 2019**

Final Scheduled Volume (MU)	IEX			PXIL		
	July, 2020	July, 2019	% Change	July, 2020	July, 2019	% Change
Minimum	114.05	109.10	4.54	-	0.045	NA
Maximum	181.17	193.12	-6.19	-	0.106	NA
Average	144.73	154.85	-6.54	-	0.069	NA

- : No transaction happened

NA: Not Applicable

Table: 3B

- 2.6. The total volume of electricity transacted in DAM on both the power exchanges during the period April, 2020 to July, 2020 is **17,964.09 MU [Annexure-I]**. The same was 16,818.30 MU during the period April, 2019 to July, 2019, which shows an increase of **6.81 %**.

3. TERM AHEAD MARKET (TAM)

- 3.1. The total volume of electricity transacted in both the power exchanges in Term Ahead Market in July, 2020 was **89.04 MU**, out of which, 60.75 MU (68.230 %) was transacted on IEX and 28.29 MU (31.77%) was transacted on PXIL.

- 3.2. The total volume of electricity transacted in both the power exchanges in Term Ahead Market in June, 2020 was **148.88 MU**, out of which, 74.00 MU (49.70 %) was transacted on IEX and 74.88MU (50.30%) was transacted on PXIL.
- 3.3. Similarly, total volume of electricity transacted during July, 2019 in Term Ahead Market on both the power exchanges was **747.94 MU**, out of which, 523.59 MU (70.00%) was transacted on IEX and **224.35 MU** (30.00%) was transacted on PXIL.
- 3.4. This shows a decrease of **40.19 %** in TAM during July, 2020 as compared to June, 2020 and a decrease of **88.10 %** as compared to July, 2019.
- 3.5. With respect to the total energy supplied during the month of July, 2020 in the country, the volume of electricity traded on the power exchanges in TAM represents 0.08 % of the total energy supplied. The same was 0.14 % in June, 2020 and 0.64 % in July, 2019.
- 3.6. The total volume of electricity transacted in TAM on both the power exchanges during the period April, 2020 to July, 2020 is **1,496.90 MU [Annexure-II]**, which shows decrease of 35.82 % as compared to 2,332.41 MU during the period April, 2019 to July, 2019.
- 3.7. **The comparison of total volume of electricity transacted on both the power exchanges in Term Ahead Market (TAM) during July, 2020 with June, 2020 and July, 2019 is given in Table - 4A & 4B:**

(a) July, 2020 vis- a- vis June, 2020

Contract Type	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Intra Day (MU)	6.54	6.55	-0.15	19.81	17.24	14.91
Day Ahead Contingency (MU)	15.57	7.69	102.47	-	-	NA
Daily/ Any Day (MU)	38.64	59.76	-35.34	8.48	57.64	-85.29
Weekly (MU)	-	-	NA	-	-	NA

- : No transaction happened

NA: Not Applicable

Table: 4A

(a) July, 2020 vis- a- vis July, 2019

Contract Type	IEX			PXIL		
	July, 2020	July, 2019	% Change	July, 2020	July, 2019	% Change
Intra Day (MU)	6.54	91.78	-92.87	19.81	157.94	-87.46
Day Ahead Contingency (MU)	15.57	62.88	-75.24	-	-	NA
Daily/ Any Day (MU)	38.64	234.53	-83.52	8.48	66.41	-87.23
Weekly (MU)	-	134.40	NA	-	-	NA

- : No transaction happened

NA: Not Applicable

Table: 4B

4. REAL TIME MARKET (RTM)

Real Time Market transaction have started from 1st June, 2020 with the approval of the CERC in both the power exchanges - IEX and PXIL. The Final Scheduled Volume (FSV), Daily Market Clearing Prices (MCP), Area Clearing Prices (ACP), Real Time Curtailment and details of Transmission Congestion in Real Time Market during the month of July, 2020 and its comparison with June, 2020 are as given in table 5A, 5B & 5C:

(i) Final Scheduled Volume:

Final Scheduled Volume (MU)	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Total	784.96	515.465	52.28	0.43	1.863	-76.92
Minimum	14.37	3.415	320.79	0.43	0.007	6,042.86
Maximum	42.69	36.086	18.30	0.43	0.900	-52.22
Average	25.32	17.182	47.36	0.43	0.233	84.55

Table-5A

(ii) Daily Market Clearing Price (MCP):

Daily MCP (Rs/kWh)	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Minimum	1.55	1.56	-0.64	2.61	2.25	16.00
Maximum	3.39	3.03	11.88	2.61	2.91	-10.31
Average	2.49	2.22	12.16	2.61	2.59	0.77

Table-5B

(iii) Area Clearing Price (ACP):

ACP (Rs/kWh)	IEX			PXIL		
	July, 2020	June, 2020	% Change	July, 2020	June, 2020	% Change
Minimum	0.190	0.015	1,166.67	2.60	1.88	38.30
Maximum	5.650	10.000	-43.50	2.61	4.00	-34.75

Table -5C

5. ANALYSIS OF MOVEMENT OF PRICES OBSERVED IN DAM DURING JULY, 2020

A regression analysis has been carried out on the Day Ahead Market data taken from IEX website. Also, data was plotted in various graphs to observe patterns for each day of the July, 2020 month. The observations made are as under:

- 5.1. In order to find out the determinants which are responsible for the Daily MCP, a regression analysis has been carried out where the Daily MCP is the dependent variable and the independent variables are peak demand, total purchase bid, total sell bid, coal generation, hydro generation, wind generation and solar generation.
- 5.2. A double log function was used so that elasticity of Daily MCP could be read off from the coefficients of independent variables. The regression analysis revealed that the significant variables were the total purchase bid and total sell bid, whereas all the other variables were found to be insignificant. Further, the regression analysis revealed that the elasticity of the Daily MCP with respect to total purchase bid was 0.47. In effect, the regression reveals that the most important variable which determines daily market clearing price is the total purchase bid in the month of July, 2020.
- 5.3. The same relationship is visible from the analysis carried out from the plot in **Figure 1**.

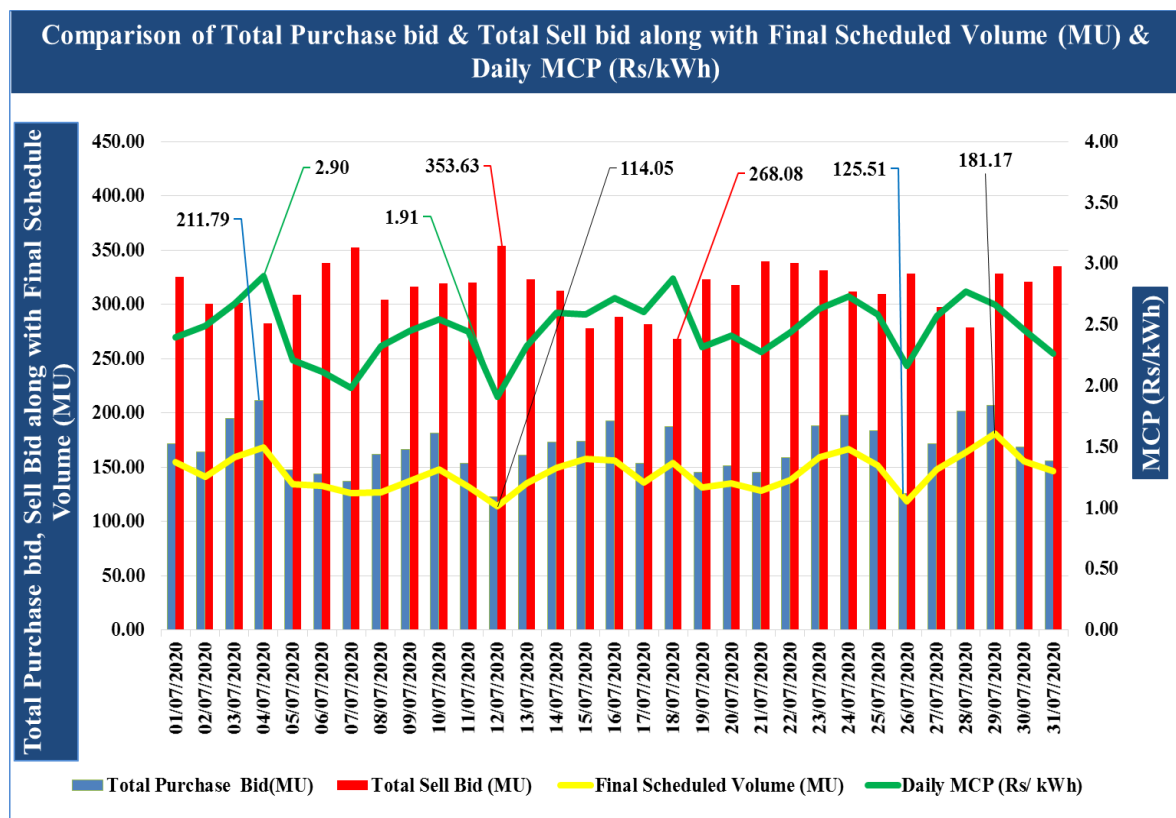


Figure -1

- 5.4. Invariably, the Final Scheduled Volume (MU) and the Daily MCP (Rs/kWh) showed decreasing trend on Sundays as the demand of electricity in the country is less compared to other days of week [**Figure 1**]. However, in the month of July, 2020, it is observed that on first Monday (i.e. 6th July, 2020), FSV showed decreasing trend in comparison to Sunday (i.e. 5th July, 2020). The detailed analysis on this is given at **Appendix-I**.

- 5.5. A comparison of maximum, minimum, daily, non-peak time, peak time MCP is shown in **Figure -2**. The same are also tabulated in **Annexure III**.

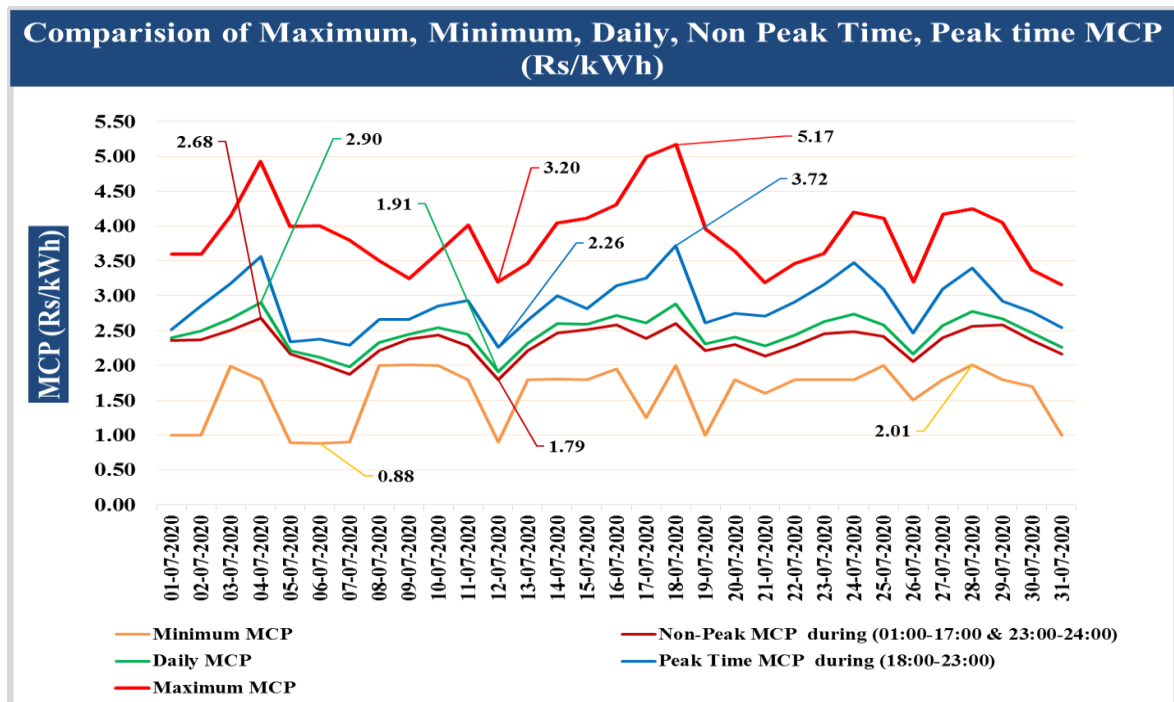


Figure -2

- 5.6. The Purchase Bids and the MCP discovered in each of the 15-minute time block during the month almost followed the same trend [Annexure IV]. This is also corroborated with the outcome of regression analysis mentioned in at para 5.1 and 5.2 above.
- 5.7. On **30 days** during the month, the maximum MCP occurred during the **time period 21:00-22:00** [Annexure V].
- 5.8. On **13 days** during the month, the maximum FSV occurred during the **time period 07:00-07:45** and also on **12 days** during the month, the maximum FSV occurred during the time period **21:45-22:15** [Annexure V]
- 5.9. On **14 days** during the month, the minimum FSV occurred during the **time period 17:45-18:30** [Annexure V].
- 5.10. On **13 days** during the month, the minimum MCP occurred during the **time period 03:30-04:30** and also on **12 days** during the month, the maximum FSV occurred during the time period **18:00-18:30** [Annexure V].
- 5.11. The maximum demand met during the month of July, 2020 in the country occurred on **2nd July, 2020 at 170.55 GW**, which is 3.39 % more than the maximum demand occurred during **June, 2020 [i.e. 164.95 GW on 23rd June, 2020]** and is 2.63 % less than the maximum demand occurred during July, 2019 i.e. **[175.16 GW on 3rd July, 2019]**.

- 5.12. One nation One Price was observed for **all 31 days** in IEX, as there was no congestion in transmission system in IEX in July, 2020. Whereas, no transaction happened in PXIL in July, 2020. In the month of June, 2020 one nation one Price was observed for **all 30 days** in IEX, as there was no congestion in transmission system in IEX in June, 2020. Also, in PXIL there was no congestion in transmission system, so one nation one price was observed on all **13 days** during which transaction happened (1st to 6th and 8th to 14th June, 2020). Similarly, in the month of July, 2019, there was no congestion in transmission system in IEX, hence, one nation one price was observed for all 31 days on IEX. In PXIL also, there was no congestion in transmission system, so one nation one price was observed on all 5 days during which transaction happened (15th, 17th-18th and 27th-28th July, 2019).
- 5.13. There was no real time curtailment in IEX during July, 2020. Further, there was no real time curtailment in IEX and PXIL in June, 2020. In July, 2019, real time curtailment of **0.039 MU** occurred in IEX, whereas there was no real time curtailment in PXIL.
- 5.14. The **top 10 sellers** on the power exchanges during the month are **Teesta -3, Himachal Pradesh, Odisha, UT of Jammu & Kashmir and Ladakh, Jaypee Nigrie, Sembcorp Gayatri, Assam, Kameng HEP, Uttar Pradesh and AD Hydro**, which constituted **60.23%** of the market share. [Annexure VI]
- 5.15. The **top 10 purchasers** on the power exchanges during the month are **Maharashtra, Telangana, Andhra Pradesh, Gujarat, Haryana, Tamil Nadu, Uttar Pradesh, Rajasthan, Uttarakhand, Arcelor Mittal Nippon steel (ESIL)**, which constituted **83.49%** of the market share. [Annexure VI]

6. ANALYSIS OF MOVEMENT OF PRICES OBSERVED IN REAL TIME MARKET (RTM) TRANSACTIONS IN JULY, 2020

- 6.1. Similar to the regression analysis of Day Ahead Market, regression analysis for Real Time Market was also done. The regression analysis revealed that the significant variables were the total purchase bid, total sell bid and hydro generation, whereas all the other variables were found to be insignificant. Further, the regression analysis revealed that the elasticity of the Daily MCP with respect to total purchase bid was 0.40. In effect, the regression reveals that the most important variable which determines daily market clearing price is the total purchase bid in the month of July, 2020
- 6.2. The Purchase Bids and the MCP discovered in each of the 15-minute time block during the month almost followed the same trend [Annexure VIII]. This is also corroborated with the outcome of regression analysis mentioned in at para 6.1 above

6.3. The Total Purchase Bid, Total Sell Bid, Daily MCP and FSV are shown in Figure-3 below:

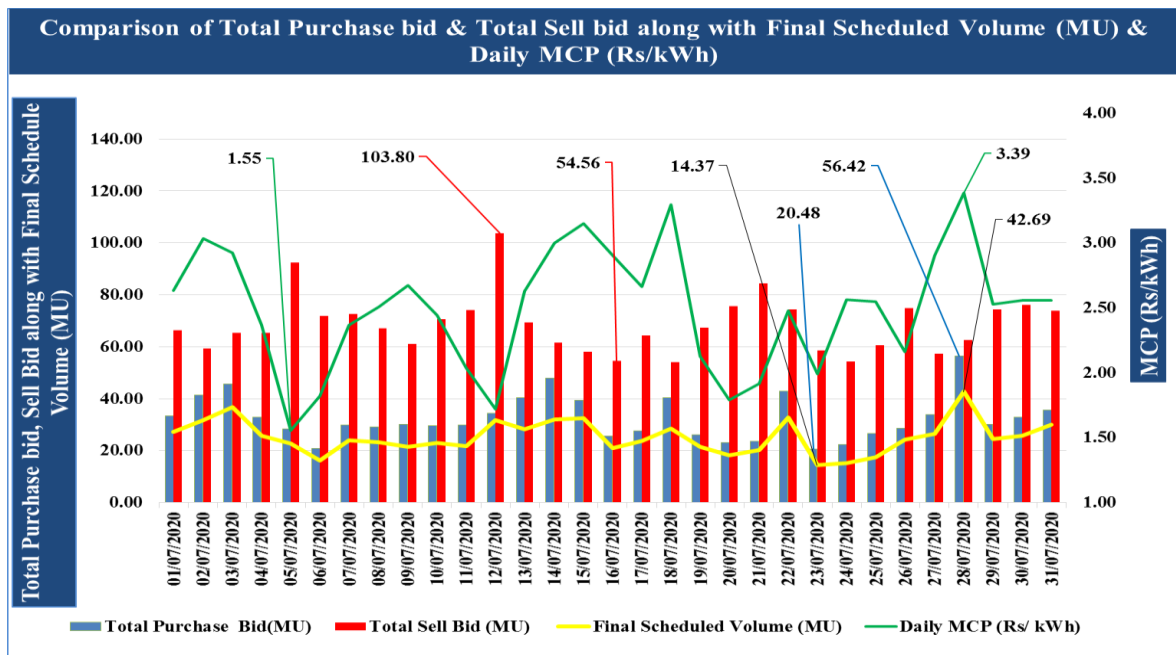


Figure-3

6.4. A comparison of maximum, minimum, daily, non-peak time, peak time MCP is shown in Figure-4. The same are also tabulated in Annexure VII.

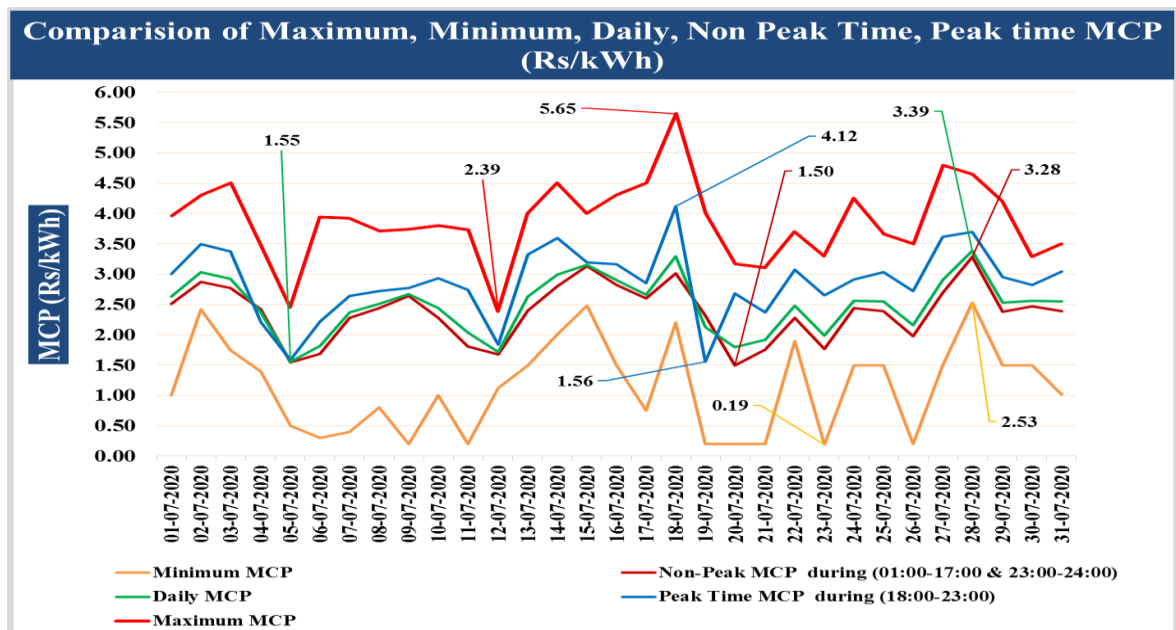


Figure-4

6.5. On **26 days** during the month, the maximum MCP occurred during the **time period 19:30-22:45**. [Annexure IX].

6.6. On **12 days** during the month, the minimum MCP occurred during the **time period 16:45-18:15**. [Annexure IX].

6.7. There was **no** real time curtailment in IEX and PXIL during July, 2020 and June, 2020 in Real Time Market.

- 6.8. In the month of July, 2020, there was congestion of **0.075 MU** in transmission system in IEX on 3rd July, 2020, hence, one nation one price was observed for 30 days on IEX. Whereas, in PXIL there was no congestion in transmission system, so one nation one price was observed on one day only during which transaction happened (3rd July, 2020).
- 6.9. The **top 10 sellers** on the power exchanges during the month are **Telangana, Rajasthan, Andhra Pradesh, Haryana, Maharashtra, Delhi, Uttar Pradesh, Chhattisgarh, West Bengal and Assam**, which constituted **85.17 %** of the market share. [Annexure X]
- 6.10. The **top 10 purchasers** on the power exchanges during the month are **UT of Jammu & Kashmir and Ladakh, Odisha, Karnataka, Uttar Pradesh, NLC, Sembcorp Gayatri, Delhi, Maharashtra, West Bengal and Adani Power STG3**, which constituted **67.82 %** of the market share. [Annexure X]

-
- **DAM, TAM and RTM data source: IEX and PXIL**
 - **Entity wise sale and purchase on PXs data source: NLDC**
 - **Total Energy supplied source: CEA**
 - **Generation & other data for Regression source: NLDC and IEX**

Annexure-I
Final Scheduled Volume, Average MCP and Real-Time Curtailment in Day Ahead Market (DAM) for the months of April, 2020 to July, 2020 of IEX and PXIL

Quarter	Months	Final Scheduled Volume (MU)		Market Clearing Price (Rs/kWh)		Real Time Curtailment (MU)	
		IEX	PXIL	IEX	PXIL	IEX	PXIL
Quarter -I	April, 2020	3,692.04	-	2.42	NA	0	NA
	May, 2020	5,573.73	22.24	2.57	2.58	0	0
	June, 2020	4,174.34	15.03	2.35	2.56	0	0
Quarter-II	July, 2020	4486.71	-	2.47	NA	0	NA
Total		17,926.82	37.27			0	0

- : No Transaction happened

NA: Not Applicable

Annexure-II**Final Scheduled Volume in Term Ahead Market (TAM) for the months of April, 2020 to July, 2020 of IEX and PXIL**

Quarter	Months	Final Scheduled Volume (MU)		
		IEX	PXIL	Total
Quarter -I	April, 2020	395.88	191.30	587.18
	May, 2020	387.42	284.38	671.80
	June, 2020	74.00	74.88	148.88
Quarter-II	July, 2020	60.75	28.29	89.04
Total		918.05	578.85	1496.90

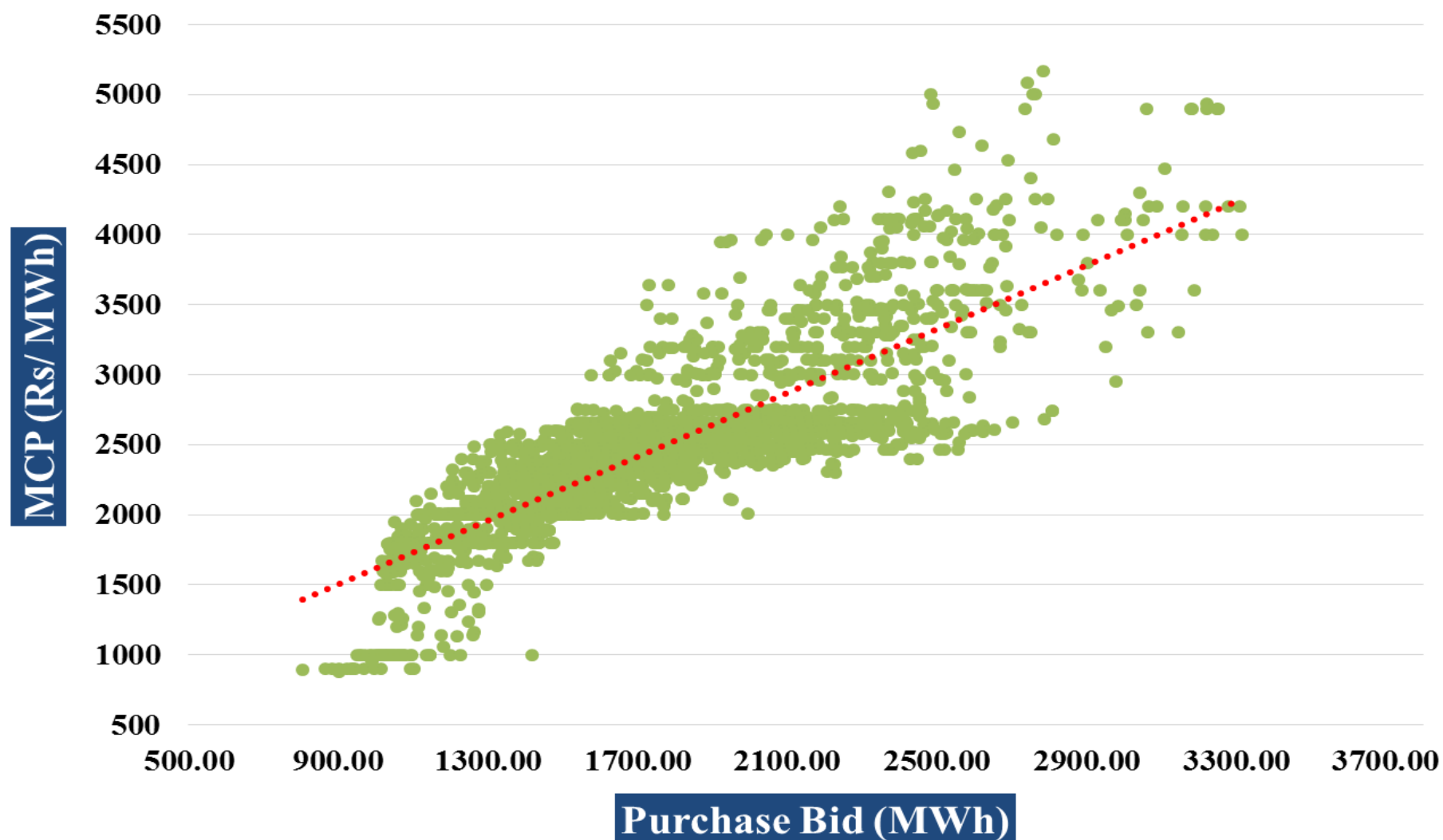
Annexure-III**Peak Time MCP, Non-Peak MCP, Maximum MCP, Minimum MCP, Average MCP and Final Scheduled Volume (MU) in DAM**

Date	MCP during (01:00-06:00, 23:00-24:00)	MCP during (07:00-10:00)	MCP during (11:00-17:00)	Peak Time MCP during (18:00-23:00)	Non-Peak MCP during (01:00-17:00 & 23:00-24:00)	Maximum MCP	Minimum MCP	Average MCP	Final Scheduled Volume (MU)
01/07/2020	2.05	2.56	2.57	2.51	2.36	3.60	1.00	2.40	154.31
02/07/2020	2.21	2.54	2.44	2.85	2.37	3.60	1.00	2.49	141.49
03/07/2020	2.57	2.48	2.46	3.17	2.50	4.15	1.99	2.67	159.33
04/07/2020	2.86	2.57	2.56	3.57	2.68	4.93	1.80	2.90	168.33
05/07/2020	2.33	2.49	1.82	2.34	2.17	4.00	0.90	2.21	134.08
06/07/2020	1.64	2.42	2.19	2.37	2.03	4.01	0.88	2.11	132.52
07/07/2020	1.59	1.95	2.12	2.29	1.88	3.80	0.90	1.98	126.47
08/07/2020	2.11	2.36	2.24	2.66	2.21	3.50	2.00	2.33	126.54
09/07/2020	2.23	2.51	2.45	2.66	2.38	3.25	2.01	2.45	137.18
10/07/2020	2.40	2.50	2.45	2.86	2.44	3.63	2.00	2.54	148.02
11/07/2020	2.33	2.33	2.20	2.93	2.28	4.02	1.80	2.44	132.08
12/07/2020	1.80	1.99	1.67	2.26	1.79	3.20	0.90	1.91	114.05
13/07/2020	2.16	2.44	2.14	2.65	2.21	3.46	1.80	2.32	134.92
14/07/2020	2.40	2.55	2.48	3.00	2.46	4.04	1.80	2.60	149.55
15/07/2020	2.35	2.64	2.60	2.81	2.51	4.11	1.80	2.59	157.89
16/07/2020	2.52	2.65	2.60	3.14	2.58	4.30	1.95	2.72	155.97
17/07/2020	2.47	2.50	2.25	3.25	2.39	5.00	1.25	2.61	135.68
18/07/2020	2.82	2.72	2.30	3.72	2.60	5.17	2.00	2.88	154.07
19/07/2020	2.42	2.47	1.87	2.61	2.22	3.96	1.00	2.31	131.38
20/07/2020	2.05	2.52	2.42	2.75	2.30	3.64	1.80	2.41	135.30
21/07/2020	1.99	2.33	2.18	2.71	2.14	3.19	1.60	2.28	128.72
22/07/2020	2.17	2.35	2.36	2.91	2.28	3.46	1.80	2.44	138.04
23/07/2020	2.34	2.58	2.48	3.16	2.45	3.61	1.80	2.63	159.40
24/07/2020	2.43	2.54	2.51	3.47	2.49	4.20	1.80	2.73	167.07
25/07/2020	2.31	2.50	2.47	3.10	2.42	4.11	2.00	2.59	151.62
26/07/2020	1.96	2.40	1.97	2.47	2.06	3.20	1.50	2.16	118.25
27/07/2020	2.31	2.38	2.49	3.10	2.40	4.17	1.80	2.57	148.12
28/07/2020	2.56	2.56	2.57	3.40	2.56	4.25	2.01	2.77	163.55
29/07/2020	2.64	2.46	2.60	2.92	2.58	4.05	1.80	2.67	181.17
30/07/2020	2.18	2.53	2.44	2.77	2.36	3.37	1.70	2.46	155.15
31/07/2020	1.71	2.48	2.45	2.55	2.17	3.16	1.00	2.26	146.43
Maximum	2.86	2.72	2.60	3.72	2.68	5.17	2.01	2.90	181.17
Minimum	1.59	1.95	1.67	2.26	1.79	3.16	0.88	1.91	114.05
Average	2.25	2.46	2.33	2.87	2.33	3.88	1.59	2.47	144.73

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

Comparison of MCP w.r.t. Purchase Bid for 2,976 Time Blocks during the month of July, 2020



Time Blocks during the Month [96 time blocks in a day x 31 days = 2,976]

Annexure-V**Maximum Final Schedule Volume (FSV), Minimum FSV, Maximum Market Clearing Price (MCP) and Minimum MCP in DAM**

Date	Max. FSV (MU)		Max. MCP (Rs/kWh)		Min FSV (MU)		Min. MCP (Rs/kWh)	
	Time Block	Value	Time Block	Value	Time Block	Value	Time Block	Value
01/07/2020	21:45 - 22:00	2.09	21:45 - 22:00	3.60	18:00 - 18:15	1.12	03:45 - 04:00	1.00
02/07/2020	21:45 - 22:00	2.16	21:45 - 22:00	3.60	10:00 - 10:15	1.03	03:45 - 04:00	1.00
03/07/2020	23:45 - 24:00	2.20	21:45 - 22:00	4.15	10:15 - 10:30	1.28	18:00 - 18:15	1.99
04/07/2020	23:45 - 24:00	2.21	21:45 - 22:00	4.93	18:00 - 18:15	1.23	18:00 - 18:15	1.80
05/07/2020	23:45 - 24:00	1.93	21:45 - 22:00	4.00	18:15 - 18:30	0.80	18:15 - 18:30	0.90
06/07/2020	22:30 - 22:45	2.13	22:30 - 22:45	4.01	04:45 - 05:00	0.90	04:45 - 05:00	0.88
07/07/2020	21:45 - 22:00	2.00	21:45 - 22:00	3.80	05:15 - 05:30	0.96	05:15 - 05:30	0.90
08/07/2020	21:45 - 22:00	1.72	21:45 - 22:00	3.50	18:15 - 18:30	1.02	03:45 - 04:00	2.00
09/07/2020	07:15 - 07:30	1.93	21:30 - 21:45	3.25	18:15 - 18:30	1.06	03:45 - 04:00	2.01
10/07/2020	21:45 - 22:00	1.95	21:45 - 22:00	3.63	02:15 - 02:30	1.19	18:00 - 18:15	2.00
11/07/2020	22:00 - 22:15	2.03	21:45 - 22:00	4.02	17:15 - 17:30	1.05	03:45 - 04:00	1.80
12/07/2020	21:45 - 22:00	1.54	21:45 - 22:00	3.20	18:00 - 18:15	0.92	18:00 - 18:15	0.90
13/07/2020	07:00 - 07:15	2.09	21:45 - 22:00	3.46	17:45 - 18:00	1.12	03:30 - 03:45	1.80
14/07/2020	22:30 - 22:45	2.02	21:45 - 22:00	4.04	18:15 - 18:30	1.18	05:00 - 05:15	1.80
15/07/2020	07:15 - 07:30	2.11	21:45 - 22:00	4.11	18:15 - 18:30	1.08	05:00 - 05:15	1.80
16/07/2020	07:15 - 07:30	2.30	21:45 - 22:00	4.30	04:00 - 04:15	1.16	03:45 - 04:00	1.95
17/07/2020	21:45 - 22:00	2.07	21:30 - 21:45	5.00	18:15 - 18:30	0.95	18:15 - 18:30	1.25
18/07/2020	07:15 - 07:30	2.12	21:45 - 22:00	5.17	18:00 - 18:15	1.21	13:15 - 13:30	2.00
19/07/2020	07:00 - 07:15	1.98	21:30 - 21:45	3.96	18:00 - 18:15	0.97	18:00 - 18:15	1.00
20/07/2020	07:15 - 07:30	2.01	21:30 - 21:45	3.64	02:00 - 02:15	1.07	04:00 - 04:15	1.80
21/07/2020	07:00 - 07:15	1.88	21:45 - 22:00	3.19	02:30 - 02:45	0.98	02:45 - 03:00	1.60
22/07/2020	07:00 - 07:15	2.00	21:00 - 21:15	3.46	01:30 - 01:45	1.14	03:45 - 04:00	1.80
23/07/2020	07:00 - 07:15	2.34	21:30 - 21:45	3.61	04:00 - 04:15	1.19	03:45 - 04:00	1.80
24/07/2020	21:45 - 22:00	2.31	21:30 - 21:45	4.20	04:00 - 04:15	1.25	03:45 - 04:00	1.80
25/07/2020	21:45 - 22:00	2.34	21:45 - 22:00	4.11	04:15 - 04:30	1.20	18:00 - 18:15	2.00
26/07/2020	21:45 - 22:00	1.82	21:15 - 21:30	3.20	13:15 - 13:30	0.97	18:15 - 18:30	1.50
27/07/2020	21:45 - 22:00	2.15	21:45 - 22:00	4.17	05:15 - 05:30	1.22	18:15 - 18:30	1.80
28/07/2020	20:45 - 21:00	2.13	21:45 - 22:00	4.25	17:45 - 18:00	1.35	18:00 - 18:15	2.01
29/07/2020	07:15 - 07:30	2.28	21:45 - 22:00	4.05	17:45 - 18:00	1.39	18:00 - 18:15	1.80
30/07/2020	07:15 - 07:30	2.45	21:45 - 22:00	3.37	04:15 - 04:30	1.20	04:15 - 04:30	1.70
31/07/2020	07:30 - 07:45	2.26	21:30 - 21:45	3.16	07:30 - 07:45	1.00	03:30 - 03:45	1.00

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

Annexure-VI**Top Ten Entities (Sellers and Purchasers) in Day Ahead Market (DAM) in the month of July, 2020**

Entity Name	Sell		Entity Name	Purchase	
	(MU)	Percent		(MU)	Percent (%)
Teesta -3	712.87	15.89%	Maharashtra	785.03	17.50%
Himachal Pradesh	431.31	9.61%	Telangana	673.12	15.00%
Odisha	348.92	7.78%	Andhra Pradesh	421.85	9.40%
UT of J&K and Ladakh	277.70	6.19%	Gujarat	420.89	9.38%
Jaypee Nigrie	255.71	5.70%	Haryana	298.51	6.65%
Sembcorp Gayatri	197.32	4.40%	Tamil Nadu	265.00	5.91%
Assam	127.69	2.85%	Uttar Pradesh	262.33	5.85%
Kameng HEP	123.01	2.74%	Rajasthan	222.28	4.95%
Uttar Pradesh	120.80	2.69%	Uttarakhand	198.77	4.43%
AD Hydro	106.90	2.38%	Arcelor Mittal Nippon	198.05	4.41%
Total	2702.24	60.23%	Total	3745.82	83.49%
Total Volume in PXs	4486.70		Total Volume in PXs	4486.70	

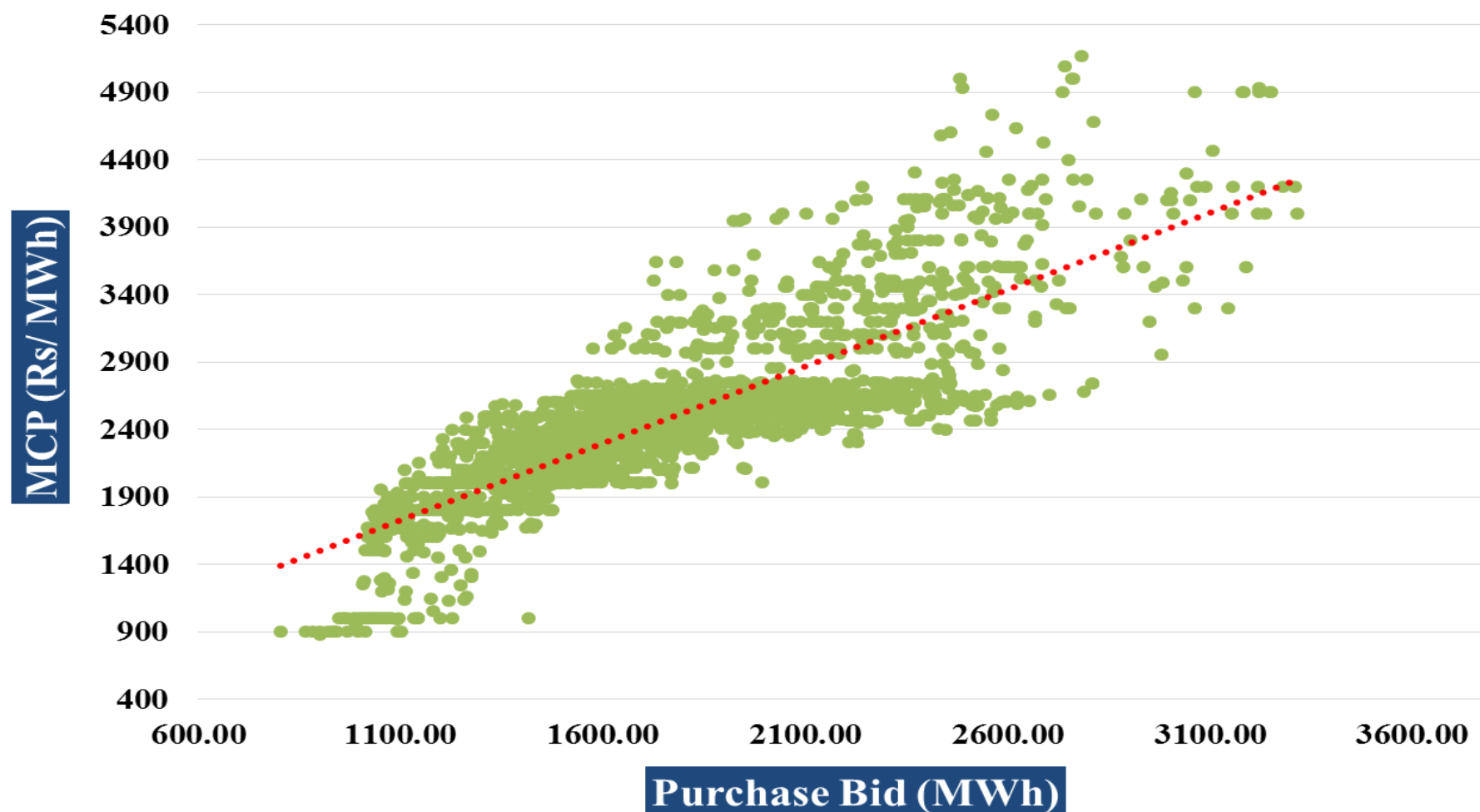
Annexure-VII**Peak Time MCP, Non-Peak MCP, Maximum MCP, Minimum MCP, Average MCP and Final Scheduled Volume (MU) in RTM**

Date	MCP during (01:00-06:00, 23:00-24:00)	MCP during (07:00-10:00)	MCP during (11:00-17:00)	Peak Time MCP during (18:00-23:00)	Non-Peak MCP during (01:00-17:00 & 23:00-24:00)	Maximum MCP	Minimum MCP	Average MCP	Final Scheduled Volume (MU)
01/07/2020	2.41	2.48	2.63	3.00	2.51	3.96	1.00	2.63	27.16
02/07/2020	2.84	2.68	3.03	3.49	2.87	4.30	2.42	3.03	31.77
03/07/2020	2.94	2.61	2.69	3.37	2.77	4.50	1.75	2.92	36.74
04/07/2020	2.72	2.88	1.83	2.21	2.42	3.49	1.40	2.37	25.63
05/07/2020	1.87	1.67	1.14	1.58	1.54	2.45	0.50	1.55	22.62
06/07/2020	1.16	1.67	2.23	2.22	1.69	3.94	0.30	1.82	16.24
07/07/2020	2.07	2.67	2.26	2.64	2.27	3.93	0.40	2.37	24.08
08/07/2020	2.62	2.56	2.18	2.72	2.44	3.71	0.80	2.51	23.20
09/07/2020	2.68	2.55	2.64	2.77	2.64	3.74	0.20	2.67	21.59
10/07/2020	2.14	2.12	2.52	2.93	2.28	3.80	1.00	2.44	22.91
11/07/2020	1.78	2.48	1.44	2.74	1.80	3.73	0.20	2.04	21.69
12/07/2020	1.95	1.80	1.34	1.84	1.68	2.39	1.12	1.72	31.77
13/07/2020	2.22	2.28	2.64	3.32	2.40	4.00	1.50	2.63	28.30
14/07/2020	2.68	2.75	2.94	3.59	2.80	4.50	2.01	3.00	32.05
15/07/2020	3.09	3.47	2.97	3.20	3.13	4.00	2.48	3.15	32.59
16/07/2020	2.84	2.99	2.70	3.16	2.82	4.30	1.50	2.90	21.01
17/07/2020	2.77	2.83	2.31	2.85	2.60	4.50	0.75	2.66	23.69
18/07/2020	3.14	3.32	2.72	4.12	3.02	5.65	2.20	3.29	28.45
19/07/2020	2.88	2.51	1.65	1.56	2.31	4.00	0.20	2.13	21.40
20/07/2020	1.29	1.71	1.59	2.68	1.50	3.16	0.20	1.79	18.22
21/07/2020	1.88	1.50	1.80	2.37	1.75	3.11	0.20	1.92	20.26
22/07/2020	2.12	2.11	2.53	3.08	2.28	3.70	1.90	2.48	32.84
23/07/2020	1.05	2.03	2.35	2.65	1.77	3.30	0.19	1.99	14.37
24/07/2020	2.29	2.46	2.59	2.91	2.44	4.25	1.50	2.56	15.15
25/07/2020	2.26	2.61	2.39	3.03	2.39	3.66	1.50	2.55	17.58
26/07/2020	2.61	1.87	1.40	2.72	1.97	3.50	0.20	2.16	24.12
27/07/2020	2.69	2.76	2.65	3.61	2.69	4.80	1.50	2.90	26.57
28/07/2020	3.49	3.00	3.24	3.70	3.28	4.65	2.53	3.39	42.69
29/07/2020	2.25	2.54	2.42	2.95	2.38	4.20	1.50	2.53	24.50
30/07/2020	2.51	2.44	2.44	2.83	2.47	3.29	1.50	2.56	25.72
31/07/2020	2.12	2.43	2.65	3.04	2.39	3.50	1.02	2.56	30.05
Maximum	3.49	3.47	3.24	4.12	3.28	5.65	2.53	3.39	42.69
Minimum	1.05	1.50	1.14	1.56	1.50	2.39	0.19	1.55	14.37
Average	2.37	2.44	2.32	2.87	2.37	3.87	1.14	2.49	25.32

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

Comparison of MCP w.r.t. Purchase Bid for 2,976 Time Blocks during the month of July, 2020 in RTM



Time Blocks during the Month [96 time blocks in a day x 31 days = 2,976]

Annexure-IX**Maximum Final Schedule Volume (FSV), Minimum FSV, Maximum Market Clearing Price (MCP) and Minimum MCP in RTM**

Date	Max. FSV (MU)		Max. MCP (Rs/kWh)		Min FSV (MU)		Min. MCP (Rs/kWh)	
	Time Block	Value	Time Block	Value	Time Block	Value	Time Block	Value
01/07/2020	11:45 - 12:00	0.50	22:15 - 22:30	3.96	18:45 - 19:00	0.13	00:15 - 00:30	1.00
02/07/2020	14:45 - 15:00	0.65	22:15 - 22:30	4.30	04:15 - 04:30	0.11	04:15 - 04:30	2.42
03/07/2020	23:00 - 23:15	0.74	22:30 - 22:45	4.50	06:15 - 06:30	0.17	11:00 - 11:15	1.75
04/07/2020	10:15 - 10:30	0.54	00:15 - 00:30	3.49	18:00 - 18:15	0.08	18:00 - 18:15	1.40
05/07/2020	14:30 - 14:45	0.46	22:15 - 22:30	2.45	02:45 - 03:00	0.11	05:15 - 05:30	0.50
06/07/2020	12:00 - 12:15	0.42	21:30 - 21:45	3.94	04:00 - 04:15	0.02	06:00 - 06:15	0.30
07/07/2020	23:00 - 23:15	0.59	23:00 - 23:15	3.93	18:15 - 18:30	0.07	17:45 - 18:00	0.40
08/07/2020	06:45 - 07:00	0.45	22:30 - 22:45	3.71	16:45 - 17:00	0.11	16:45 - 17:00	0.80
09/07/2020	22:30 - 22:45	0.51	20:15 - 20:30	3.74	17:15 - 17:30	0.06	17:15 - 17:30	0.20
10/07/2020	22:00 - 22:15	0.60	21:45 - 22:00	3.80	06:15 - 06:30	0.05	06:00 - 06:15	1.00
11/07/2020	21:15 - 21:30	0.45	21:15 - 21:30	3.73	00:45 - 01:00	0.08	17:00 - 17:15	0.20
12/07/2020	07:30 - 07:45	0.57	00:45 - 01:00	2.39	19:45 - 20:00	0.14	17:45 - 18:00	1.12
13/07/2020	21:00 - 21:15	0.62	22:15 - 22:30	4.00	01:45 - 02:00	0.08	04:30 - 04:45	1.50
14/07/2020	23:45 - 24:00	0.62	22:30 - 22:45	4.50	05:30 - 05:45	0.04	03:15 - 03:30	2.01
15/07/2020	12:45 - 13:00	0.66	06:45 - 07:00	4.00	05:30 - 05:45	0.11	05:30 - 05:45	2.48
16/07/2020	22:45 - 23:00	0.42	22:00 - 22:15	4.30	18:30 - 18:45	0.05	18:00 - 18:15	1.50
17/07/2020	15:00 - 15:15	0.47	21:00 - 21:15	4.50	17:30 - 17:45	0.06	17:30 - 17:45	0.75
18/07/2020	17:15 - 17:30	0.51	21:30 - 21:45	5.65	19:00 - 19:15	0.15	13:15 - 13:30	2.20
19/07/2020	15:30 - 15:45	0.43	00:30 - 00:45	4.00	22:00 - 22:15	0.06	17:45 - 18:00	0.20
20/07/2020	22:45 - 23:00	0.46	19:30 - 19:45	3.16	07:30 - 07:45	0.08	23:15 - 23:30	0.20
21/07/2020	23:30 - 23:45	0.39	20:30 - 20:45	3.11	19:45 - 20:00	0.11	06:30 - 06:45	0.20
22/07/2020	17:15 - 17:30	0.66	20:00 - 20:15	3.70	23:45 - 24:00	0.19	04:15 - 04:30	1.90
23/07/2020	20:15 - 20:30	0.28	20:15 - 20:30	3.30	07:30 - 07:45	0.06	02:45 - 03:00	0.19
24/07/2020	15:45 - 16:00	0.34	21:15 - 21:30	4.25	06:45 - 07:00	0.04	17:45 - 18:00	1.50
25/07/2020	09:45 - 10:00	0.36	22:00 - 22:15	3.66	18:15 - 18:30	0.08	05:15 - 05:30	1.50
26/07/2020	22:30 - 22:45	0.51	21:45 - 22:00	3.50	08:00 - 08:15	0.04	08:00 - 08:15	0.20
27/07/2020	14:30 - 14:45	0.48	21:15 - 21:30	4.80	01:45 - 02:00	0.03	01:45 - 02:00	1.50
28/07/2020	13:30 - 13:45	0.79	20:45 - 21:00	4.65	18:15 - 18:30	0.19	18:00 - 18:15	2.53
29/07/2020	20:45 - 21:00	0.46	20:30 - 20:45	4.20	02:00 - 02:15	0.12	18:00 - 18:15	1.50
30/07/2020	11:45 - 12:00	0.48	21:15 - 21:30	3.29	18:00 - 18:15	0.08	03:15 - 03:30	1.50
31/07/2020	16:00 - 16:15	0.61	19:45 - 20:00	3.50	13:30 - 13:45	0.10	04:00 - 04:15	1.02

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

Annexure-X**Top Ten Entities (Sellers and Purchasers) in Real Time Market (RTM) in the month of July, 2020**

Entity Name	Sell		Entity Name	Purchase	
	(MU)	Percent (%)		(MU)	Percent (%)
Telangana	185.39	23.61%	UT of J&K and Ladakh	180.75	23.02%
Rajasthan	154.18	19.63%	Odisha	72.85	9.28%
Andhra Pradesh	80.38	10.23%	Karnataka	57.87	7.37%
Haryana	49.88	6.35%	Uttar Pradesh	56.03	7.13%
Maharashtra	47.29	6.02%	NLC	32.10	4.09%
Delhi	40.11	5.11%	Sembcorp Gayatri	29.59	3.77%
Uttar Pradesh	34.59	4.40%	Delhi	27.49	3.50%
Chhattisgarh	29.09	3.70%	Maharashtra	26.98	3.44%
West Bengal	25.70	3.27%	West Bengal	24.87	3.17%
Assam	22.31	2.84%	Adani Power STG3	24.10	3.07%
Total	668.90	85.17%	Total	532.63	67.82%
Total Volume in	785.36		Total Volume in PXs	785.36	

Appendix-I**Analysis for change in trend of Final Scheduled Volume in DAM on 1st Monday of July, 2020 (i.e. on 6th July, 2020)**

During the month of July, 2020, it is observed that on first Monday (i.e. 6th July, 2020), FSV showed decreasing trend in comparison to Sunday (i.e. 5th July, 2020). On analysis of this variation in trends of FSV on above days during July, 2020, it has been observed as under:

- (i) On Monday (6th July, 2020), although there was increase in purchase on power exchange by some of the States in comparison to Sunday (5th July, 2020) by **20.037 MU** [i.e. Punjab (8.88 MU), Telangana (5.13 MU), Tamil Nadu (2.22 MU), Rajasthan (2.19 MU), etc.], however, there was also decrease in purchase on power exchange by some of the States by **21.593 MU** [i.e. Gujarat (5.14 MU), Chhattisgarh (5.02 MU), Uttar Pradesh (3.16 MU), Delhi (2.52 MU) etc.] This resulted in an overall decrease in FSV by **1.556 MU** on Monday (6th July, 2020).

Definitions/ Terminologies used in the Report

1. **Area Clearing Price (ACP)** is price discovered in each time block of concerned bid area. The country has been divided into 13 bid areas for the purpose of calculating prices in Power Exchanges.

13 Bid area are as under:

N1:Jammu and Kashmir, Himachal Pradesh, Chandigarh, Haryana; **N2:** Uttar Pradesh, Uttaranchal, Rajasthan, Delhi; **N3:** Punjab; **E1:** West Bengal, Sikkim, Bihar, Jharkhand; **E2:** Odisha; **W1:** Madhya Pradesh; **W2:** Maharashtra, Gujarat, Daman and Diu, Dadar and Nagar Haveli, North Goa; **W3:** Chhattisgarh; **S1:** Andhra Pradesh, Telangana, Karnataka, Pondicherry (Yanam), South Goa; **S2:** Tamil Nadu, Pondicherry (Puducherry), Pondicherry (Karaikal), Pondicherry (Mahe); **S3:** Kerala; **A1:** Tripura, Manipur, Mizoram, Nagaland; **A2:** Assam, Arunachal Pradesh, Meghalaya.

2. **Average MCP** is the average of daily MCP of the days during the month on which transaction happened.
3. **Daily MCP** is the average of MCP of all 96 Time Blocks of the day during which transaction happened.
4. **Day-Ahead Market (DAM)** on the power exchanges are market for electricity where market participants purchase and sell electricity at financially binding day-ahead prices for the following day.
5. **Elasticity** is percentage of change in MCP with respect to change in independent variable viz. peak demand, average purchase bid, average sell bid, generation from coal based plants, generation from hydro based plants, generation from wind based plants and generation from solar plants.
6. **Energy Supplied** is the total energy (MU) available at the States' periphery.
7. **Final Scheduled Volume** is the total of scheduled volume of all 96 time blocks in a day during the month in which transaction happened.
8. **MCP** is the price discovered in each of the 15 Minute Time Block. The day is divided in 96-time blocks of 15 minutes each.
9. **Real Time Market** on the power exchanges is the market for electricity where market participants buy/ sell electricity on a half-hourly market and would commence with the end of the right to revision of schedule or declared capability and would end with gate closure. The auction sessions would be conducted every half an hour for the delivery of power for the duration of 30 minutes in two-time blocks of 15 minutes each to commence from one hour after the closure of the RTM trading session.
10. **Term Ahead Market (TAM)** on the power exchanges is the market for electricity where market participants buy/sell electricity on a term basis ranging from 3 hours before actual despatch (i.e. intra-day) and up to 11 days in advance. There are 4 types of contracts in TAM, namely; Intra-day, Day Ahead Contingency, Daily and Weekly.