



नवंबर, 2019 की मासिक मार्केट मॉनिटरिंग रिपोर्ट

Monthly Market Monitoring Report

November, 2019



भारत सरकार/ Government of India

विद्युत मंत्रालय/ Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority

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REPORT FOR MONTH: NOVEMBER, 2019

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 in the month of November 2019 was **3,389.26 MU**. The total energy supplied in the country during the month of November, 2019 was **94,182 MU (Provisional)**. The volume of electricity transacted on the power exchanges in DAM represents 3.60% of the total energy supplied in the country. The total volume of electricity transacted in November, 2018 was **3,406.47 MU** which was 3.46% of the total energy supplied [**98,321 MU**].
- 1.2. The volume of electricity transacted on IEX and PXIL during November, 2019 are 3,388.84 MU and 0.42 MU, respectively, which means that the total volume transacted on IEX is 99.99 % of the total volume on the power exchanges. The total volume of electricity transacted during November, 2018 on IEX and PXIL was 3,403.89 MU and 2.58 MU, respectively, which means that the total volume transacted on IEX is 99.92 % of the total volume on the power exchanges.
- 1.3. The Average Market Clearing Price (MCP) on IEX during the month November, 2019 was Rs 2.85/ kWh, which shows a decline of 20.61% when compared with average MCP for the month of November, 2018, which was Rs 3.59/ kWh. Similarly, on PXIL, the Average MCP during November, 2019 was Rs 3.01/kWh, which shows a decline of 26.59% when compared with average MCP for the month of November, 2018, which was Rs 4.10 kWh.

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

- 2.1. A comparison of the Minimum, Maximum and Average of daily MCP during the months of November, 2019 and November, 2018 are as given below:

MCP (Rs/kWh)	IEX			PXIL		
	November, 2019	November, 2018	% Change	November, 2019	November, 2018	% Change
Minimum	2.56	2.73	-6.23	2.91	3.30	-11.82
Maximum	3.29	5.11	-35.62	3.15	4.50	-30.00
Average	2.85	3.59	-20.61	3.01	4.10	-26.59

Table: 1

- 2.2. The maximum Area Clearing Price (ACP) in IEX was observed in southern region at **Rs 7.93 /kWh** during the time block 18:30-18:45 on 23rd November, 2019. Whereas the MCP for this time-block was **Rs 5.31 kWh**, as there was transmission congestion in southern region. However, the Daily MCP on pan India basis on 23rd November, 2019 was **Rs 3.05/ kWh**.
- 2.3. The minimum ACP observed in IEX among all 13 regions was **Rs 1.80 /kWh** during the time block 03:45-04:00 on 8th November, 2019. As there was no congestion in transmission system, the MCP for this time-block was also **Rs 1.80/ kWh**. However, the Daily MCP on pan India basis on 8th November, 2019 was **Rs 2.57/ kWh**.
- 2.4. A comparison of the Minimum and Maximum ACP during the months of November, 2019 and November, 2018 in IEX are as given below:

ACP (Rs/kWh)	IEX		
	November, 2019	November, 2018	% Change
Minimum	7.93	19.99	-60.33
Maximum	1.80	1.50	20.00

Table: 2

- 2.5. A comparison of the Minimum, Maximum and Average Scheduled Volume of electricity transactions happened on IEX and PXIL for a day during the months of November, 2019 and November, 2018 are as given below:

Scheduled Volume (MU)	IEX			PXIL		
	November, 2019	November, 2018	% Change	November, 2019	November, 2018	% Change
Minimum	88.06	85.35	3.18	0.025	0.091	-72.53
Maximum	133.97	174.58	-23.26	0.087	2.400	-96.38
Average	112.96	113.46	-0.44	0.059	0.861	-93.15

Table: 3

- 2.6. The total volume of electricity transacted on both the power exchanges during the period, April to November, 2019, was 31,772.69 MU. The same was 37,649.19 MU during the same period of 2018, which shows a decline of 15.61%. A comparison of Final Scheduled Volume and the Average MCP for the period of April to November, 2019 of IEX and PXIL are given at **Annexure-I**.

3. TERM AHEAD MARKET (TAM)

- 3.1. The total volume of electricity transacted on both the power exchanges in term ahead market in November, 2019 was **589.99 MU** (i.e. 458.83 MU on IEX and 131.16 MU on PXIL), which means that the total volume transacted on IEX was 77.77% and PXIL was 22.23% of total volume in term ahead market in both the power exchanges. The total

volume of electricity transacted during November, 2018 in term ahead market on both the power exchanges was **268.92 MU** (i.e. 157.33 MU on IEX and 111.59 MU on PXIL), which means that the total volume on IEX was 58.50% and PXIL was 41.50% of the total volume on the power exchanges. This shows an increase of 119.39% in TAM during November, 2019 as compared to November, 2018.

- 3.1 With respect to the total energy supplied during the month of November, 2019 in the country the volume of electricity traded on the power exchanges in TAM represents **0.63%** of the total energy supplied. The same was **0.27%** in November, 2018.
- 3.2 The Total Volume of electricity transacted on both the power exchanges during the period, April to November, 2019 in TAM, was 5,908.14 MU. The same was 2,143.69 MU during the same period of 2018, which shows an increase of 175.61%. A comparison of Final Scheduled Volume for the months of April to November, 2019 of IEX and PXIL are given at **Annexure-II**.

4. ANALYSIS OF MOVEMENT OF PRICES OBSERVED IN DAM DURING NOVEMBER, 2019

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 November month. The observations made are as under:

- 4.1 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.
- 4.2 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 only the total purchase bid, total sell bid and peak demand. All the other variables were found to be insignificant. The regression analysis further revealed that the maximum elasticity of the Daily MCP was with respect to total purchase bid and elasticity figure was around 0.39. 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 November, 2019.

4.3 The same relationship is visible from the analysis carried out from the plot in **Figure 1**.

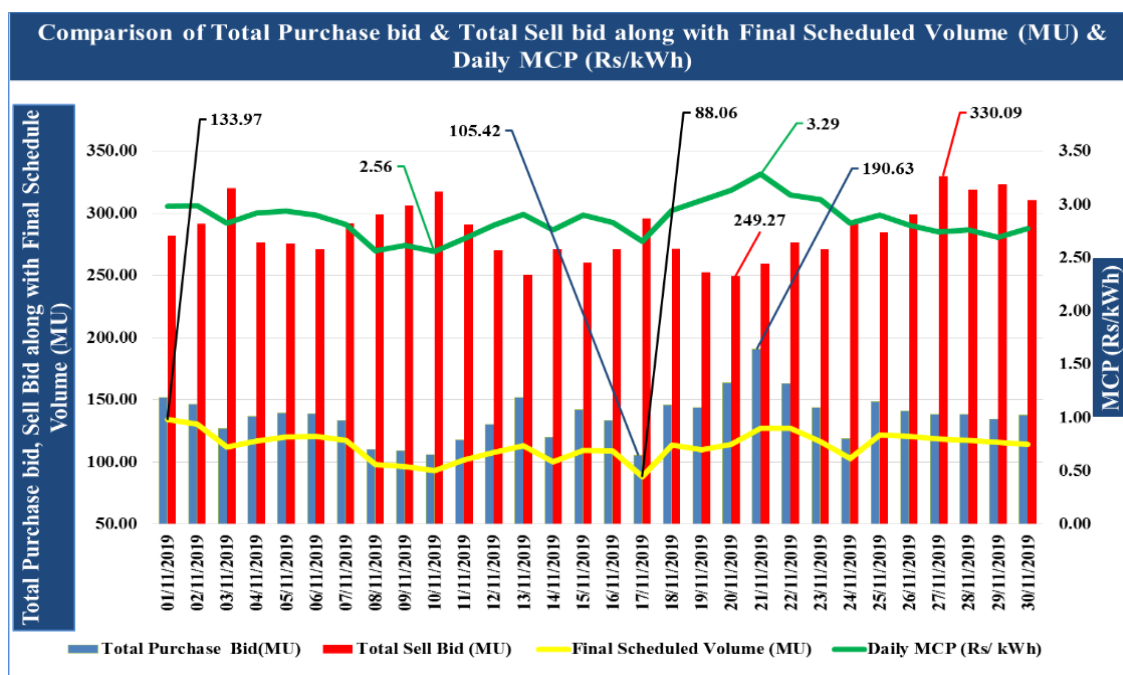


Figure -1

4.4 The Final Scheduled Volume (MU) and the Daily MCP (Rs/ kWh) invariably showed decreasing trend on Sundays as the demand of electricity in the country is less compared to other days of week [**Figure 1**].

4.5 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**.

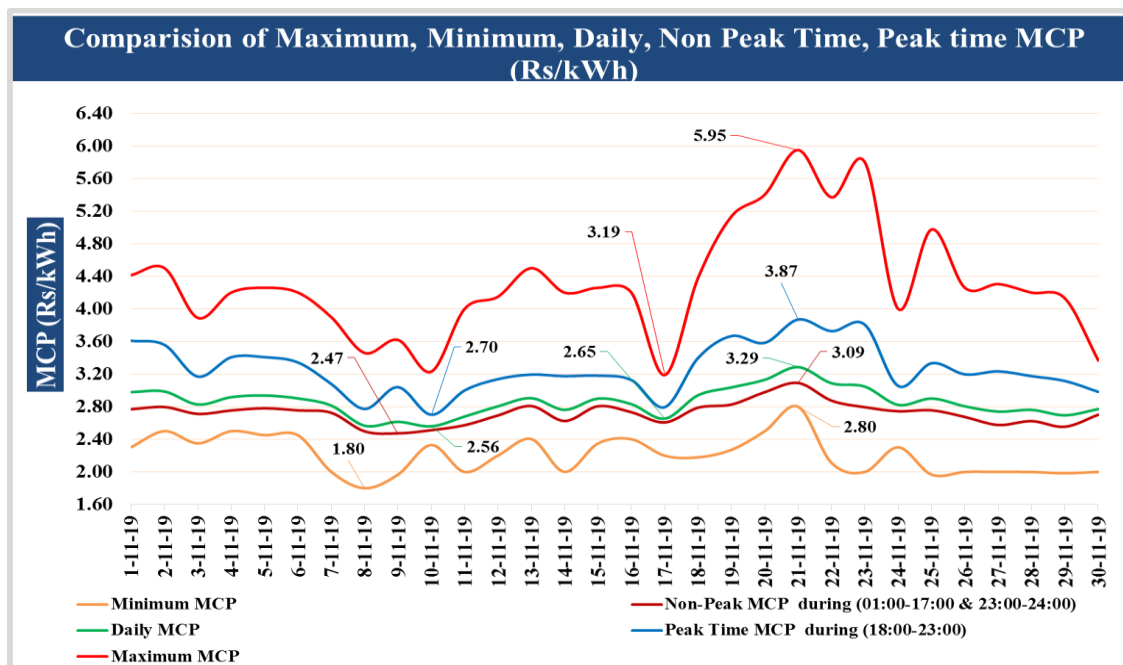


Figure -2

4.6 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 4.1 and 4.2 above.

- 4.7 On **28 days** during the month, the maximum Daily MCP occurred during the **time period 18:00 – 18:45. [Annexure V].**
- 4.8 On **25 days** during the month, the minimum Daily MCP occurred during the **time period 03:15 – 04:15. [Annexure V].**
- 4.9 On **23 days** during the month, the maximum FSV occurred during the **time period 17:15 to 19:30 [Annexure V].**
- 4.10 The maximum demand met during the month of November, 2019 in the country occurred on **19th November 2019 at 155.58 GW**, which is 3.87% less as compared to maximum demand during the month of November, 2018 i.e. **[161.85 GW on 2nd November, 2018].**
- 4.11 One nation One Price was observed for **26 days** during the month, as there was transmission congestion for 4 days (i.e. 20th, 21st, 22nd, and 23rd November, 2019) during the month.
- 4.12 There was no real time curtailment on IEX and PXIL in November, 2019. Also, there was no real time curtailment in November, 2018.
- 4.13 The cumulative real time curtailment during the period April to November, 2019 was **12.68 MU** in DAM. During months of April to November, 2018 the real time curtailment was **72.84 MU** in DAM. The month wise real time curtailment is given at **Annexure-I**
- 4.14 The **top 10 sellers** on the power exchanges during the month are: **Madhya Pradesh, Karnataka, Teesta-3, Assam, Odisha, Sembcorp Gayatri, Rajasthan, Bihar, Jaypee Nigrie and Thermal Powertech** which constituted **54.73%** of the market share. **[Annexure VI]**
- 4.15 The **top 10 purchaser** on the power exchanges during the month are: **Tamil Nadu, Gujarat, Andhra Pradesh, Telangana, Maharashtra, Delhi, West Bengal, Rajasthan, Jammu & Kashmir and Haryana** which constituted **70.50%** of the market share. **[Annexure VI]**

Final Scheduled Volume, Average MCP and Real-Time Curtailment in Day Ahead Market (DAM) for the months of April to November, 2019 of IEX and PXIL

Months	Final Scheduled Volume (MU)		Market Clearing Price (Rs/kWh)		Real Time Curtailment (MU)	
	IEX	PXIL	IEX	PXIL	IEX	PXIL
April, 2019	4,005.41	31.43	3.22	3.75	3.090	-
May, 2019	3,772.47	1.17	3.34	3.45	0.217	-
June, 2019	4,206.68	0.42	3.32	3.48	4.910	-
July, 2019	4,800.37	0.35	3.38	3.21	0.039	-
August, 2019	4,674.88	0.35	3.32	3.10	4.420	-
September, 2019	3,487.57	1.03	2.77	2.85	-	-
October, 2019	3,391.49	9.81	2.71	2.62	-	-
November, 2019	3,388.84	0.42	2.85	3.01	-	-
Total	31,727.71	44.98			12.676	-

[Source: IEX and PXIL]

- There was no real time curtailment.

Annexure-II

Final Scheduled Volume in Term Ahead Market (TAM) for the months of April to November, 2019 of IEX and PXIL

Months	Final Scheduled Volume (MU)		
	IEX	PXIL	Total
April, 2019	334.13	293.47	627.6
May, 2019	326.72	122.10	448.82
June, 2019	368.84	139.22	508.06
July, 2019	523.59	224.35	747.94
August, 2019	808.07	555.51	1,363.58
September, 2019	354.33	390.45	744.78
October, 2019	430.16	447.21	877.37
November, 2019	458.83	131.16	589.99
Total	3,604.67	2,303.47	5,908.14

[Source: IEX and PXIL]

Annexure-III

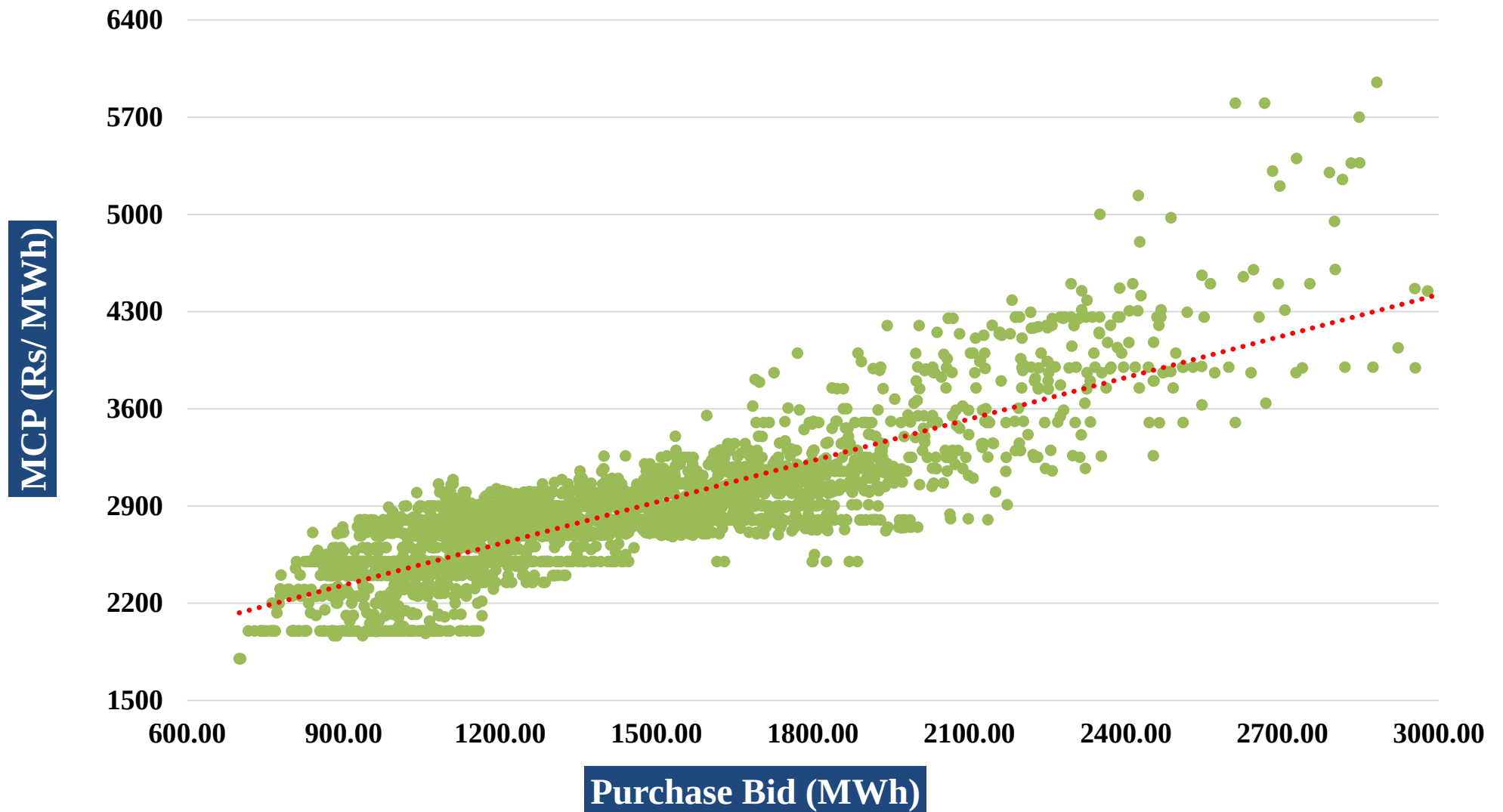
Date	MCP during (01:00-06:00, 23:00-24:00)	MCP during (07:00-10:00)	MCP during (11:00-17:00)	Peak Time MCP during (18:00-23:00)	Non-Peak MCP during (01:00-17:00 & 23:00-24:00)	Maximum MCP	Minimum MCP	Average MCP	Final Scheduled Volume (MU)
01/11/2019	2.69	2.94	2.74	3.61	2.77	4.42	2.30	2.98	133.97
02/11/2019	2.70	2.95	2.80	3.56	2.80	4.50	2.50	2.99	130.61
03/11/2019	2.80	2.85	2.54	3.17	2.71	3.89	2.35	2.83	112.15
04/11/2019	2.62	2.86	2.82	3.41	2.75	4.20	2.50	2.92	116.83
05/11/2019	2.65	2.88	2.85	3.41	2.78	4.26	2.45	2.94	120.32
06/11/2019	2.60	2.86	2.85	3.34	2.75	4.20	2.45	2.90	120.66
07/11/2019	2.50	2.91	2.85	3.08	2.73	3.90	2.00	2.81	117.39
08/11/2019	2.15	2.73	2.71	2.77	2.50	3.46	1.80	2.57	98.17
09/11/2019	2.26	2.72	2.54	3.04	2.47	3.62	1.97	2.61	96.62
10/11/2019	2.51	2.67	2.42	2.70	2.51	3.23	2.33	2.56	93.00
11/11/2019	2.26	2.81	2.75	3.00	2.57	4.00	2.00	2.68	101.89
12/11/2019	2.50	2.95	2.74	3.14	2.69	4.15	2.20	2.80	107.55
13/11/2019	2.62	3.03	2.87	3.19	2.81	4.50	2.40	2.90	113.16
14/11/2019	2.32	2.92	2.76	3.17	2.62	4.20	2.00	2.76	100.32
15/11/2019	2.58	3.06	2.88	3.18	2.81	4.26	2.35	2.90	109.25
16/11/2019	2.55	2.96	2.79	3.13	2.73	4.20	2.40	2.83	108.86
17/11/2019	2.49	2.80	2.61	2.79	2.61	3.19	2.20	2.65	88.06
18/11/2019	2.48	3.09	2.92	3.40	2.79	4.38	2.18	2.94	113.73
19/11/2019	2.57	3.21	2.86	3.67	2.83	5.14	2.27	3.04	109.65
20/11/2019	2.69	3.55	2.94	3.58	2.98	5.40	2.50	3.13	114.27
21/11/2019	2.84	3.50	3.11	3.87	3.09	5.95	2.80	3.29	127.37
22/11/2019	2.55	3.30	2.95	3.73	2.87	5.37	2.11	3.09	126.94
23/11/2019	2.36	3.31	2.93	3.81	2.79	5.80	2.00	3.05	116.14
24/11/2019	2.52	3.05	2.79	3.05	2.74	4.00	2.30	2.82	103.02
25/11/2019	2.16	3.24	3.07	3.33	2.76	4.98	1.97	2.90	121.97
26/11/2019	2.14	3.07	2.98	3.20	2.67	4.26	2.00	2.80	120.54
27/11/2019	2.11	3.03	2.77	3.23	2.58	4.30	2.00	2.74	118.72
28/11/2019	2.20	2.99	2.84	3.17	2.62	4.20	2.00	2.76	117.52
29/11/2019	2.13	2.86	2.80	3.12	2.55	4.13	1.98	2.69	115.92
30/11/2019	2.30	3.05	2.90	2.98	2.70	3.37	2.00	2.77	114.23
Maximum	2.84	3.55	3.11	3.87	3.09	5.95	2.80	3.29	133.97
Minimum	2.11	2.67	2.42	2.70	2.47	3.19	1.80	2.56	88.06
Average	2.46	3.01	2.81	3.26	2.72	4.31	2.21	2.85	112.96

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

[Source: IEX]

Comparison of MCP w.r.t. Purchase Bid for 2880 Time Blocks during the month of November, 2019



Time Blocks during the Month [96 time blocks in a day x 30 days = 2,880]

Annexure-V

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
01/11/2019	19:00 - 19:15	1.95	19:00 - 19:15	4.42	05:45 - 06:00	0.85	04:00 - 04:15	2.30
02/11/2019	19:15 - 19:30	1.96	19:00 - 19:15	4.50	05:45 - 06:00	0.84	03:30 - 03:45	2.50
03/11/2019	17:45 - 18:00	1.70	18:15 - 18:30	3.89	05:45 - 06:00	0.73	13:45 - 14:00	2.35
04/11/2019	19:00 - 19:15	1.85	18:15 - 18:30	4.20	03:45 - 04:00	0.67	03:45 - 04:00	2.50
05/11/2019	19:00 - 19:15	1.77	18:30 - 18:45	4.26	04:45 - 05:00	0.74	04:30 - 04:45	2.45
06/11/2019	11:45 - 12:00	1.80	18:30 - 18:45	4.20	03:45 - 04:00	0.80	03:45 - 04:00	2.45
07/11/2019	17:45 - 18:00	1.92	18:30 - 18:45	3.90	03:00 - 03:15	0.79	04:00 - 04:15	2.00
08/11/2019	17:45 - 18:00	1.54	18:15 - 18:30	3.46	23:15 - 23:30	0.63	03:45 - 04:00	1.80
09/11/2019	11:00 - 11:15	1.39	18:15 - 18:30	3.62	22:30 - 22:45	0.67	04:00 - 04:15	1.97
10/11/2019	18:30 - 18:45	1.24	18:15 - 18:30	3.23	04:30 - 04:45	0.73	13:15 - 13:30	2.33
11/11/2019	09:45 - 10:00	1.52	18:30 - 18:45	4.00	01:00 - 01:15	0.70	03:30 - 03:45	2.00
12/11/2019	18:45 - 19:00	1.51	18:30 - 18:45	4.15	03:00 - 03:15	0.69	04:00 - 04:15	2.20
13/11/2019	11:45 - 12:00	1.81	18:00 - 18:15	4.50	23:15 - 23:30	0.65	22:00 - 22:15	2.40
14/11/2019	11:45 - 12:00	1.51	18:15 - 18:30	4.20	22:30 - 22:45	0.65	02:45 - 03:00	2.00
15/11/2019	11:45 - 12:00	1.59	18:15 - 18:30	4.26	23:15 - 23:30	0.80	04:00 - 04:15	2.35
16/11/2019	17:45 - 18:00	1.47	18:15 - 18:30	4.20	23:15 - 23:30	0.79	03:15 - 03:30	2.40
17/11/2019	17:45 - 18:00	1.37	18:15 - 18:30	3.19	23:45 - 24:00	0.65	03:15 - 03:30	2.20
18/11/2019	17:15 - 17:30	1.70	18:15 - 18:30	4.38	00:00 - 00:15	0.75	03:30 - 03:45	2.18
19/11/2019	19:15 - 19:30	1.83	18:15 - 18:30	5.14	23:45 - 24:00	0.73	03:45 - 04:00	2.27
20/11/2019	17:15 - 17:30	1.79	18:30 - 18:45	5.40	23:45 - 24:00	0.76	03:15 - 03:30	2.50
21/11/2019	17:15 - 17:30	1.91	18:30 - 18:45	5.95	23:45 - 24:00	0.91	03:30 - 03:45	2.80
22/11/2019	17:30 - 17:45	2.14	18:00 - 18:15	5.37	23:30 - 23:45	0.89	03:30 - 03:45	2.11
23/11/2019	17:45 - 18:00	1.96	18:00 - 18:15	5.80	23:45 - 24:00	0.68	04:00 - 04:15	2.00
24/11/2019	18:15 - 18:30	1.46	18:15 - 18:30	4.00	23:45 - 24:00	0.71	04:00 - 04:15	2.30
25/11/2019	18:00 - 18:15	1.92	18:15 - 18:30	4.98	04:45 - 05:00	0.78	04:00 - 04:15	1.97
26/11/2019	18:15 - 18:30	1.95	18:15 - 18:30	4.26	05:00 - 05:15	0.79	04:00 - 04:15	2.00
27/11/2019	17:45 - 18:00	1.95	18:15 - 18:30	4.30	22:45 - 23:00	0.83	04:00 - 04:15	2.00
28/11/2019	17:45 - 18:00	1.88	18:00 - 18:15	4.20	22:15 - 22:30	0.80	04:00 - 04:15	2.00
29/11/2019	18:30 - 18:45	1.75	18:15 - 18:30	4.13	22:30 - 22:45	0.79	04:00 - 04:15	1.98
30/11/2019	09:45 - 10:00	1.53	18:00 - 18:15	3.37	22:30 - 22:45	0.83	04:00 - 04:15	2.00

[Source: IEX]

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

Top Ten Entity (Sellers and Purchaser) during the month of November, 2019

Entity Name	Sell		Entity Name	Purchase	
	(MU)	Percent (%)		(MU)	Percent (%)
Madhya Pradesh	287.74	8.49%	Tamil Nadu	387.98	11.45%
Karnataka	277.91	8.20%	Gujarat	341.46	10.07%
Teesta -3	218.04	6.43%	Andhra Pradesh	299.02	8.82%
Assam	197.14	5.82%	Telangana	287.37	8.48%
Odisha	184.14	5.43%	Maharashtra	267.09	7.88%
Sembcorp Gayatri	153.21	4.52%	Delhi	179.02	5.28%
Rajasthan	149.44	4.41%	West Bengal	170.37	5.03%
Bihar	146.68	4.33%	Rajasthan	153.77	4.54%
Jaypee Nigrie	136.27	4.02%	J&K	152.11	4.49%
Thermal Powertech	104.53	3.08%	Haryana	151.24	4.46%
Total	1,855.09	54.73%	Total	2,389.43	70.50%
Total Volume in PXs	3,389.26		Total Volume in PXs	3,389.26	

[Source: POSOCO]

Definitions/ Terminologies used in the Report

Area Clearing Price (ACP) is area clearing price in each time block in each of 13 bid areas. 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.

1. **Daily MCP** is the average of MCP of all 96 Time Blocks of the day during which transaction happened.
2. **Average MCP** is the average of daily MCP of the days during the month on which transaction happened.
3. **Average Scheduled Volume** is the average of scheduled volume of the days during the month on 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. **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.
8. **Term Ahead Market (TAM)** on the power exchanges are 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, Intraday, Day Ahead Contingency, Daily and Weekly.