

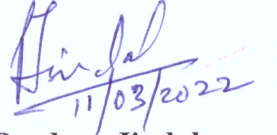


भारत सरकार/ Government of India
विद्युत मंत्रालय/ Ministry of Power
केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority
आर. ए. प्रभाग/ Regulatory Affairs Division

Subject: Monthly Market Monitoring Report for the month of December, 2021-reg.

The monthly market monitoring report for the month of December, 2021 with detailed overview of electricity transaction happened in the power exchanges and other short term markets is annexed below for reference.

The report comprises total volume of electricity transacted, prices discovered, transmission congestion, real-time curtailment, top buyers and sellers, share of discoms, analysis of variation in prices discovered, factors affecting price discovery during the month and many other observations for Day Ahead Market, Real Time Market, Green Day Ahead Market, Term Ahead Market and Green Term Ahead Market.


11/03/2022

Pardeep Jindal
Chief Engineer (RA)

To

All Stake holders



सत्यमेव जयते

दिसंबर, 2021 मासिक मार्केट मॉनिटरिंग रिपोर्ट

Monthly Market Monitoring Report

December, 2021



भारत सरकार/ Government of India

विद्युत मंत्रालय/ Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority

आर. ए. प्रभाग/ Regulatory Affairs Division

मार्केट मॉनिटरिंग सेल /Market Monitoring Cell

दिनांक: 10.03.2022

TABLE OF CONTENTS

S.N.	Title	Page
1.	Summary of Report	7
2.	Day Ahead Market (DAM)	10
3.	Summary of the Day Ahead Market in the Power Exchanges	10
4.	Term Ahead Market (TAM)	12
5.	Real Time Market (RTM)	15
6.	Green Term Ahead Market(GTAM)	16
7.	Green Day Ahead Market (GDAM)	24
8.	Bilateral Transactions	26
9.	Analysis of movement of prices observed in DAM Transactions in December, 2021	27
10.	Analysis of Movement of prices observed in RTM Transactions in December, 2021	31

TABLES

1.	Table: 1A	Daily MCP of IEX and PXIL in DAM for December, 2021 vs November, 2021	11
2.	Table: 1B	Daily MCP of IEX and PXIL in DAM for December, 2021 vs December, 2020	11
3.	Table: 2A	ACP of IEX and PXIL in DAM for December, 2021 vs November, 2021	11
4.	Table: 2B	ACP of IEX and PXIL in DAM for December, 2021 vs December, 2020	12
5.	Table: 3A	FSV of IEX and PXIL in DAM for December, 2021 vs November, 2021	12
6.	Table: 3B	FSV of IEX and PXIL in DAM for December, 2021 vs December, 2020	12
7.	Table: 4A	Volume transacted in TAM in PXs for December, 2021 vs November, 2021 (on trade date basis)	13
8.	Table: 4B	Volume transacted in TAM in PXs for December, 2021 vs December, 2020 (on trade date basis)	13
9.	Table: 4C	Average MCP of IEX and PXIL in TAM for December, 2021vs November, 2021 and December, 2020 (on trade date basis)	13
10.	Table: 4D	FSV of IEX and PXIL in TAM for December, 2021 vs November, 2021 (on delivery date basis)	14
11.	Table: 4E	FSV of IEX and PXIL in TAM for December, 2021 vs December, 2020 (on delivery date basis)	15
12.	Table: 4F	Average MCP of IEX and PXIL in TAM for December, 2021vs November, 2021 and December, 2020 (on delivery date basis)	15
13.	Table: 5A	FSV of IEX and PXIL in RTM for December, 2021 vs November, 2021 and December, 2020	16
14.	Table: 5B	Daily MCP of IEX and PXIL in RTM for December, 2021 vs November, 2021 and December, 2020	16
15.	Table: 5C	ACP of IEX and PXIL in RTM for December, 2021 vs November, 2021 and December, 2020	16
16.	Table:6A	FSV of IEX and PXIL in Solar Segment of GTAM for December, 2021vs November, 2021(on Trade date basis)	17

17.	Table: 6B	Daily MCP of IEX and PXIL in Solar Segment of GTAM for December, 2021 vs November, 2021 (on trade date basis)	18
18.	Table: 6C	FSV of IEX and PXIL in Solar Segment of GTAM for December, 2021 vs November, 2021 (on delivery date basis)	19
19.	Table: 6D	Daily MCP of IEX and PXIL in Solar Segment of GTAM for December, 2021 vs November, 2021 (on delivery date basis)	20
20.	Table: 6E	FSV of IEX & PXIL in Non-Solar Segment of GTAM for December, 2021 vs November, 2021 (on trade date basis)	21
21.	Table: 6F	Daily MCP of IEX & PXIL in Non-Solar Segment of GTAM for December, 2021 vs November, 2021 (on trade date basis)	22
22.	Table: 6G	FSV of IEX & PXIL in Non-Solar Segment of GTAM for December, 2021 vs November, 2021 (on delivery date basis)	23
23.	Table: 6H	Daily MCP of IEX & PXIL in Non-Solar Segment of GTAM for December, 2021 vs November, 2021 (on delivery date basis)	24
24.	Table: 7A	FSV of GDAM in IEX for December, 2021	25
25.	Table: 7B	Daily MCP and ACP of GDAM in IEX for December, 2021	25
26.	Table: 8A	Total volume in Bilateral transaction for December, 2021	26
27.	Table: 8B	Region wise volume in Bilateral transaction for December, 2021	26

FIGURES

1.	Figure: 1	Comparison of volume of electricity transacted through both PXs together in DAM and Bilateral buy (Direct and through Traders)	27
2.	Figure: 2	Comparison of Total Purchase, Sell bids along with FSV and Daily MCP in DAM	28
3.	Figure: 3	Comparison of Maximum, Minimum, Daily, Evening Time MCP (Rs/kWh) in DAM	28
4.	Figure: 4	MCP duration curve for 2976 Time Blocks in December, 2021 in DAM	29
5.	Figure: 5	Daily MCP duration curve for the period 1 st April, 2021 to 30 th December, 2021 in DAM	29
6.	Figure: 6	Comparison of Total Purchase, Sell bids along with FSV and Daily MCP in RTM	31
7.	Figure: 7	Comparison of Maximum, Minimum, Daily, Evening Time MCP (Rs/kWh) in RTM	32
8.	Figure: 8	MCP duration curve for 2976 Time Blocks in December, 2021 in RTM	32
9.	Figure: 9	Daily MCP duration curve for the period 1 st April, 2021 to 30 th December, 2021 in RTM	32

ANNEXURES

1.	Annexure I	FSV and Average MCP in DAM for the months April, 2021 to March, 2022	35
2.	Annexure II	FSV in TAM for the months April, 2021 to March, 2022 (on delivery and trade date basis)	36
3.	Annexure-III	Top Five Entity (Buyers and Sellers) in Bilateral transactions in December, 2021	37

4.	Annexure-IV	All MCPs vis: Evening, Day, Night, Morning, Maximum, Minimum, Average MCP (Rs/kWh) and Final Schedule Volume (MU) in DAM in December, 2021	38
5.	Annexure-V	Comparison of MCP w.r.t. Purchase Bid for 2976 Time Blocks during the month of December, 2021 in DAM	39
6.	Annexure-VI	Max. FSV, Min FSV, Max MCP and Min MCP w.r.t. all Time blocks in DAM in December, 2021	40
7.	Annexure-VII	Sellers and Purchasers of Electricity in DAM in December, 2021	41
8.	Annexure-VIII	All MCPs vis: Evening, Day, Night, Morning, Maximum, Minimum, Average MCP (Rs/kWh) and Final Schedule Volume (MU) in RTM in December, 2021	43
9.	Annexure-IX	Comparison of MCP w.r.t. Purchase Bid for 2976 Time Blocks during the month of December, 2021 in RTM	44
10.	Annexure-X	Max. FSV, Min FSV, Max MCP and Min MCP w.r.t. all Time blocks in December, 2021 in RTM	45
11.	Annexure-XI	Sellers and Purchasers of Electricity in RTM in December, 2021	46
12.	Annexure-XII	Cross Border Transactions of Electricity with Nepal in DAM in IEX in December, 2021	48

APPENDIX

1.	Appendix-I	Analysis for change in trend of Final Scheduled Volume in DAM during December, 2021 on 1 st Sunday (i.e. 5 th December, 2021)	49
2.	Appendix-II	Definitions/ Terminologies used in the Report	50

MARKET MONITORING REPORT
FOR THE MONTH OF DECEMBER, 2021

SUMMARY

SUMMARY FOR MONTH: DECEMBER, 2021

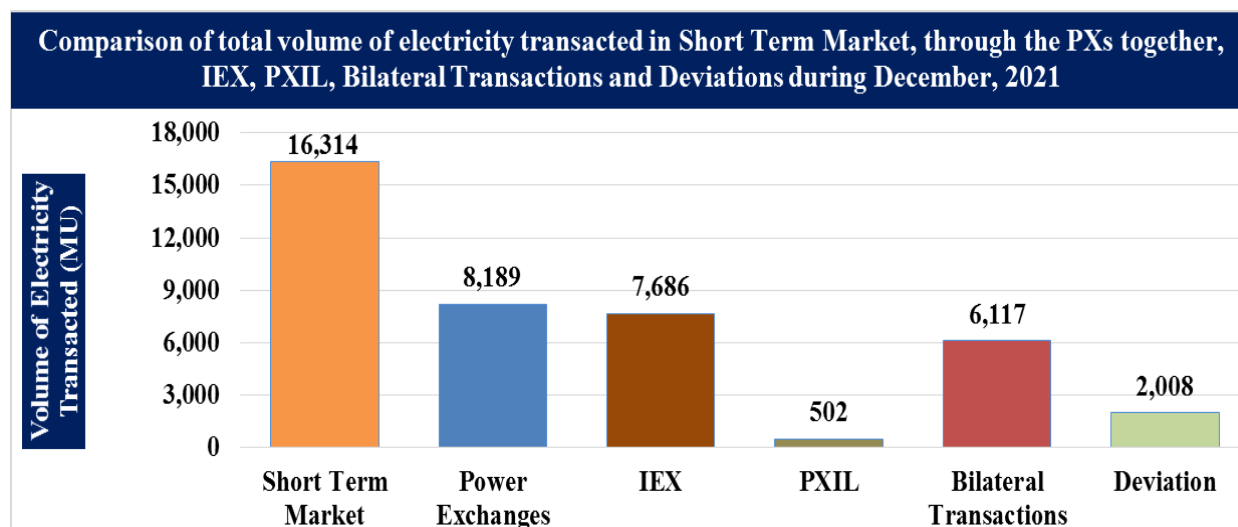
SUMMARY OF ELECTRICITY TRANSACTIONS ON POWER EXCHANGES IN INDIA

- A total volume of **8,188.65 MU** electricity was transacted in both the power exchanges i.e. IEX & PXIL, during the month of December, 2021. This volume of electricity is on delivery date basis and includes transactions through DAM, GDAM, RTM, TAM and GTAM market segments.

Segment	Transactions happened in PXs (IEX and PXIL combined)			
	FSV (MU)	Average MCP (Rs/kWh)	Congestion	Real Time Curtailment
DAM	5,424.15	3.88	-	-
GDAM	157.20	4.72	-	-
RTM	1,512.39	3.61	0.06	-
TAM	643.00	4.02	-	0.77
GTAM	451.91	4.20	-	-
Total in PXs	8,188.65	3.87*	0.66	0.77

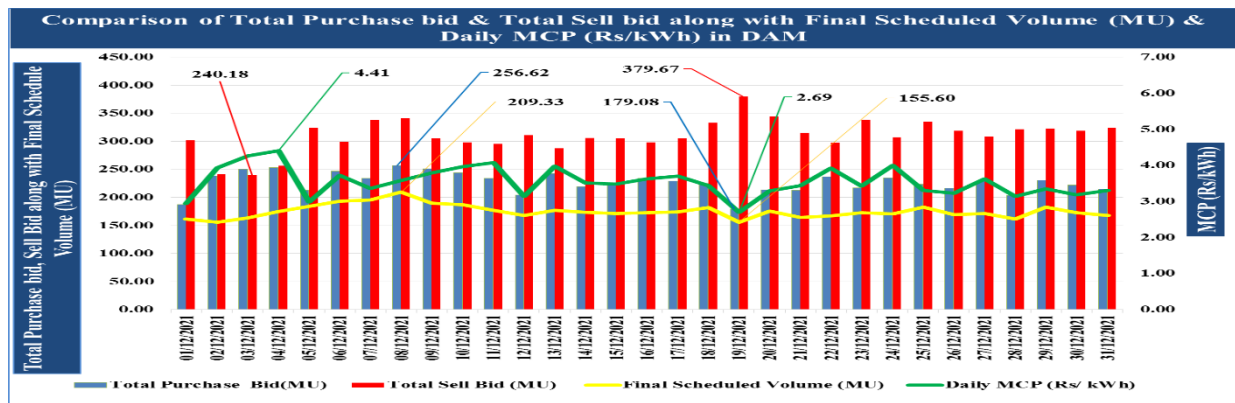
* The total average is weighted average of all market segments.

- Under the Bilateral trade a total of **6,117 MU** of electricity was transacted and **2,008 MU** was transferred as deviation. Thus a total of **16,314 MU** of electricity was transacted as short term trade. In the month of December, 2021 a total of **109,177 MU** of electricity was supplied in the country, thus the share of short term market in the total volume of electricity traded in December was **14.94 %**.

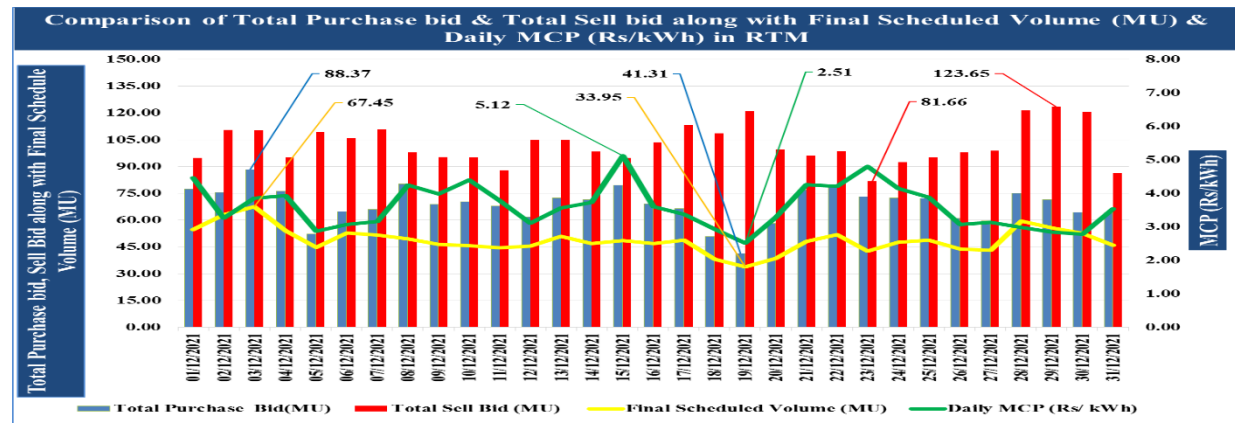


- The total volume of congestion that happened during the month of December, 2021 was **0.06 MU** which is only 0.0007 % of the total volume of electricity transacted in the power exchanges and 0.00006 % of total energy supplied during the month of December, 2021. There was no congestion observed in DAM, GDAM, TAM and GTAM in December, 2021, whereas there was congestion in RTM on 14th December, 2021. The total volume of real time curtailment reported in the month of December, 2021 was only **0.77 MU**. The total volume of electricity scheduled at ISTS during the month of December, 2021 was **51,223 MU**. **The total volume of electricity transacted in the short term market was 31.85 % of total volume schedule at ISTS in the month of December, 2021.**
- The variation of Purchase and Sell bids, Final Scheduled Volume and Daily MCP in DAM and RTM during the month of December, 2021 are shown in following figures:

DAM Volume

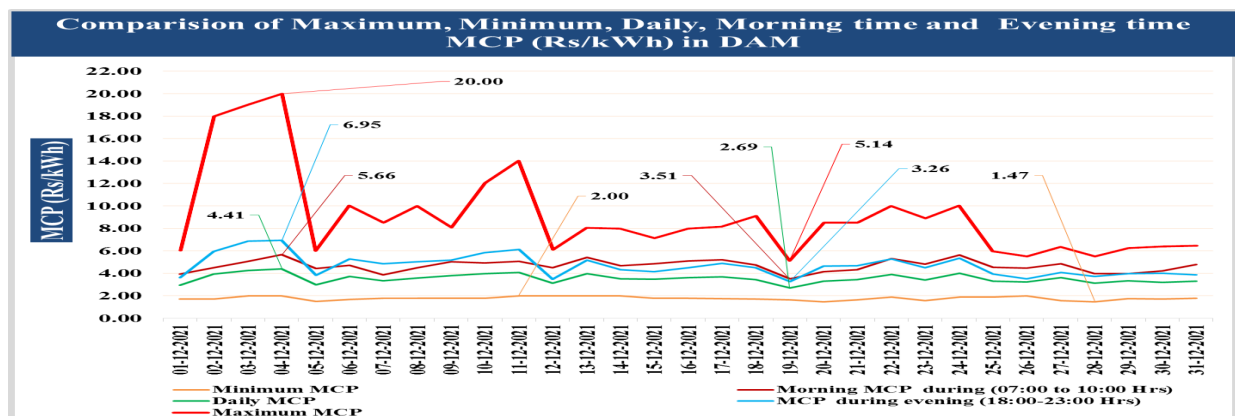


RTM Volume

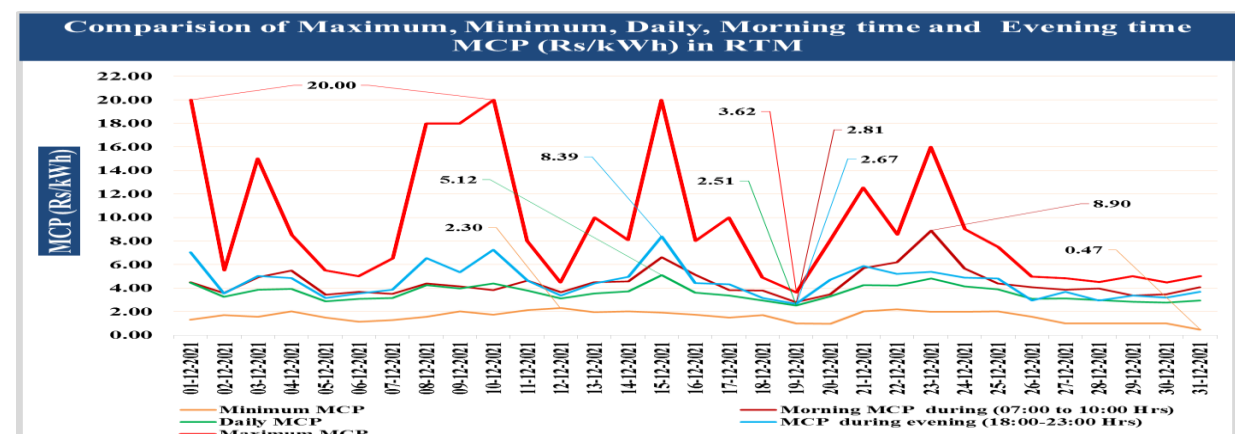


- The variation of Maximum, Minimum, Daily, Morning and Evening time MCPs in DAM and RTM during the month of December, 2021 are shown in following figures:

DAM Prices



RTM Prices



OVERVIEW OF REPORT

REPORT FOR MONTH: DECEMBER, 2021

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 December, 2021 was **5,424.15 MU**. The total energy supplied in the country during the month of December, 2021 was 109,177 MU. Thus, the volume of electricity transacted on both the power exchanges in DAM during December, 2021 was 4.97 % of the total energy supplied in the country. Comparing with the total volume of electricity transacted in DAM during the past month .i.e. November, 2021, it was **4,719.50 MU** which was 4.75% of the total energy supplied [99,324 MU] in the country during November, 2021. Similarly, the total volume of electricity transacted in DAM during previous year .i.e. December, 2020, it was **5,611 MU** which was 5.31 % of the total energy supplied [105,623 MU] in the country during December, 2020.
- 1.2. The volume of electricity transacted on IEX and PXIL during December, 2021 were **5,423.27 MU and 0.88 MU**, respectively, which means that the total volume transacted on IEX was **99.98 %** of the total volume on power exchanges. The volume of electricity transacted on IEX and PXIL during November, 2021 were **4,718.76 MU and 0.74 MU**, respectively, which means that the total volume transacted on IEX was **99.98 %** of the total volume on power exchanges. Also, the volume of electricity transacted on IEX and PXIL during December, 2020, were **5,605.58 MU and 5.42 MU** respectively.
- 1.3. There was Cross Border Transactions of Electricity of **74.86 MU** (69.03 MU buy and 5.83 MU sell) with Nepal in DAM in IEX during December, 2021. Whereas, there was Cross Border Transactions of Electricity of **26.21 MU** (Sell only) with Nepal in DAM in IEX during November, 2021.
- 1.4. The Average Market Clearing Price (MCP) on IEX during the month of December, 2021 was **Rs 3.54/kWh**, which shows an increase of **14.94 %** and **25.09 %** when compared with average MCP's for the month of November, 2021 and December, 2020, which were **Rs 3.08/kWh and Rs 2.83/kWh**, respectively. On PXIL, the average MCP during the month of December, 2021 was **Rs 4.23/kWh**, which shows an increase of **14.02 %** and **29.75 %** when compared with average MCP's for the month of November, 2021 and December, 2020, which were **Rs 3.71/kWh and Rs 3.26/kWh** respectively.

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

- 2.1. A comparison of the Minimum, Maximum and Average of Daily MCP during the month of December, 2021 with that of November, 2021 and December, 2020 is given in Table- 1A & 1B:

(a) December, 2021 vis- a -vis November, 2021

Daily MCP (Rs/kWh)	IEX			PXIL		
	December, 2021	November, 2021	% Change	December, 2021	November, 2021	% Change
Minimum	2.69	1.96	37.24	2.16	2.99	-27.76
Maximum	4.41	3.83	15.14	5.50	4.99	10.22
Average	3.54	3.08	14.94	4.23	3.71	14.02

Table: 1A**(b) December, 2021 vis- a –vis December, 2020**

Daily MCP (Rs/kWh)	IEX			PXIL		
	December, 2021	December, 2020	% Change	December, 2021	December, 2020	% Change
Minimum	2.69	2.54	5.91	2.16	2.55	-15.29
Maximum	4.41	3.25	35.69	5.50	4.53	21.41
Average	3.54	2.83	25.09	4.23	3.26	29.75

Table: 1B

- 2.2. The maximum Area Clearing Price (ACP) of **Rs 20.00/kWh** in IEX was observed in all 13 regions during the time blocks 18:15-18:30 Hrs & 18:30-18:45 Hrs on 4th December, 2021. As there was no congestion in transmission system, the MCP for these time-block dates was also **Rs 20.00/kWh**. However, the Daily MCP in IEX on 4th December, 2021 was **Rs 4.41/kWh**. Whereas, in PXIL, the maximum ACP of **Rs 5.50/kWh** was observed in all 13 regions during the time blocks **17:15-17:30 Hrs & 17:30-17:45 Hrs** on 25th December, 2021. As there was no congestion in transmission system, the MCP for above time blocks was also **Rs 5.50/kWh**. Also, the Daily MCP in PXIL on 25th December, 2021 was **Rs 4.11/kWh**.
- 2.3. The minimum ACP of **Rs 1.47/kWh** in IEX was observed in all 13 regions during the time block **3:45-4:00 Hrs** on 20th December, 2021. As there was no congestion in transmission system, the MCP for this time-block was also **Rs 1.47/kWh** on 20th December, 2021. However, the Daily MCP in IEX on pan India basis on 4th December, 2021 was **Rs 3.29/kWh**. Whereas, in PXIL, the minimum ACP of **Rs 1.85/kWh** was observed in all 13 regions during the 14 consecutive time blocks **01:15-01:45 to 04:30-04:45** on 22nd December, 2021. As no congestion was there in transmission system, the MCP for the above time periods were also **Rs 1.85/kWh**. Moreover, the Daily MCP in PXIL on 22nd December, 2021 was **Rs 2.45/kWh**.
- 2.4. A comparison of the Minimum and Maximum Area Clearing Price (ACP) during the months of December, 2021 with that of November, 2021 and December, 2020 is given in Table-2A&2B:

(a) December, 2021 vis- a -vis November, 2021

ACP (Rs/kWh)	IEX			PXIL		
	December, 2021	November, 2021	% Change	December, 2021	November, 2021	% Change
Minimum	1.47	1.37	7.30	1.85	2.99	-38.13
Maximum	20.00	20.00	0.00	5.50	5.99	-8.18

Table: 2A**(b) December, 2021 vis- a- vis December, 2020**

ACP (Rs/kWh)	IEX			PXIL		
	December, 2021	December, 2020	% Change	December, 2021	December, 2020	% Change
Minimum	1.47	1.57	-6.37	1.85	2.00	-7.50
Maximum	20.00	6.05	230.58	5.50	5.99	-8.18

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 December, 2021 with that of November, 2021 and December, 2020 is given in Table- 3A & 3B:

(a) December, 2021 vis- a- vis November, 2021

Final Scheduled Volume (MU)	IEX			PXIL		
	December, 2021	November, 2021	% Change	December, 2021	November, 2021	% Change
Minimum	155.60	108.16	43.86	0.01	0.02	-50.00
Maximum	209.33	180.05	16.26	0.28	0.20	40.00
Average	174.94	157.29	11.22	0.05	0.07	-28.57

Table: 3A**(b) December, 2021 vis- a- vis December, 2020**

Final Scheduled Volume (MU)	IEX			PXIL		
	December, 2021	December, 2020	% Change	December, 2021	December, 2020	% Change
Minimum	155.60	143.02	8.80	0.01	0.02	-50.00
Maximum	209.33	207.05	1.10	0.28	0.38	-26.32
Average	174.94	180.83	-3.26	0.05	0.18	-72.22

Table: 3B**3. TERM AHEAD MARKET (TAM)****Term Ahead Market (TAM) (on Trade Date Basis)**

- 3.1.** The total volume of electricity transacted on both the power exchanges in Term Ahead Market in December, 2021 on trade date basis was **721.42 MU**, out of which, **421.34 MU** (58.40%) was transacted on IEX and **300.08 MU** (41.60%) was transacted on PXIL.
- 3.2.** The total volume of electricity transacted on both the power exchanges in Term Ahead Market in December, 2021 on trade date basis was **573.44 MU**, out of which, **291.20 MU** (50.78 %) was transacted on IEX and **282.24 MU** (49.22 %) was transacted on PXIL.
- 3.3.** Similarly, total volume of electricity transacted during December, 2020 in Term Ahead Market on trade date basis on both the power exchanges was **1,295.67 MU**, out of which, **371.59 MU** (28.68%) was transacted on IEX and **924.08 MU** (71.32 %) was transacted on PXIL.

3.4. With respect to the total energy supplied during month of December, 2021 in the country, the volume of electricity traded on power exchanges in TAM on trade date basis represents **0.66 %** of the total energy supplied. The same was **0.58%** in November, 2021 and **1.23 %** in December, 2020.

3.5. In the month of December, 2021, there was no transmission congestion in IEX & PXIL in TAM in the month of December, 2021.

3.6. The comparison of total volume of electricity transacted and Average MCP on both the power exchanges in Term Ahead Market (TAM) during December, 2021 with November, 2021 and December, 2020 is given in Table- 4A, 4B & 4C:

(a) December, 2021 vis- a- vis November, 2021 (on trade Date Basis)

Contract Type	IEX			PXIL		
	December, 2021	November, 2021	% Change	December, 2021	November, 2021	% Change
Intra Day (MU)	0.87	0.15	480.00	6.05	1.66	264.46
Day Ahead Contingency(MU)	73.67	106.25	-30.66	258.03	246.98	4.47
Daily/ AnyDay (MU)	346.80	184.80	87.66	36.00	33.60	7.14
Weekly (MU)	-	-	NA	-	-	NA

- : No Transaction happened

NA: Not Applicable

Table: 4A

(b) December, 2021 vis- a- vis December, 2020 (on trade Date Basis)

Contract Type	IEX			PXIL		
	December, 2021	December, 2020	% Change	December, 2021	December, 2020	% Change
Intra Day (MU)	0.87	5.04	-82.74	6.05	18.70	-67.65
Day Ahead Contingency(MU)	73.67	14.69	401.50	258.03	-	NA
Daily/ AnyDay (MU)	346.80	351.86	-1.44	36.00	905.38	-96.02
Weekly (MU)	-	-	NA	-	-	NA

- : No Transaction happened

NA: Not Applicable

Table: 4B

(c) Average MCP, December, 2021 vis- a- vis December, 2020 and November, 2021 (on trade Date Basis)

Exchange	Period	Average MCP (Rs/kWh)			
		Intra Day	Day Ahead Contingency	Daily or Any Day	Weekly
IEX	December, 2021	3.36	4.69	3.28	-
	November, 2021	11.15	3.37	3.22	-
	%Change (Month over Month)	-69.87	39.17	1.86	NA
	December, 2020	3.76	3.12	2.57	-
	%Change (Year over Year)	-10.64	50.32	27.63	NA
PXIL	December, 2021	5.42	4.12	3.10	-
	November, 2021	4.58	3.22	3.40	-
	%Change (Month over Month)	18.34	27.95	-8.82	NA
	December, 2020	3.26	-	2.78	-

	%Change (Year over Year)	66.26	NA	11.51	NA
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-: No transaction happened

NA: Not Applicable

Table: 4C**Term Ahead Market (TAM) (on delivery Date Basis)**

- 3.7. The total volume of electricity transacted on both the power exchanges in Term Ahead Market in December, 2021 on delivery date basis was **643.00 MU**, out of which, **379.77 MU** (59.06%) was transacted on IEX and **263.23 MU** (40.94%) was transacted on PXIL.
- 3.8. The total volume of electricity transacted on both the power exchanges in Term Ahead Market in December, 2021 on delivery date basis was **579.13 MU**, out of which, **302.75 MU** (52.28 %) was transacted on IEX and **276.38 MU** (47.72 %) was transacted on PXIL.
- 3.9. Similarly, total volume of electricity transacted during December, 2020 in Term Ahead Market on both the power exchanges on delivery date basis was **1,365.45 MU**, out of which, **435.72 MU** (31.91 %) was transacted on IEX and **929.73 MU** (68.09%) was transacted on PXIL.
- 3.10. With respect to the total energy supplied during the month of December, 2021 in the country, the volume of electricity traded on the power exchanges in TAM on delivery date basis represents **0.59 %** of the total energy supplied. The same was **0.58 %** in November, 2021 and **1.29 %** in December, 2020.
- 3.11. In the month of December, 2021, there was no real time curtailment in IEX. Whereas, there was real time curtailment of **0.77 MU** in PXIL in Day Ahead Contingency contract in TAM.
- 3.12. **The comparison of total volume of electricity transacted and Average MCP in both the power exchanges in Term Ahead Market (TAM) on delivery date basis during December, 2021 with November, 2021 and December, 2020 is given in Table – 4D, 4E & 4 F:**

(a) December, 2021 vis- a- vis November, 2021 (on Delivery Date Basis)

Contract Type	IEX			PXIL		
	December 2021	November, 2021	% Change	December, 2021	November, 2021	% Change
Intra Day (MU)	0.87	0.15	480.00	6.05	1.66	264.46
Day Ahead Contingency(MU)	72.90	107.24	-32.02	253.58	241.12	5.17
Daily/Any Day (MU)	276.00	195.36	41.28	3.60	33.60	-89.29
Weekly (MU)	-	-	NA	-	-	NA

- : No transaction happened

NA: Not Applicable

Table: 4D**(b) December, 2021 vis- a- vis December, 2020 (on Delivery Date Basis)**

Contract Type	IEX			PXIL		
	December, 2021	December, 2020	% Change	December, 2021	December, 2020	% Change
Intra Day (MU)	0.87	5.04	-82.74	6.05	18.70	-67.65

Day Ahead Contingency MU)	72.90	14.47	403.80	253.58	-	NA
Daily/ Any Day (MU)	276.00	416.21	-33.69	3.60	911.03	-99.60
Weekly (MU)	-	-	NA	-	-	NA

-: No transaction happened

NA: Not Applicable

Table: 4E

(c) Average MCP, December, 2021 vis- a- vis December, 2020 and November, 2021 (on Delivery Date Basis)

Exchange	Period	Average MCP (Rs/kWh)			
		Intra Day	Day Ahead Contingency	Daily or Any Day	Weekly
IEX	December, 2021	3.36	4.66	3.36	-
	November, 2021	11.15	3.37	3.19	-
	% Change (Month over Month)	-69.87	38.28	5.33	NA
	December, 2020	3.76	3.11	2.58	-
	% Change (Year over Year)	-10.64	49.84	30.23	NA
PXIL	December, 2021	5.42	3.85	3.50	-
	November, 2021	4.58	3.22	3.40	-
	% Change (Month over Month)	18.34	19.57	2.94	NA
	December, 2020	3.23	-	2.74	-
	% Change (Year over Year)	67.80	NA	27.74	NA

-: No transaction happened

NA: Not Applicable

Table: 4F

4. REAL TIME MARKET (RTM)

The transaction of Electricity in Real Time Market was started from 1st June, 2020 with the approval of the CERC in both the power exchanges - IEX and PXIL. The total volume of electricity transacted on both the power exchanges in Real Time Market in December, 2021 was **1,512.39 MU**, out of which, **1,512.39 MU** (100 %) was transacted in IEX and no transaction happened in PXIL. The Final Scheduled Volume (FSV), Daily Market Clearing Prices (MCP) and Area Clearing Prices (ACP) in Real Time Market during the month of December, 2021 as compared with November, 2021 and December, 2020 are as given in table 5A, 5B & 5C:

(i) Final Scheduled Volume:

Exchange	Period	Final Scheduled Volume (MU)			
		Total	Minimum	Maximum	Average
IEX	December, 2021	1512.39	33.95	67.45	48.79
	November, 2021	1311.35	31.36	56.17	43.71
	Change % (Month over Month)	15.33	8.26	20.08	11.62
	December, 2020	1129.09	24.09	51.34	36.42
	Change % (Year over Year)	33.95	40.93	31.38	33.96

PXIL	December, 2021	-	-	-	-
	November, 2021	-	-	-	-
	Change % (Month over Month)	NA	NA	NA	NA
	December, 2020	-	-	-	-
	Change % (Year over Year)	NA	NA	NA	NA

-: No transaction happened

NA: Not Applicable

Table-5A**(ii) Daily Market Clearing Price (MCP):**

Exchange	Period	Daily MCP (Rs/kWh)		
		Minimum	Maximum	Average
IEX	December, 2021	2.51	5.12	3.61
	November, 2021	2.08	5.43	3.48
	Change % (Month over Month)	20.67	-5.71	3.74
	December, 2020	2.40	3.76	294
	Change % (Year over Year)	4.58	36.17	-98.77
PXIL	December, 2021	-	-	-
	November, 2021	-	-	-
	Change % (Month over Month)	NA	NA	NA
	December, 2020	-	-	-
	Change % (Year over Year)	NA	NA	NA

-: No transaction happened

NA: Not Applicable

Table-5B**(iii) Area Clearing Price (ACP):**

Exchange	Period	ACP (Rs/kWh)	
		Minimum	Maximum
IEX	December, 2021	0.95	20.00
	November, 2021	0.50	20.00
	Change % (Month over Month)	90.00	0.00
	December, 2020	0.90	15.00
	Change % (Year over Year)	5.56	33.33
PXIL	December, 2021	-	-
	November, 2021	-	-
	Change % (Month over Month)	NA	NA
	December, 2020	-	-
	Change % (Year over Year)	NA	NA

-: No transaction happened

NA: Not Applicable

Table -5C**5. GREEN TERM AHEAD MARKET (GTAM):**

The transaction of electricity in Green Term Ahead Market was started in IEX w.e.f. 21st August, 2020 onwards, whereas, in PXIL, GTAM (Non-Solar) was started w.e.f. 24th March, 2021 and GTAM (Solar) w.e.f. June, 2021 onwards. The total volume of electricity transacted in both the power exchanges in GTAM on trade date basis was **451.91 MU** (181.89 MU in Solar and 270.02 MU in non-Solar), whereas, the same on delivery date basis was **447.88 MU** (170.91 MU in Solar and 276.97 MU in Non-Solar), respectively. The total volume of electricity transacted in Solar Energy Segment in GTAM in Day Ahead Contingency, Intraday, Daily/ Anyday and Weekly contracts during December, 2021 on trade date basis and delivery date basis has been shown in Tables 6A to 6H.

5.1. Solar Energy Segment in GTAM (On Trade date basis)

The Final Scheduled Volume and the Price of electricity transacted in GTAM in IEX & PXIL during December, 2021 and its comparison with November, 2021 has been shown in Table 6A & 6B below.

(i) Final Scheduled Volume:

Exch-ange	Solar Energy Contract	Period	Final Scheduled Volume (MU)			
			Total	Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	60.83	0.15	6.53	1.96
		November, 2021	173.88	0.50	13.00	5.80
		%Change (Month over Month)	-65.02	-70.00	-49.77	-66.21
		December, 2020	61.61	0.05	6.69	2.20
		%Change (Year over Year)	-1.27	200.00	-2.39	-10.91
	Intraday	December, 2021	4.33	0.02	1.51	0.14
		November, 2021	1.52	0.04	0.06	0.05
		%Change (Month over Month)	184.87	-50.00	2416.67	180.00
		December, 2020	0.32	0.16	0.16	0.16
		%Change (Year over Year)	1253.13	-87.50	843.75	-12.50
IEX	Daily/ Anyday	December, 2021	-	-	-	-
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
		December, 2020	-	-	-	-
		%Change (Year over Year)	NA	NA	NA	NA
	Weekly	December, 2021	-	-	-	-
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
		December, 2020	5.95	2.45	3.50	2.98
		%Change (Year over Year)	NA	NA	NA	NA
PXIL	Day Ahead Contingency	December, 2021	105.60	1.19	9.31	3.52
		November, 2021	49.56	0.96	4.84	1.98
		%Change (Month over Month)	113.08	23.96	92.36	77.78
	Intraday	December, 2021	0.15	0.15	0.15	0.15
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
	Daily/ Anyday	December, 2021	-	-	-	-
		November, 2021	52.75	9.80	26.95	17.58
		%Change (Month over Month)	NA	NA	NA	NA
	Weekly	December, 2021	-	-	-	-
		November, 2021	-	-	-	-
		%Change	NA	NA	NA	NA

		(Month over Month)				
-: No transaction happened			NA: Not Applicable			

Table-6A

(ii) Daily Market Clearing Price (MCP):

Exchange	Solar Energy Contract	Period	Prices(Rs/kWh)		
			Minimum	Maximum	Average
-	Day Ahead Contingency	December, 2021	3.41	4.11	3.73
		November, 2021	3.24	4.40	3.72
		% Change (Month over Month)	5.25	-6.59	0.27
		December, 2020	3.41	5.15	4.00
		% Change (Year over Year)	0.00	-20.19	-6.75
	Intraday	December, 2021	3.30	3.63	3.43
		November, 2021	3.50	3.50	3.50
		% Change (Month over Month)	-5.71	3.71	-2.00
		December, 2020	3.86	4.00	3.93
		% Change (Year over Year)	-14.51	-9.25	-12.72
	Daily/Anyday	December, 2021	-	-	-
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
		December, 2020	-	-	-
		% Change (Year over Year)	NA	NA	NA
	Weekly	December, 2021	-	-	-
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
		December, 2020	3.70	3.70	3.70
		% Change (Year over Year)	NA	NA	NA
PXIL	Day Ahead Contingency	December, 2021	3.51	4.16	3.79
		November, 2021	3.30	4.00	3.66
		% Change (Month over Month)	6.36	4.00	3.55
	Intraday	December, 2021	3.41	3.41	3.41
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
	Daily/ Anyday	December, 2021	-	-	-
		November, 2021	3.50	3.60	3.53
		% Change (Month over Month)	NA	NA	NA
	Weekly	December, 2021	-	-	-
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA

-: No transaction happened

NA: Not Applicable

Table-6B

5.2. Solar Energy Segment in GTAM (On Delivery date basis)

The Final Scheduled Volume and the Price of electricity transacted in GTAM in IEX & PXIL during December, 2021 and its comparison with November, 2021 has been shown in Table 6C & 6D below.

(i) Final Scheduled Volume:

Exch-ange	Solar Energy Contract	Period	Final Scheduled Volume (MU)			
			Total	Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	66.45	0.15	6.53	2.14
		November, 2021	177.20	0.50	13.00	5.91
		%Change (Month over Month)	-62.50	-70.00	-49.77	-63.79
		December, 2020	68.54	0.05	7.09	2.45
		%Change (Year over Year)	-3.05	200.00	-7.90	-12.65
	Intraday	December, 2021	4.33	0.02	1.51	0.14
		November, 2021	1.52	0.04	0.06	0.05
		%Change (Month over Month)	184.87	-50.00	2416.67	180.00
		December, 2020	0.32	0.16	0.16	0.16
		%Change (Year over Year)	1253.13	-87.50	843.75	-12.50
	Daily/ Anyday	December, 2021	-	-	-	-
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
		December, 2020	-	-	-	-
		%Change (Year over Year)	NA	NA	NA	NA
	Weekly	December, 2021	-	-	-	-
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
		December, 2020	5.95	0.85	0.85	0.85
		%Change (Year over Year)	NA	NA	NA	NA
PXIL	Day Ahead Contingency	December, 2021	103.96	0.96	9.32	3.47
		November, 2021	48.61	1.16	4.84	2.03
		%Change (Month over Month)	113.87	-17.24	92.56	70.94
	Intraday	December, 2021	0.15	0.15	0.15	0.15
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
	Daily/Anyday	December, 2021	7.00	1.40	1.40	1.40
		November, 2021	65.26	1.40	11.22	2.84
		%Change (Month over Month)	-89.27	0.00	-87.52	-50.70
	Weekly	December, 2021	-			
		November, 2021	-			

:- No transaction happened

NA: Not Applicable

Table-6C

(ii) Daily Market Clearing Price (MCP):

Exchange	Solar Energy Contract	Period	Prices(Rs/kW)		
			Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	3.41	4.11	3.73
		November, 2021	3.24	4.40	3.72
		%Change (Month over Month)	5.25	-6.59	0.27
		December, 2020	3.41	5.00	3.94
		%Change (Year over Year)	0.00	-17.80	-5.33
		December, 2021	3.30	3.63	3.43
	Intraday	November, 2021	3.50	3.50	3.50
		%Change (Month over Month)	-5.71	3.71	-2.00
		December, 2020	3.86	4.00	3.93
		%Change (Year over Year)	-14.51	-9.25	-12.72
		December, 2021	-	-	-
	Daily/Anyday	November, 2021	-	-	-
		%Change (Month over Month)	NA	NA	NA
		December, 2020	-	-	-
		%Change (Year over Year)	NA	NA	NA
		December, 2021	-	-	-
	Weekly	November, 2021	-	-	-
		%Change (Month over Month)	NA	NA	NA
		December, 2020	3.70	3.70	3.70
		%Change (Year over Year)	NA	NA	NA
		December, 2021	3.51	4.16	3.79
PXIL	Day Ahead Contingency	November, 2021	3.30	4.00	3.67
		%Change (Month over Month)	6.36	4.00	3.27
		December, 2021	3.41	3.41	3.41
	Intraday	November, 2021	-	-	-
		%Change (Month over Month)	NA	NA	NA
		December, 2021	3.50	3.50	3.50
	Daily/Anyday	November, 2021	3.50	3.60	3.53
		%Change (Month over Month)	0.00	-2.78	-0.85
		December, 2021	-	-	-
	Weekly	November, 2021	-	-	-
		December, 2021	-	-	-

-: No transaction happened

NA: Not Applicable

Table-6D

- In December, 2021, there was no transmission congestion in GTAM (Solar) in both IEX & PXIL.
- In December, 2021, there was no real time curtailment in GTAM (Solar) in both IEX & PXIL.

5.3. Non-Solar Energy Segment in GTAM (On Trade date basis)

The total volume of electricity transacted on both the power exchanges in non-Solar Energy Segment in GTAM in Day Ahead Contingency, Intraday, Daily/ Anyday and Weekly contracts during December, 2021 on trade date basis and delivery date basis has been shown in Tables 6E to 6H.

The Final Scheduled Volume and the Price of electricity transacted in Non-Solar GTAM in IEX & PXIL during December, 2021 on trade date basis and its comparison with November, 2021 has been shown in Table 6E & 6F below.

(i) Final Scheduled Volume:

Exchange	Non- Solar Energy Contract	Period	Final Scheduled Volume (MU)			
			Total	Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	142.14	0.28	9.86	4.59
		November, 2021	125.92	0.22	12.01	4.20
		%Change (Month over Month)	12.88	27.27	-17.90	9.29
		December, 2020	21.00	0.38	1.51	0.68
		%Change (Year over Year)	576.86	-26.32	552.98	575.00
	Intraday	December, 2021	-	-	-	-
		November, 2021	0.43	0.43	0.43	0.43
		%Change (Month over Month)	NA	NA	NA	NA
		December, 2020	0.20	0.02	0.18	0.10
		%Change (Year over Year)	NA	NA	NA	NA
	Daily/ Anyday	December, 2021	0.15	0.15	0.15	0.15
		November, 2021	0.59	0.25	0.34	0.29
		%Change (Month over Month)	-74.58	-40.00	-55.88	-48.28
		December, 2020	-	-	-	-
		%Change (Year over Year)	NA	NA	NA	NA
	Weekly	December, 2021	0.65	0.22	0.22	0.22
		November, 2021	0.34	0.34	0.34	0.34
		%Change (Month over Month)	-91.18	-35.29	-35.29	-35.29
		December, 2020	0.70	0.70	0.70	0.70
		%Change (Year over Year)	-7.14	-68.57	-68.57	-68.57
PXIL	Day Ahead Contingency	December, 2021	131.67	0.45	9.35	4.25
		November, 2021	17.50	0.30	0.89	0.58
		%Change (Month over Month)	652.40	50.00	950.56	632.76
	Intraday	December, 2021	1.40	1.40	1.40	1.40
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
	Daily/ Anyday	December, 2021	0.96	0.96	0.96	0.96
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
	Weekly	December, 2021	-			

		November, 2021	-
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-: No transaction happened

NA: Not Applicable

Table-6E

(ii) Daily Market Clearing Price (MCP):

Exchange	Non- Solar Energy Contract	Period	Prices(Rs/kWh)		
			Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	3.60	4.29	4.00
		November, 2021	3.56	4.84	4.03
		%Change (Month over Month)	1.12	-11.36	-0.74
		December, 2020	3.47	4.15	3.97
		%Change (Year over Year)	3.75	3.37	0.76
	Intraday	December, 2021	-	-	-
		November, 2021	3.65	3.65	3.65
		%Change (Month over Month)	NA	NA	NA
		December, 2020	3.40	3.64	3.52
		%Change (Year over Year)	NA	NA	NA
	Daily/ Anyday	December, 2021	4.65	4.65	4.65
		November, 2021	4.65	4.65	4.65
		%Change (Month over Month)	0.00	0.00	0.00
		December, 2020	-	-	-
		%Change (Year over Year)	NA	NA	NA
	Weekly	December, 2021	4.65	4.65	4.65
		November, 2021	4.65	4.65	4.65
		%Change (Month over Month)	0.00	0.00	0.00
		December, 2020	4.00	4.00	4.00
		%Change (Year over Year)	16.25	16.25	16.25
PXIL	Day Ahead Contingency	December, 2021	3.61	4.31	3.83
		November, 2021	4.02	4.27	4.13
		% Change (Month over Month)	-10.20	0.94	-7.26
	Intraday	December, 2021	7.00	7.00	7.00
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
	Daily/ Anyday	December, 2021	4.40	4.40	4.40
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
	Weekly	December, 2021	-	-	-
		November, 2021	-	-	-

-: No transaction happened

NA: Not Applicable

Table-6F

5.4. Non-Solar Energy Segment in GTAM (On Delivery date basis)

The Final Scheduled Volume and the Price of electricity transacted in GTAM in IEX & PXIL during December, 2021 and its comparison with November, 2021 has been shown in Table 6G & 6H below.

(i) Final Scheduled Volume:

Exch- ange	Non- Solar Energy Contract	Period	Final Scheduled Volume (MU)			
			Total	Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	141.83	0.28	9.86	4.58
		November, 2021	127.57	0.22	12.01	4.25
		%Change (Month over Month)	11.18	27.27	-17.90	7.76
		December, 2020	21.11	0.38	1.51	0.68
		%Change (Year over Year)	571.86	-26.32	552.98	573.53
	Intraday	December, 2021	-	-	-	-
		November, 2021	0.43	0.43	0.43	0.43
		%Change (Month over Month)	NA	NA	NA	NA
		December, 2020	0.20	0.02	0.18	0.10
		%Change (Year over Year)	NA	NA	NA	NA
	Daily/Anyday	December, 2021	0.31	0.03	0.03	0.03
		November, 2021	0.43	0.05	0.05	0.05
		%Change (Month over Month)	-27.91	-40.00	-40.00	-40.00
		December, 2020	-	-	-	-
		%Change (Year over Year)	NA	NA	NA	NA
	Weekly	December, 2021	0.65	0.03	0.03	0.03
		November, 2021	0.34	0.05	0.05	0.05
		%Change (Month over Month)	91.18	-40.00	-40.00	-40.00
		December, 2020	0.70	0.10	0.10	0.10
		%Change (Year over Year)	-7.14	-70.00	-70.00	-70.00
PXIL	Day Ahead Contingency	December, 2021	125.83	0.30	9.35	4.06
		November, 2021	18.04	0.31	0.89	0.60
		%Change (Month over Month)	597.51	-3.23	950.56	576.67
	Intraday	December, 2021	1.40	1.40	1.40	1.40
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
	Daily/Anyday	December, 2021	-	-	-	-
		November, 2021	-	-	-	-
		%Change (Month over Month)	NA	NA	NA	NA
	Weekly	December, 2021	-			
		November, 2021	-			

-: No transaction happened

NA: Not Applicable

Table-6G

(ii) Daily Market Clearing Price (MCP):

Exchange	Non- Solar Energy Contract	Period	Prices(Rs/kW)		
			Minimum	Maximum	Average
IEX	Day Ahead Contingency	December, 2021	3.60	4.40	4.02
		November, 2021	3.56	4.84	4.00
		% Change (Month over Month)	1.12	-9.09	0.50
		December, 2020	3.47	4.15	3.97
		% Change (Year over Year)	3.75	6.02	1.26
	Intraday	December, 2021	-	-	-
		November, 2021	3.65	3.65	3.65
		% Change (Month over Month)	NA	NA	NA
		December, 2020	3.40	3.64	3.52
		% Change (Year over Year)	NA	NA	NA
	Daily/Anyday	December, 2021	4.65	4.65	4.65
		November, 2021	4.65	4.65	4.65
		% Change (Month over Month)	0.00	0.00	0.00
		December, 2020	-	-	-
		% Change (Year over Year)	NA	NA	NA
	Weekly	December, 2021	4.65	4.65	4.65
		November, 2021	4.65	4.65	4.65
		% Change (Month over Month)	0.00	0.00	0.00
		December, 2020	4.00	4.00	4.00
		% Change (Year over Year)	16.25	16.25	16.25
PXIL	Day Ahead Contingency	December, 2021	3.61	4.31	3.85
		November, 2021	4.02	4.26	4.12
		% Change (Month over Month)	-10.20	1.17	-6.55
	Intraday	December, 2021	7.00	7.00	7.00
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
	Daily/Anyday	December, 2021	-	-	-
		November, 2021	-	-	-
		% Change (Month over Month)	NA	NA	NA
	Weekly	December, 2021	-		
		November, 2021	-		

-: No transaction happened

NA: Not Applicable

Table-6H

- In December, 2021, there was no transmission congestion in GTAM (Non-Solar) in both IEX & PXIL.
- In December, 2021, there was no real time curtailment in GTAM (Solar) in both IEX & PXIL.

6. GREEN DAY AHEAD MARKET (GDAM):

The transaction of electricity in Green Day Ahead Market (GDAM) has been started in IEX from 27th December, 2021 with the approval of the CERC. The total volume of electricity transacted in GDAM in the month of December, 2021 was **157.20 MU** at an average price MCP of **Rs 4.72/kWh**. The Final Scheduled Volume (FSV), Daily Market Clearing Prices (MCP), Area Clearing Prices (ACP), Real Time Curtailment and details of Transmission Congestion under these 3 segments in Green Day Ahead Market during the month of December, 2021 are given below:

i) Final Scheduled Volume in IEX:

Segment	Period	Final Scheduled Volume (MU)			
		Total	Minimum	Maximum	Average
Solar	December, 2021	102.67	1.45	5.70	3.31
	November, 2021	129.25	1.06	7.16	4.31
	% Change Month over Month	-20.56	36.79	-20.39	-23.20
Non Solar	December, 2021	54.53	1.12	2.17	1.76
	November, 2021	20.22	0.18	1.44	0.67
	% Change Month over Month	169.68	522.22	50.69	162.69
Hydro	December, 2021	-	-	-	-
	November, 2021	-	-	-	-

-: No transaction happened

NA: Not Applicable

Table-7A

ii) Daily Market Clearing Price (MCP) and Area Clearing Price (ACP):

Exchange	Period	Prices (Rs/kWh)				
		Daily MCP (Rs/kWh)			ACP (Rs/kWh)	
		Minimum	Maximum	Average	Minimum	Maximum
Solar and Non Solar	December, 2021	4.24	5.36	4.72	3.04	13.90
	November, 2021	3.85	5.04	4.48	0.80	13.30
	% Change Month over Month	10.13	6.35	5.36	280.00	4.51

-: No transaction happened

NA: Not Applicable

Table-7B

- 6.1.** In the month of December, 2021, there was no transmission congestion in IEX in Green Day Ahead Market, hence one nation one price was observed for all **31 days** during the month. Similarly, in the month of November, 2021, there was no transmission congestion in IEX in GDAM, hence one nation one price was observed for all **30 days** during the month.
- 6.2.** There was **no** real time curtailment in IEX in Green Day Ahead Market during the month of December, 2021 and November, 2021, respectively.
- 6.3.** The **top 10 sellers** on the power exchanges in **Green Day Ahead Market (GDAM)** in the month of December, 2021 were **Karnataka, Telangana, Madhya Pradesh, J&K, Azure Power Forty Three Private Limited, Renew Solar Energy (Jharkhand Three) Pvt Ltd (RSEJTPL), Andhra Pradesh, Renew Solar Urja Private Limited, Adani wind Energy**

Kutchh Five Limited and Adani Green Solar Jaisalmer, which constituted **98.09 %** of the market volume.

6.4. The top 10 purchasers on the power exchanges in **Green Day Ahead Market (GDAM)** in the month of December, 2021 were **Dadra & Nagar Haveli, Delhi, Assam, Odisha, Haryana, West Bengal, Maharashtra, Kerala, Tamil Nadu and Daman & Diu**, which constituted **98.01%** of the market volume.

7. BILATRAL TRANSACTIONS:

The total volume of electricity transacted through **Bilateral transactions** in the month of December, 2021 was **6,117.41 MU**. The total buy volume of electricity transacted in bilateral market through direct transactions and traders in the month of December, 2021 were **1,950.87 MU** and **4,166.54 MU** respectively. The details of Bilateral transactions of Electricity happened during December, 2021 have been shown in Table Below:

December, 2021	Direct	Traders	Total Bilateral Transaction (MU)
Total	1950.87	4166.54	6,117.41
Minimum	1.14	0.87	-
Maximum	1147.10	1171.20	-

Table -8A

The region-wise maximum/ minimum volume of electricity transaction happened bilaterally during December, 2021 are given in table below:

(i) Region-wise Volume:

Region-wise Volume (MU)	ER		WR		NR		SR		NER	
	Direct	Trader	Direct	Trader	Direct	Trader	Direct	Trader	Direct	Trader
Total	241.74	786.44	1532.54	1518.97	149.06	1691.78	27.53	51.51	0.00	68.30
Minimum	9.90	0.87	4.65	12.24	1.14	5.88	13.61	24.00	0.00	2.02
Maximum	140.13	523.14	1147.10	1171.20	83.24	472.27	13.92	27.51	0.00	55.47

Table -8B

7.1. The top 5 buyers on bilateral transaction through direct transactions in the month of December, 2021 were **Madhya Pradesh, AMNSIL_WR, Jharkhand, Maharashtra, and West Bengal**, which constituted **84.45 %** of the market volume. Whereas **top 5 buyers** on bilateral transaction through traders in the month of December, 2021 were **Gujarat, Odisha, Rajastham, Himachal Pradesh and Uttarakhand**, which constituted **70.84 %** of the market volume. [Annexure III]

7.2. The top 5 sellers on bilateral transaction through direct transactions in the month of December, 2021 were **Punjab, Chhattisgarh, Uttar Pradesh, DB Power and Adhunik Power**, which constituted **67.80 %** of the market volume. Whereas **top 5 sellers** on bilateral transaction through traders in the month of December, 2021 were **JITPL, Raipur Energen, Delhi, Raigarh Energy and Karnatak**, which constituted **46.64%** of the market volume. [Annexure III]

7.3. Deviation Volume - The volume of Deviation observed in the month of November, 2021 in import and export were **1,953.76 MU** and **2,062.74 MU** respectively. The total volume of Deviation observed in the month of November, 2021 can be taken as **2,008.25 MU**.

7.4. A comparison of volume of electricity transacted through both the Power Exchanges together in DAM, TAM, RTM, GTAM, GDAM (on delivery date basis) with Bilateral transactions and Deviation in the month of December, 2021 is shown in **Figure 1**:

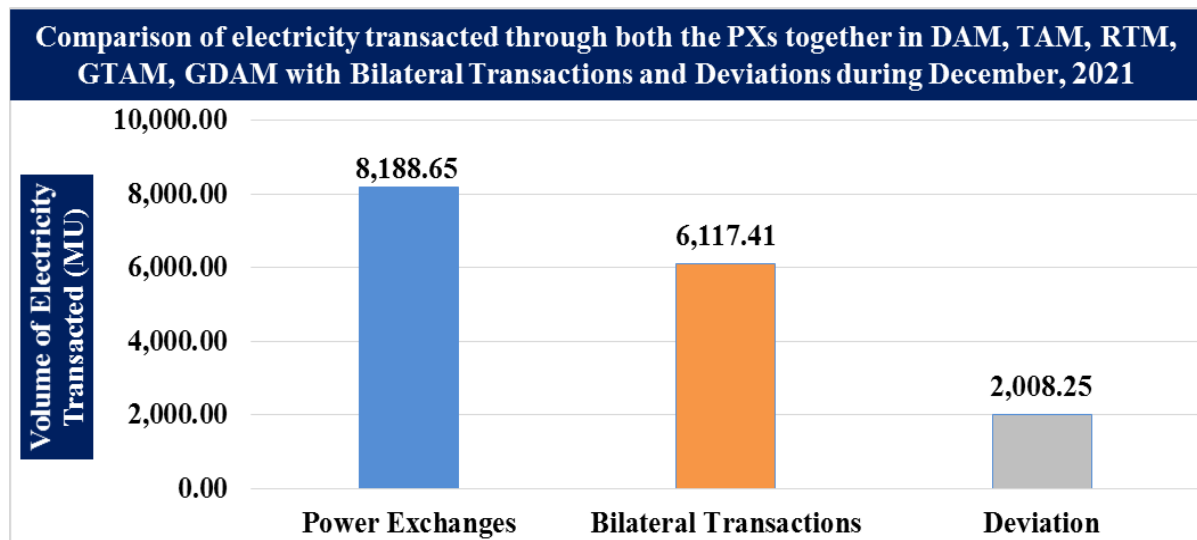


Figure -1

8. ANALYSIS OF MOVEMENT OF PRICES OBSERVED IN DAM DURING DECEMBER, 2021

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 December, 2021 month. The observations made are as under:

- 8.1.** 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.
- 8.2.** 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 variable were the total purchase bid, sell bid and wind 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 **0.52**, which signifies that there is high multi-collinearity among the predictor variables/ independent variables used in regression analysis.
- 8.3.** The same relationship is visible from the analysis carried out from the plot in **Figure 2**.

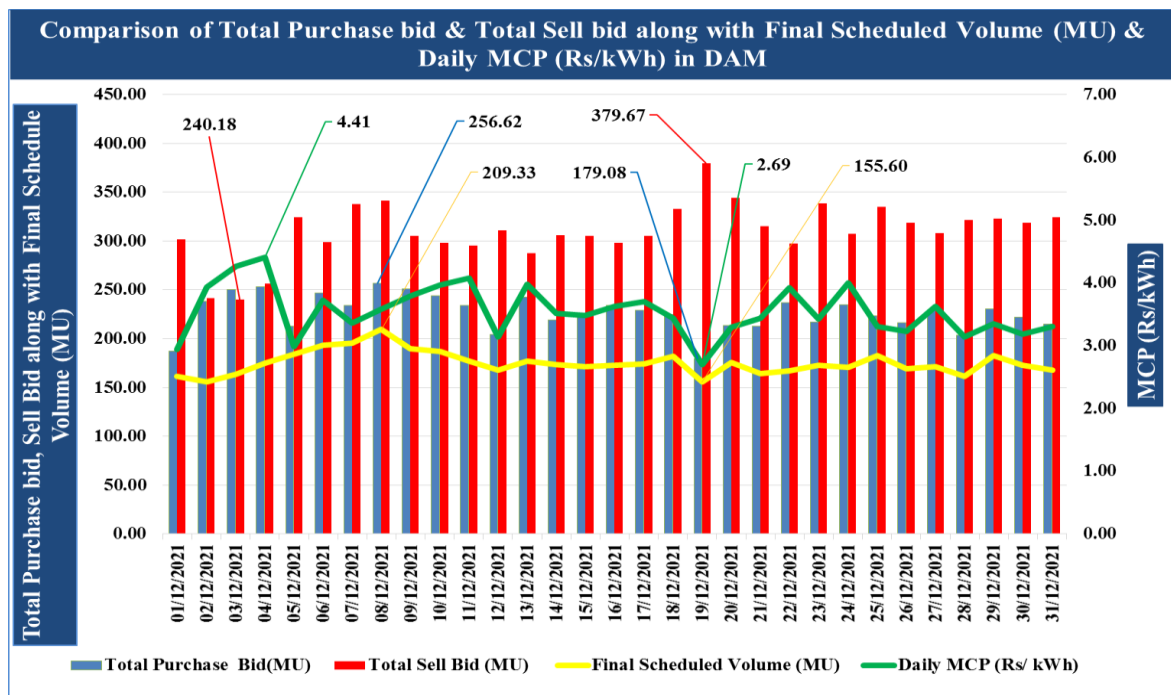


Figure -2

8.4. Invariably, the Final Scheduled Volume (MU) and the Daily MCP (Rs/kWh) showed decreasing trend on Sundays and increasing trend on Mondays as the demand of electricity in the country was less on Sundays as compared to other days of week. However, during the month of December, 2021, it is observed that on first Sunday (5th December, 2021), FSV showed increasing trend in comparison to first Saturday (4th December, 2021). The detailed analysis on this is given at **Appendix-I**.

8.5. A comparison of maximum, minimum, daily, evening time MCP is shown in **Figure -3**. The same are also tabulated in **Annexure-IV**.

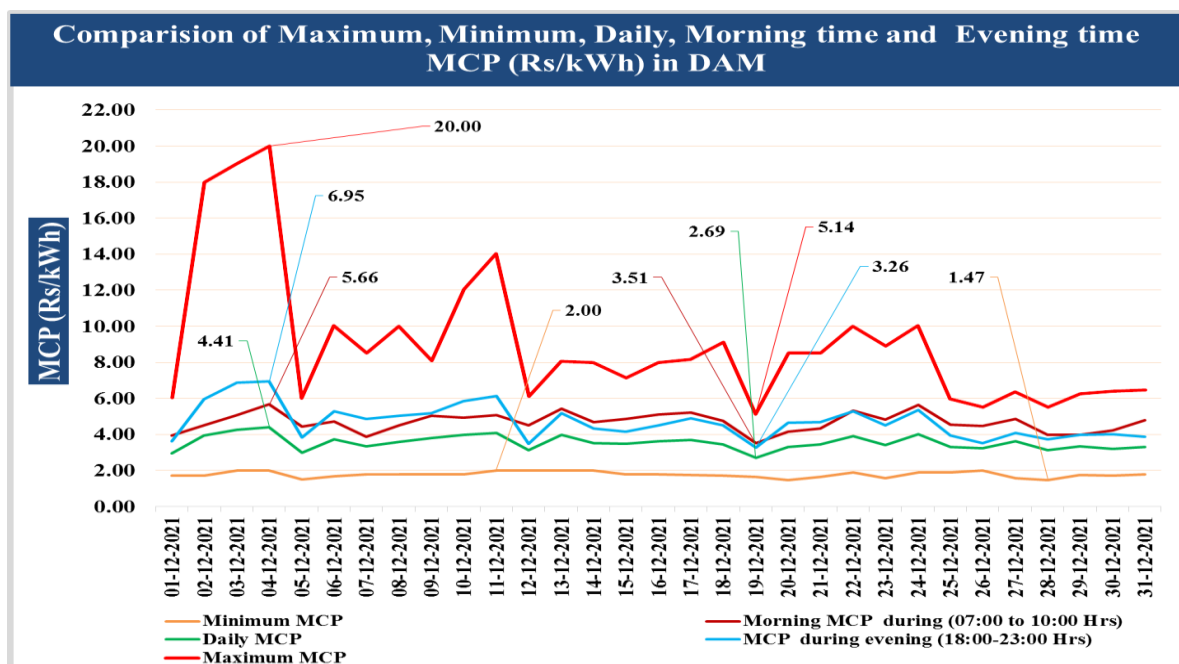


Figure -3

- 8.6. The Market Clearing Price duration curves for time block wise MCP for the month of December, 2021 is shown in **Figure 4**, whereas the day wise MCP duration curve for the period 1st April, 2021 to 31st December, 2021 is shown in **Figure 5**.

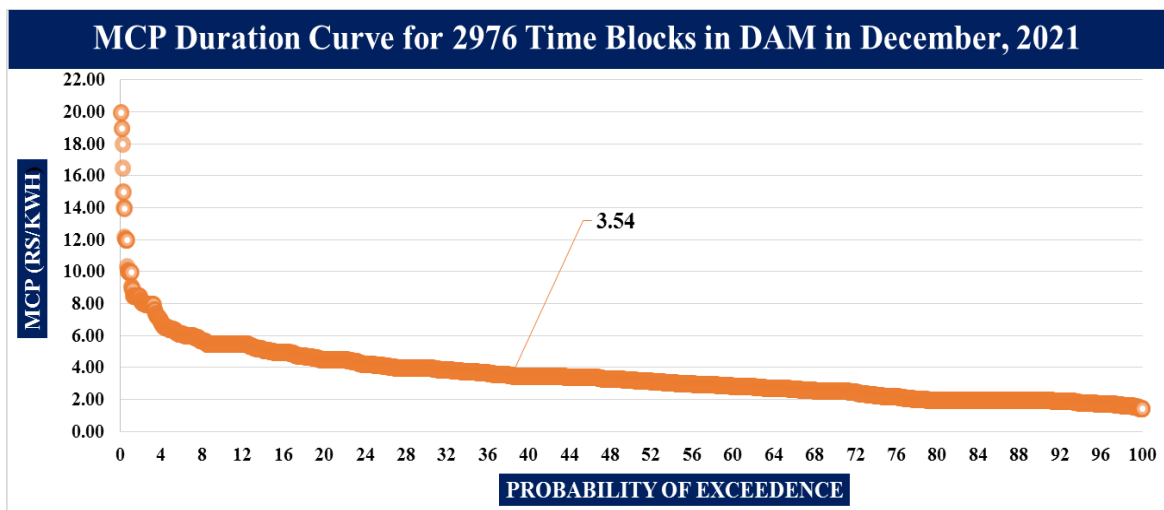


Figure-4

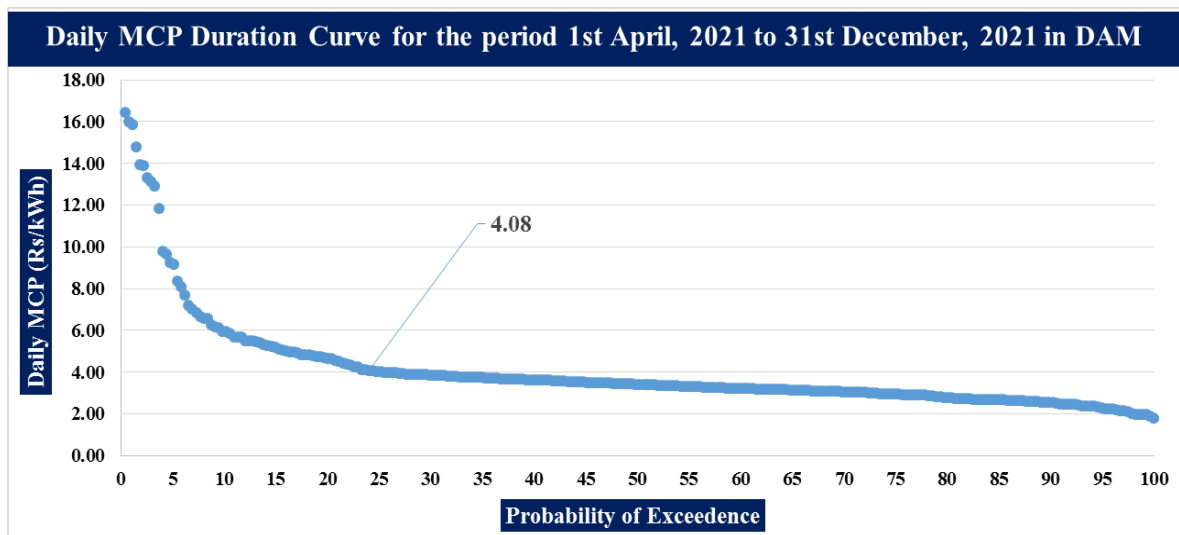


Figure-5

- 8.7. It can be seen in figure 4 above that in the MCP duration curve of December, 2021, for 38.07 % of the time MCP was above average MCP of the month (i.e. **Rs. 3.54/kWh**) and almost 61.93 % of the time MCP was below the average MCP of the month. Similarly, it can be seen in the cumulative MCP duration curve from 1st April, 2021 to 31st December, 2021 (figure 5), that for 24.00 % of the time the daily MCP was above the average MCP for the period (i.e. **Rs. 4.08/kWh**) and for 76.00 % of the time the daily MCP was below the average MCP for the period.
- 8.8. The Purchase Bids and the MCP discovered in each of the 15-minute time block during the month almost followed the same trend [Annexure V]. This is also corroborated with the outcome of regression analysis mentioned at **para 8.1 and 8.2 above**.
- 8.9. In December, 2021, the maximum FSV occurred mostly during the **time period 8-9 AM and 9-10 AM** (on 30 no. of days). Whereas, the maximum MCP occurred mostly during the **time period 6-7 PM** (on 23 no. of days). Similarly, the minimum FSV occurred mostly during the **time period 10-11 PM and 11 PM to 12 AM** (on 24 no. of days). Whereas, the

minimum MCP occurred mostly during the **time period 3-4 AM and 4-5 AM** (on 26 no. of days). [Annexure VI]

- 8.10.** The maximum demand met during the month of December, 2021 in the country occurred on **24th December, 2021 at 183.39 GW**, which is 10.35 % more than the maximum demand occurred during **November, 2021 [i.e. 166.19 GW on 16th November, 2021]** and is 0.27 % more than the maximum demand occurred during December, 2020 i.e. **[182.89 GW on 30th December, 2020]**.
- 8.11.** In the month of December, 2021, One nation One Price was observed in IEX for **all 31 days** during the month, as there was no transmission congestion. Whereas, in PXIL also, there was no congestion in transmission system during December, 2021, so one nation one price was observed on all **19 days** during which transaction of electricity happened (i.e. 1st, 4th, 7th, 10th to 12th, 14th to 15th, 17th to 19th, 21st to 25th, 28th to 29th and 31st December, 2021). While in the month of November, 2021, One nation One Price was observed in IEX for **all 30 days** during the month, as there was no transmission congestion. Whereas, in PXIL also, there was no congestion in transmission system during November, 2021, so one nation one price was observed on all **10 days** during which transaction of electricity happened (i.e. 19th to 20th, 22nd to 28th and 30th November, 2021). Similarly, in the month of December, 2020, there was congestion of **0.18 MU** in transmission system on 19th December, 2020 in IEX, hence, one nation one price was observed for 30 days on IEX in the month of December, 2020. In PXIL, there was no congestion in transmission system during December, 2020, so one nation one price was observed on all 30 days during which transaction of electricity happened (1st and 3rd to 31st December, 2020)..
- 8.12.** In the month of December, 2021, there was **no** real time curtailment in IEX and PXIL in December, 2021. Further, in the month of November, 2021, there was real time curtailment of **0.41 MU** in IEX on 27th November, 2021, whereas, there was no real time curtailment in PXIL. In the month of December, 2020, there was **no** real time curtailment in IEX and PXIL, respectively.
- 8.13.** The **top 10 sellers** on the power exchanges in **Day Ahead Market (DAM)** in the month of December, 2021 were **West Bengal, Bihar, Uttar Pradesh, Chhattisgarh, Essar Power MP Ltd., Jindal Power Ltd. Stg-II, Rajasthan, Jindal Power, Karnataka and Teesta-3**, which constituted **68.63 %** of the market volume. [Annexure VII]
- 8.14.** The **top 10 purchasers** on the power exchanges in **Day Ahead Market (DAM)** in the month of December, 2021 were **Andhra Pradesh, Punjab, Tamil Nadu, Gujarat, J&K, Haryana, Rajasthan, Telangana, Maharashtra and Uttar Pradesh** and which constituted **85.46 %** of the market volume. [Annexure VII]
- 8.15.** The total volume of electricity purchased by Discoms/Licensees in DAM in the month of December, 2021 was **3,391.41 MU**, which constituted **71.86 %** of total volume of electricity purchased on both the power exchanges.

8.16. Similarly, the total volume of electricity sold by Discoms/Licensees in DAM in the month of December, 2021 was **3,477.23 MU**, which constituted **73.68%** of total volume of electricity sold on both the power exchanges.

9. ANALYSIS OF MOVEMENT OF PRICES OBSERVED IN REAL TIME MARKET (RTM) TRANSACTIONS IN DECEMBER, 2021

9.1. Similar to the regression analysis carried out for Day Ahead Market, the regression analysis for Real Time Market was also done. The regression analysis revealed that the significant variables were the peak demand, total purchase bid, total sell bid, and solar 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 **0.62**. 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 December, 2021 for RTM transactions.

9.2. The Purchase Bids and the MCP discovered in each of the 15-minute time block during the month almost followed the same trend [Annexure IX]. This is also corroborated with the outcome of regression analysis mentioned at **para 9.1 above**.

9.3. The Total Purchase Bid, Total Sell Bid, Daily MCP and FSV are shown in Figure-6 below:

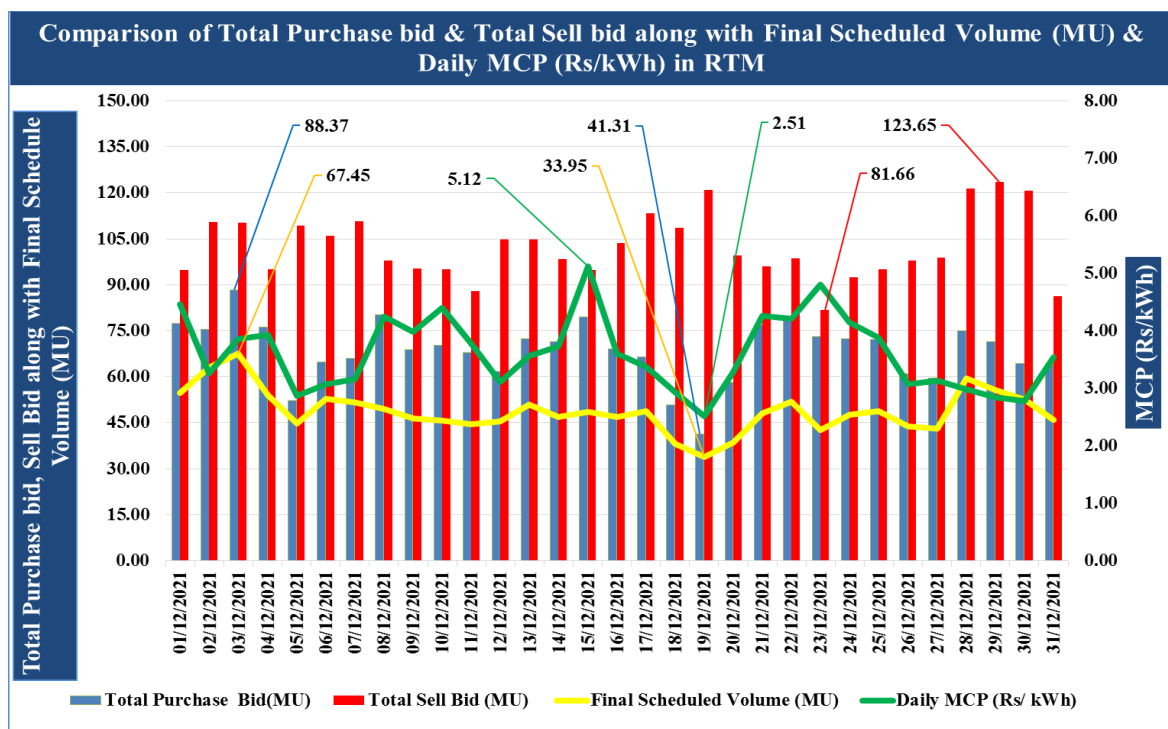


Figure-6

9.4. A comparison of maximum, minimum, daily, evening time MCP is shown in **Figure-7**. The same are also tabulated in **Annexure-VIII**.

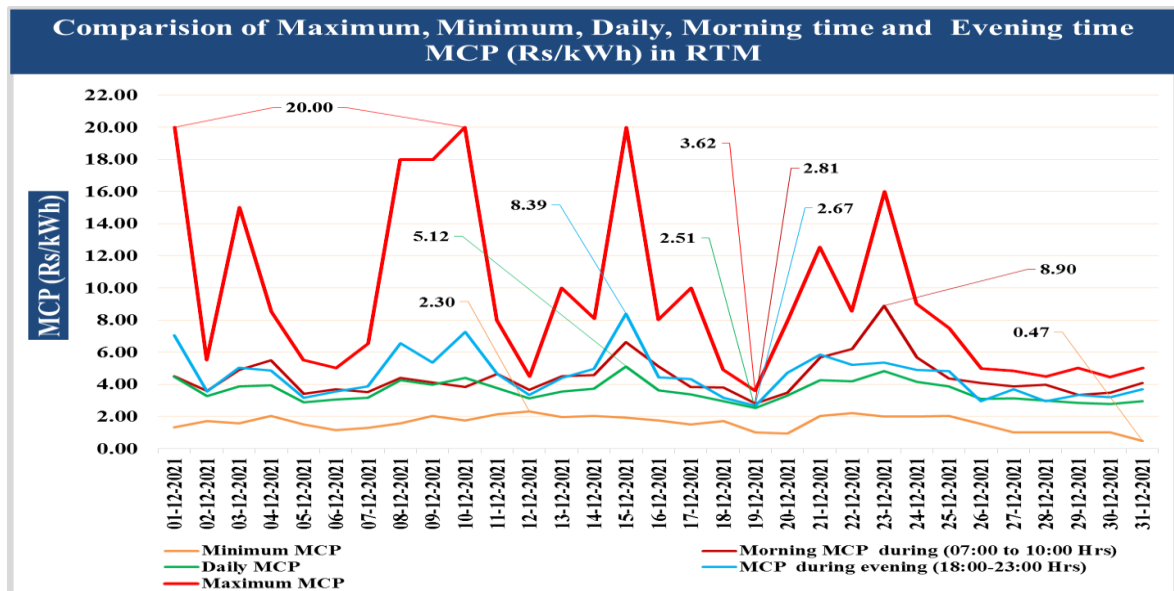


Figure-7

- 9.5. The Market Clearing Price duration curves for time block wise MCP for the month of December, 2021 is shown in **Figure 8**, whereas the day wise MCP duration curve for the period 1st April, 2021 to 31st December, 2021 is shown in **Figure 9**.

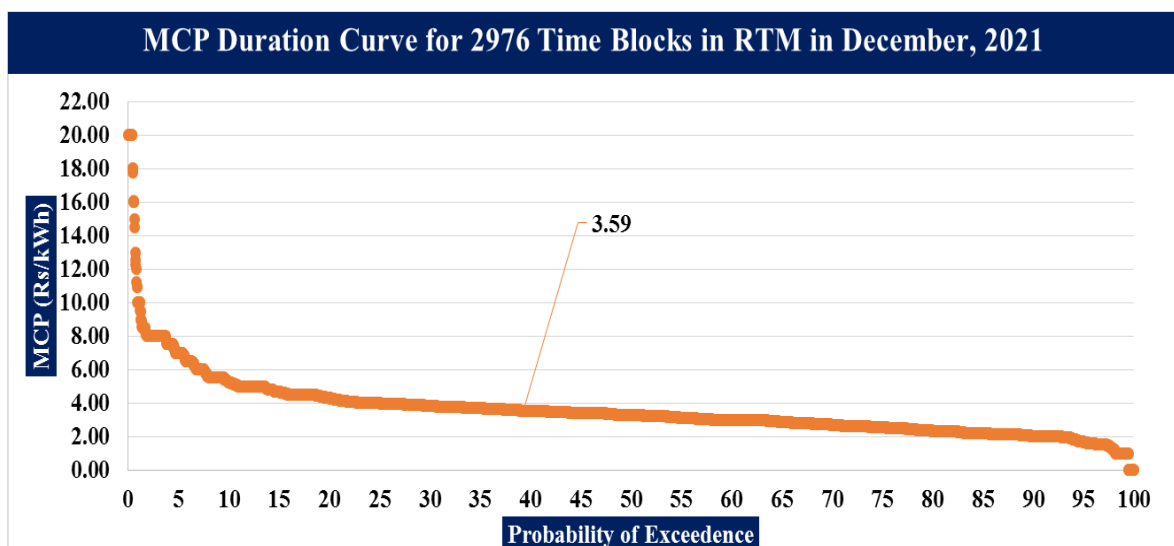


Figure-8

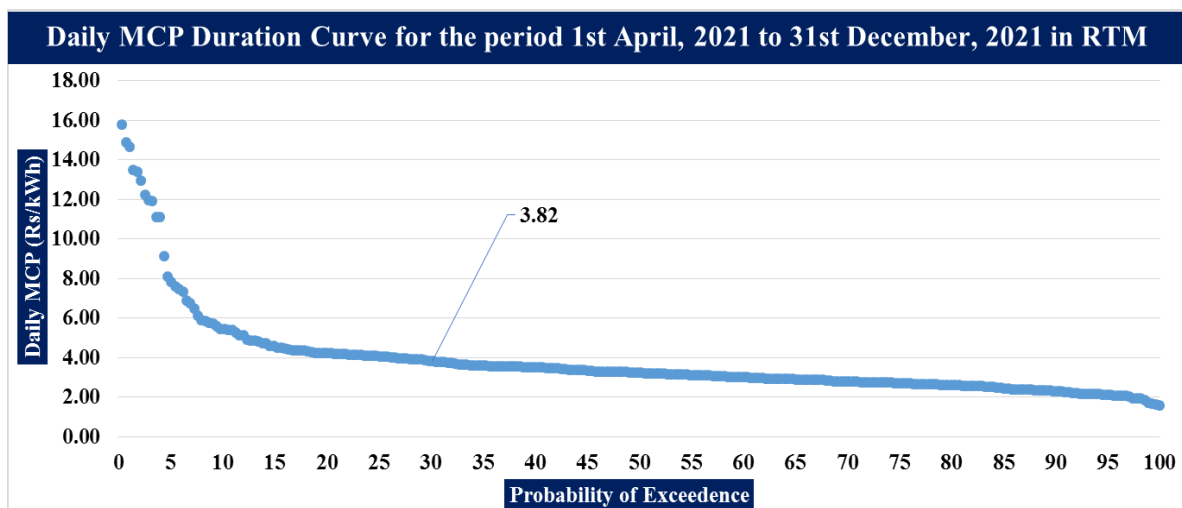


Figure-9

- 9.6. It can be seen in figure 8 above that in the MCP duration curve of December, 2021, for 38.44 % of the time the MCP was above the average MCP of the month (i.e. **Rs. 3.59/kWh**) and for 61.56 % of the time the MCP was below the average MCP of the month. Similarly, it can be seen in the cumulative MCP duration curve from 1st April, 2021 to 31st December, 2021 (figure 9) that, for 30.18 % of the time the daily MCP was above the average MCP for the period (i.e. **Rs. 3.82/kWh**) and for 71.56 % of the time the daily MCP was below the average MCP for the period.
- 9.7. In December, 2021, the maximum FSV occurred mostly during the **time period 8-9 AM and 9-10 PM** (on 13 no. of days). Whereas, the maximum MCP occurred mostly during the **time period 5-6 PM and 6-7 PM** (on 25 no. of days). Similarly, the minimum FSV occurred mostly during the **time period 12-1 AM** (on 9 no. of days). Whereas, the minimum MCP occurred mostly during the **time period 3-4 AM** (on 10 no. of days). **[Annexure X]**
- 9.8. There was **no** real time curtailment in IEX in Real Time Market (RTM) during December, 2021 and November, 2021, whereas, no transaction of electricity happened in PXIL during December, 2021 and November, 2021. Similarly, in December, 2020, there was no real time curtailment in IEX, whereas, no transaction of electricity happened in PXIL during December, 2020 in Real Time Market (RTM).
- 9.9. In the month of December, 2021, there was congestion of **0.06 MU** in the transmission system in IEX on 12th December, 2021, hence one nation one price was observed for **30 days** in IEX during December, 2021, whereas, in PXIL, no transaction of electricity happened in December, 2021. Further, in the month of November, 2021, there was **no** congestion in the transmission system, hence one nation one price was observed for all **30 days** in IEX during December, 2021, whereas, in PXIL, no transaction of electricity happened in December, 2021. In the month of December, 2020, there was congestion of **0.02 MU** in transmission system in IEX in Real Time Market on **four days** (i.e. 1st, 2nd, 14th and 31st December, 2020), hence, one nation one price was observed for **27 days** in IEX, whereas, in PXIL, no transaction of electricity happened in December, 2020 in Real Time Market.
- 9.10. The **top 10 sellers** on the power exchanges in **Real Time Market (RTM)** in the month of December, 2021 were **Madhya Pradesh, Bihar, Uttar Pradesh, Odisha, Karnataka, West Bengal, Chhattisgarh, Rajasthan, Kameng HEP and Tripura**, which constituted **62.99 %** of the market volume. **[Annexure XI]**
- 9.11. The **top 10 purchasers** on the power exchanges in **Real Time Market (RTM)** in the month of December, 2021 were **J&K, Telangana, Rajasthan, Maharashtra, Odisha, Andhra Pradesh, Uttar Pradesh, Gujarat, Haryana and Punjab**, which constituted **84.90%** of the market volume. **[Annexure XI]**

9.12. The total volume of electricity purchased by Discoms/Licensees in RTM in the month of December, 2021 was **1,507.99 MU**, which constituted **99.71 %** of total volume of electricity purchased on both the power exchanges.

9.13. Similarly, the total volume of electricity sold by Discoms/Licensees in RTM in the month of December, 2021 was **1,182.41 MU**, which constituted **78.18 %** of total volume of electricity sold on both the power exchanges.

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

Final Scheduled Volume, Average MCP and Real-Time Curtailment in Day Ahead Market (DAM) for the months of April, 2021 to March, 2022 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, 2021	5,699.22	4.73	3.70	3.69	0	0
	May, 2021	4,363.88	3.32	2.83	3.06	0	0
	June, 2021	4,314.17	21.91	3.06	3.35	2.35	0
Total Quarter -I	April - June, 2021	14,377.27	29.96			2.35	0
Quarter- II	July, 2021	4,238.25	2.76	2.95	3.02	0	0
	August, 2021	6,648.76	5.12	5.06	4.72	5.13	0
	September, 2021	6,418.27	1.27	4.40	6.52	0	0
Total Quarter- II	July- September, 2021	17,305.28	9.15			5.13	0
Quarter -III	October, 2021	6,568.31	0.37	8.01	7.17	0	0
	November, 2021	4,718.76	0.74	3.08	3.71	0.41	0
	December, 2021	5,423.27	0.88	3.54	4.23	0	0
Total Quarter- III	November - December, 2021	16,710.34	1.99			0.41	0
Total April, 2021 - March, 2022		48,392.89	41.10			7.89	0

Annexure-II**Final Scheduled Volume in Term Ahead Market (TAM) for the months of April, 2021 to March, 2022 of IEX and PXIL (Trade and Delivery date basis)**

Quarter	Months	Final Scheduled Volume (MU) on Trade Date Basis		
		IEX	PXIL	Total
Quarter -I	April, 2021	325.78	651.35	977.13
	May, 2021	425.63	344.03	769.66
	June, 2021	622.42	358.74	981.16
Total Quarter -I	April- June, 2021	1,373.83	1,354.12	2,727.95
Quarter- II	July, 2021	832.44	267.10	1,099.54
	August, 2021	483.31	284.40	767.71
	September, 2021	198.18	209.46	407.64
Total Quarter -II	July- September, 2021	1,513.93	760.96	2,274.89
Quarter- III	October, 2021	298.11	223.78	521.89
	November, 2021	291.20	282.24	573.44
	December, 2021	421.34	300.08	721.42
Total Quarter- III	November - December, 2021	1,010.65	806.10	1,816.75
Total April, 2021 - March, 2022		3,898.41	2,921.18	6,819.59

Quarter	Months	Final Scheduled Volume (MU) on Delivery Date Basis		
		IEX	PXIL	Total
Quarter -I	April, 2021	348.58	576.72	925.30
	May, 2021	382.62	419.36	801.98
	June, 2021	640.91	312.66	953.57
Total Quarter -I	April- June, 2021	1,372.11	1,308.74	2,680.85
Quarter- II	July, 2021	761.26	332.72	1,093.98
	August, 2021	617.23	238.63	855.86
	September, 2021	192.87	251.17	444.04
Total Quarter -II	July- November, 2021	1,571.36	822.52	2,393.88
Quarter- III	October, 2021	224.78	234.56	459.34
	November, 2021	302.75	276.38	579.13
	December, 2021	379.77	263.23	643.00
Total Quarter- III	November - December, 2021	907.30	774.17	1,681.47
Total April, 2021 - March, 2022		3,850.77	2,905.43	6,756.20

Top Five Entities (Buyers and Sellers) in Bilateral transactions in the month of December, 2021

(i) Top five Buyers in Bilateral transactions

Entity Name	Direct		Entity Name	Through Traders	
	(MU)	Percent		(MU)	Percent
Madhya Pradesh	1,147.10	58.80%	Gujarat	1,171.20	28.11%
AMNSIL_WR	147.27	7.55%	Odisha	523.14	12.56%
Jharkhand	140.13	7.18%	Rajasthan	472.27	11.33%
Maharashtra	121.26	6.22%	Himachal Pradesh	416.26	9.99%
West Bengal	91.71	4.70%	Uttarakhand	368.68	8.85%
Total Volume	1,647.46	84.45%	Total Volume	2,951.54	70.84%
Total Volume in Bilateral	1,950.87		Total Volume in Bilateral	4,166.54	

(ii) Top five Sellers in Bilateral transactions

Entity Name	Direct		Entity Name	Through Traders	
	(MU)	Percent		(MU)	Percent
Punjab	542.99	28.38%	JITPL	451.06	10.73%
Chhattisgarh	242.53	12.68%	Raipur Energen	428.61	10.20%
Uttar Pradesh	201.74	10.55%	Delhi	371.35	8.83%
DB Power	169.59	8.86%	Raigarh Energy	360.39	8.57%
Adhunik Power	140.13	7.33%	Karnataka	349.08	8.30%
Total Volume	1,297.66	67.80%	Total Volume	1,960.49	46.64%
Total Volume in Bilateral	1,913.04		Total Volume in Bilateral	4,203.89	

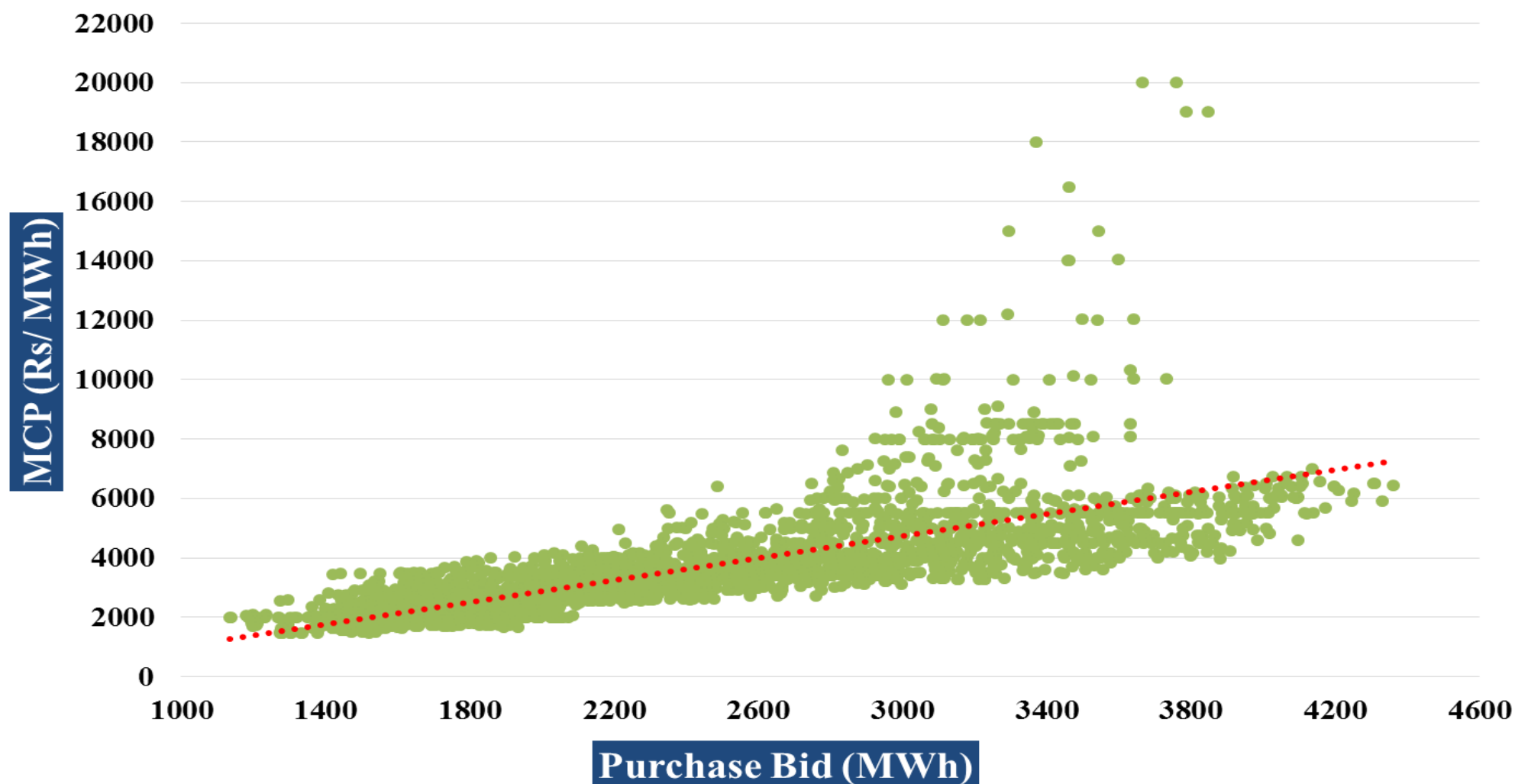
Annexure-IV**Evening, Day, Night, Morning, Maximum, Minimum, Average MCP (Rs/kWh) and Final Scheduled Volume (MU) in DAM**

Date	Morning MCP (07:00-10:00)	Day MCP (11:00-17:00)	Evening MCP (18:00- 23:00)	Night MCP (01:00- 06:00, 23:00-24:00)	Maximum MCP	Minimum MCP	Average MCP	Final Scheduled Volume (MU)
01-12-2021	3.94	2.77	3.61	1.98	6.04	1.72	2.95	161.46
02-12-2021	4.52	3.67	5.95	2.12	18.00	1.70	3.93	155.88
03-12-2021	5.06	3.58	6.87	2.25	19.02	2.00	4.26	163.69
04-12-2021	5.66	3.77	6.95	2.15	20.00	1.99	4.41	174.59
05-12-2021	4.45	2.36	3.85	2.03	6.00	1.50	2.98	183.68
06-12-2021	4.70	3.52	5.27	2.03	10.04	1.66	3.72	193.06
07-12-2021	3.86	3.09	4.85	2.05	8.52	1.80	3.35	195.68
08-12-2021	4.52	3.20	5.05	2.15	10.00	1.80	3.58	209.33
09-12-2021	5.05	3.48	5.16	2.18	8.10	1.80	3.78	189.90
10-12-2021	4.92	3.59	5.84	2.18	12.05	1.80	3.96	186.76
11-12-2021	5.06	3.63	6.12	2.21	14.04	2.00	4.08	177.29
12-12-2021	4.50	3.03	3.49	2.19	6.10	1.99	3.14	167.56
13-12-2021	5.43	3.90	5.18	2.20	8.07	2.00	3.98	177.18
14-12-2021	4.70	3.57	4.33	2.09	8.00	2.00	3.52	173.42
15-12-2021	4.87	3.55	4.16	2.05	7.15	1.80	3.48	171.26
16-12-2021	5.10	3.61	4.50	2.05	8.00	1.80	3.63	172.99
17-12-2021	5.20	3.49	4.88	2.04	8.15	1.74	3.70	174.29
18-12-2021	4.75	3.22	4.50	2.00	9.11	1.70	3.44	182.06
19-12-2021	3.51	2.58	3.26	1.85	5.14	1.64	2.69	155.60
20-12-2021	4.14	3.23	4.66	1.69	8.52	1.47	3.29	175.34
21-12-2021	4.33	3.39	4.68	1.91	8.53	1.64	3.44	164.25
22-12-2021	5.33	3.73	5.29	2.11	10.00	1.90	3.92	167.35
23-12-2021	4.84	3.24	4.50	1.86	8.92	1.58	3.42	172.69
24-12-2021	5.63	3.74	5.36	2.14	10.02	1.90	3.99	170.64
25-12-2021	4.54	3.25	3.94	2.12	5.99	1.90	3.31	182.44
26-12-2021	4.46	3.36	3.50	2.17	5.52	1.98	3.23	169.20
27-12-2021	4.87	4.22	4.08	1.92	6.35	1.58	3.62	170.98
28-12-2021	3.96	3.43	3.72	1.87	5.50	1.47	3.14	161.67
29-12-2021	3.99	3.73	3.99	2.03	6.25	1.74	3.34	182.79
30-12-2021	4.21	3.10	4.02	1.95	6.39	1.70	3.18	172.64
31-12-2021	4.79	3.26	3.87	2.02	6.48	1.80	3.31	167.60
Maximum	5.66	4.22	6.95	2.25	20.00	2.00	4.41	209.33
Minimum	3.51	2.36	3.26	1.69	5.14	1.47	2.69	155.60
Average	4.67	3.40	4.72	2.05	9.12	1.78	3.55	175.19

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 December, 2021 in DAM



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

Annexure-VI**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
01-12-2021	09:15 - 09:30	2.63	18:15 - 18:30	6.04	23:45 - 24:00	1.06	03:45 - 04:00	1.72
02-12-2021	08:30 - 08:45	2.50	18:15 - 18:30	18.00	03:00 - 03:15	1.16	04:00 - 04:15	1.70
03-12-2021	08:45 - 09:00	2.42	18:15 - 18:30	19.02	22:15 - 22:30	1.37	04:00 - 04:15	2.00
04-12-2021	08:30 - 08:45	2.60	18:15 - 18:30	20.00	22:15 - 22:30	1.33	03:45 - 04:00	1.99
05-12-2021	08:30 - 08:45	3.04	07:45 - 08:00	6.00	14:00 - 14:15	1.37	13:15 - 13:30	1.50
06-12-2021	08:45 - 09:00	2.96	18:15 - 18:30	10.04	23:00 - 23:15	1.56	03:45 - 04:00	1.66
07-12-2021	09:30 - 09:45	2.80	18:15 - 18:30	8.52	23:45 - 24:00	1.54	03:00 - 03:15	1.80
08-12-2021	09:00 - 09:15	3.25	18:15 - 18:30	10.00	02:45 - 03:00	1.50	03:45 - 04:00	1.80
09-12-2021	09:30 - 09:45	2.76	18:15 - 18:30	8.10	00:00 - 00:15	1.37	04:00 - 04:15	1.80
10-12-2021	09:15 - 09:30	2.93	18:15 - 18:30	12.05	22:45 - 23:00	1.40	04:00 - 04:15	1.80
11-12-2021	09:00 - 09:15	2.72	18:15 - 18:30	14.04	22:30 - 22:45	1.33	04:00 - 04:15	2.00
12-12-2021	07:15 - 07:30	2.72	07:45 - 08:00	6.10	22:30 - 22:45	1.25	03:45 - 04:00	1.99
13-12-2021	09:00 - 09:15	2.73	18:15 - 18:30	8.07	23:15 - 23:30	1.36	02:45 - 03:00	2.00
14-12-2021	09:00 - 09:15	2.88	17:45 - 18:00	8.00	22:45 - 23:00	1.15	03:45 - 04:00	2.00
15-12-2021	08:30 - 08:45	2.78	18:15 - 18:30	7.15	22:30 - 22:45	1.20	03:15 - 03:30	1.80
16-12-2021	08:45 - 09:00	2.72	18:15 - 18:30	8.00	02:00 - 02:15	1.27	03:30 - 03:45	1.80
17-12-2021	08:30 - 08:45	2.71	17:45 - 18:00	8.15	23:00 - 23:15	1.18	03:45 - 04:00	1.74
18-12-2021	08:30 - 08:45	3.13	18:15 - 18:30	9.11	22:30 - 22:45	1.10	04:00 - 04:15	1.70
19-12-2021	08:30 - 08:45	2.82	18:15 - 18:30	5.14	23:00 - 23:15	1.01	02:45 - 03:00	1.64
20-12-2021	08:30 - 08:45	3.21	18:15 - 18:30	8.52	23:30 - 23:45	1.01	03:45 - 04:00	1.47
21-12-2021	08:45 - 09:00	3.10	18:15 - 18:30	8.53	00:45 - 01:00	1.09	03:45 - 04:00	1.64
22-12-2021	08:30 - 08:45	2.80	17:45 - 18:00	10.00	00:00 - 00:15	1.15	04:00 - 04:15	1.90
23-12-2021	08:30 - 08:45	3.18	18:15 - 18:30	8.92	22:00 - 22:15	1.12	03:00 - 03:15	1.58
24-12-2021	08:30 - 08:45	3.00	18:15 - 18:30	10.02	22:45 - 23:00	1.14	03:00 - 03:15	1.90
25-12-2021	08:30 - 08:45	3.11	18:15 - 18:30	5.99	22:45 - 23:00	1.29	04:00 - 04:15	1.90
26-12-2021	09:00 - 09:15	2.95	09:30 - 09:45	5.52	22:15 - 22:30	1.11	04:00 - 04:15	1.98
27-12-2021	08:30 - 08:45	2.91	09:45 - 10:00	6.35	22:15 - 22:30	1.06	03:45 - 04:00	1.58
28-12-2021	08:30 - 08:45	2.51	19:00 - 19:15	5.50	23:30 - 23:45	1.10	03:45 - 04:00	1.47
29-12-2021	08:30 - 08:45	2.90	18:15 - 18:30	6.25	23:00 - 23:15	1.14	02:45 - 03:00	1.74
30-12-2021	09:15 - 09:30	2.69	18:15 - 18:30	6.39	22:00 - 22:15	1.14	03:00 - 03:15	1.70
31-12-2021	08:30 - 08:45	2.80	18:15 - 18:30	6.48	22:45 - 23:00	1.00	02:45 - 03:00	1.80

MCP: Market Clearing Price (Rs/kWh)**FSV: Final Scheduled Volume (MU)**

Annexure-VII**Sellers and Purchasers in Day Ahead Market (DAM) in the month of December, 2021**

S. No.	Entity Name	Sell		Entity Name	Purchase	
		(MU)	Percent (%)		(MU)	Percent (%)
1.	West Bengal	1300.01	23.97%	Andhra Pradesh	848.67	15.65%
2.	Bihar	534.15	9.85%	Punjab	835.93	15.41%
3.	Uttar Pradesh	401.54	7.40%	Tamil Nadu	476.14	8.78%
4.	Chhattisgarh	328.73	6.06%	Gujarat	441.93	8.15%
5.	Essar Power MP Ltd	224.29	4.14%	J&K	436.62	8.05%
6.	Jindal Power Ltd. Stg-II	214.41	3.95%	Haryana	432.45	7.97%
7.	Rajasthan	198.47	3.66%	Rajasthan	343.92	6.34%
8.	Jindal Power	190.96	3.52%	Telangana	331.74	6.12%
9.	Karnataka	175.04	3.23%	Maharashtra	288.60	5.32%
10.	Teesta -3	154.72	2.85%	Uttar Pradesh	199.69	3.68%
11.	MB Power	154.58	2.85%	Orissa	145.86	2.69%
12.	Assam	138.88	2.56%	ArcelorMittal Nippon steel (ESIL)	100.57	1.85%
13.	Kerala	106.84	1.97%	Uttarakhand	94.14	1.74%
14.	Delhi	103.23	1.90%	Madhya Pradesh	82.19	1.52%
15.	Jaypee Nigrie	97.31	1.79%	Delhi	80.21	1.48%
16.	Himachal Pradesh	79.35	1.46%	NVVN (SNA) - NEA	69.03	1.27%
17.	Orissa	69.37	1.28%	Himachal Pradesh	54.94	1.01%
18.	RKM Power	67.98	1.25%	Karnataka	54.47	1.00%
19.	ACBIL	66.97	1.23%	Assam	25.04	0.46%
20.	Madhya Pradesh	59.91	1.10%	Dadra & Nagar Haveli	21.33	0.39%
21.	JITPL	58.45	1.08%	Meghalaya	16.97	0.31%
22.	Sembcorp Gayatri	48.40	0.89%	Daman & Diu	14.90	0.27%
23.	Raipur Energen	43.50	0.80%	Kerala	14.41	0.27%
24.	Maharashtra	43.03	0.79%	Goa SR	4.50	0.08%
25.	Talcher Stg-2	39.27	0.72%	Sikkim	2.74	0.05%
26.	Goa WR	32.98	0.61%	Goa WR	1.99	0.04%
27.	Telangana	32.03	0.59%	Bihar	1.21	0.02%
28.	Adhunik Power	31.88	0.59%	West Bengal	1.11	0.02%
29.	Sembcorp Energy India Ltd.	30.59	0.56%	Railways	0.95	0.02%
30.	Maruti Clean Coal Power	26.05	0.48%	Jharkhand	0.52	0.01%
31.	DVC	21.50	0.40%	NTPL	0.44	0.01%
32.	NTPC Kudgi	20.27	0.37%	Manipur	0.36	0.01%
33.	Ramagundam Stg-1	19.84	0.37%	Gandhar_Combined RLNG Fuel	0.26	0.00%
34.	DB Power	19.48	0.36%	Chandigarh	0.22	0.00%
35.	AD Hydro	18.39	0.34%	Chhattisgarh	0.11	0.00%
36.	Andhra Pradesh	17.89	0.33%			
37.	Tashiding HEP	17.31	0.32%			
38.	Raigarh Energy Ltd.	17.01	0.31%			

39.	Karcham Wangtoo	16.58	0.31%			
40.	NLC TPS-II	15.27	0.28%			
41.	GMR Kamalanga	14.52	0.27%			
42.	Jhabua Power	14.08	0.26%			
43.	Jorethang	13.93	0.26%			
44.	NLC TPS-II Stg-2	11.57	0.21%			
45.	Simhadri Stg-2	10.82	0.20%			
46.	Tripura	10.47	0.19%			
47.	Sainj HEP	10.44	0.19%			
48.	Palatana	10.40	0.19%			
49.	NLC	8.46	0.16%			
50.	Arunachal Pradesh	8.25	0.15%			
51.	Ramagundam Stg-3	7.43	0.14%			
52.	RGPPL	7.33	0.14%			
53.	NVVN (SNA) - NEA	5.83	0.11%			
54.	NLC TPS-II Expn	5.59	0.10%			
55.	J&K	5.49	0.10%			
56.	Tamil Nadu	5.44	0.10%			
57.	Neyveli New Thermal Power	5.40	0.10%			
58.	Dikchu	4.82	0.09%			
59.	Jharkhand	4.46	0.08%			
60.	Gujarat	4.27	0.08%			
61.	Singoli Bhagwati	3.78	0.07%			
62.	KSK Mahanadi	2.66	0.05%			
63.	Haryana	2.17	0.04%			
64.	Chuzachen	2.05	0.04%			
65.	Nagaland	1.44	0.03%			
66.	Sorang HEP, (Himachal Sorang Power Private Ltd)	1.30	0.02%			
67.	Renew Solar Energy (Jharkhand Three) Pvt Ltd (RSEJTPL)	1.26	0.02%			
68.	GMR Warora	1.00	0.02%			
69.	Bongaigaon	0.73	0.01%			
70.	BALCO 2	0.64	0.01%			
71.	Dhariwal	0.47	0.01%			
72.	Koldam HEP	0.32	0.01%			
73.	Mizoram	0.31	0.01%			
74.	Dhauliganga	0.30	0.01%			
75.	Renew Solar Urja Private Limited	0.16	0.00%			
76.	Farakka	0.03	0.00%			
77.	Ostro Energy Private Limited (OEPL)	0.02	0.00%			
78.	Kahalgaon	0.01	0.00%			
79.	Talcher	0.01	0.00%			
Total Volume of top 10		3,722.32	68.63%	Total Volume of top 10	4,635.67	85.46%
Total Volume in PXs		5,424.15		Total Volume in PXs	5,424.15	

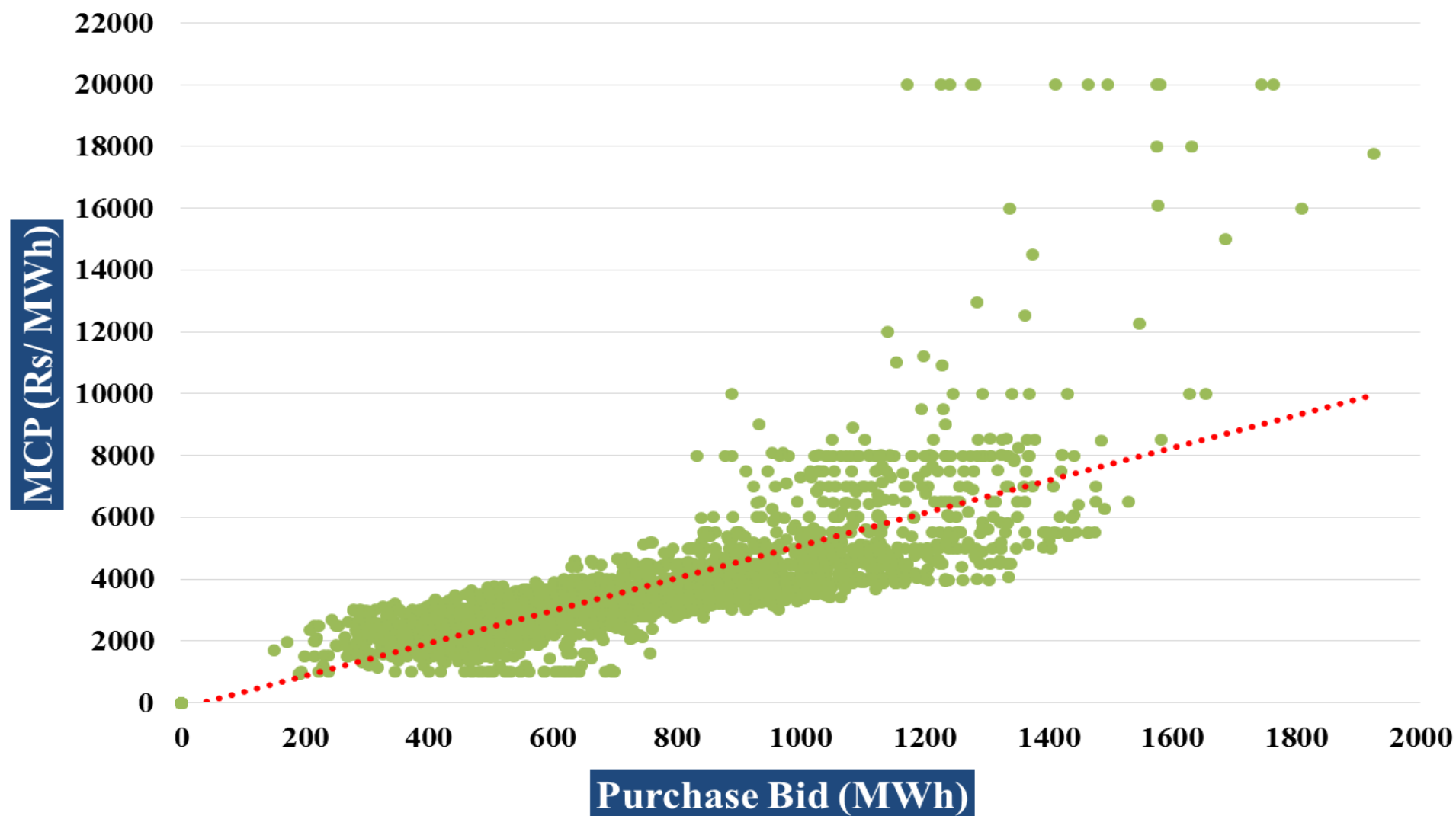
Annexure-VIII**Evening, Day, Night, Morning, Maximum, Minimum, Average MCP (Rs/kWh) and Final Scheduled Volume (MU) in RTM**

Date	Morning MCP (07:00-10:00)	Day MCP (11:00- 17:00)	Evening MCP (18:00- 23:00)	Night MCP (01:00- 06:00, 23:00-24:00)	Maximum MCP	Minimum MCP	Average MCP	Final Scheduled
01-12-2021	4.50	4.43	7.05	2.26	20.00	1.33	4.47	54.81
02-12-2021	3.57	3.56	3.54	2.52	5.50	1.70	3.25	63.06
03-12-2021	4.91	3.84	5.04	2.24	15.00	1.58	3.85	67.45
04-12-2021	5.48	3.45	4.85	2.75	8.52	2.04	3.93	54.04
05-12-2021	3.42	2.90	3.17	2.27	5.50	1.50	2.87	44.70
06-12-2021	3.68	3.37	3.56	2.01	5.00	1.13	3.07	52.79
07-12-2021	3.50	3.31	3.85	2.21	6.52	1.29	3.16	51.54
08-12-2021	4.41	4.11	6.56	2.31	18.00	1.56	4.25	49.58
09-12-2021	4.13	4.21	5.34	2.50	18.00	2.03	3.98	46.51
10-12-2021	3.82	4.28	7.26	2.42	20.00	1.73	4.41	45.68
11-12-2021	4.64	3.70	4.66	2.61	8.00	2.12	3.78	44.58
12-12-2021	3.64	3.03	3.35	2.68	4.49	2.30	3.11	45.52
13-12-2021	4.49	3.64	4.39	2.24	10.00	1.95	3.56	50.87
14-12-2021	4.57	3.50	4.96	2.42	8.10	2.04	3.73	46.94
15-12-2021	6.63	4.12	8.39	2.45	20.00	1.91	5.12	48.64
16-12-2021	5.12	3.21	4.42	2.44	8.02	1.75	3.61	46.84
17-12-2021	3.83	3.62	4.32	2.04	10.00	1.50	3.37	48.70
18-12-2021	3.80	3.06	3.15	2.12	4.90	1.70	2.93	38.16
19-12-2021	2.81	2.68	2.67	2.03	3.62	1.00	2.51	33.95
20-12-2021	3.48	3.48	4.71	1.77	8.00	0.95	3.29	38.50
21-12-2021	5.69	3.96	5.86	2.37	12.54	2.03	4.26	48.00
22-12-2021	6.19	3.82	5.20	2.59	8.55	2.19	4.20	51.78
23-12-2021	8.90	4.41	5.37	2.39	16.00	2.00	4.81	42.60
24-12-2021	5.66	4.32	4.90	2.47	9.00	2.01	4.15	47.63
25-12-2021	4.38	4.19	4.83	2.47	7.50	2.03	3.88	48.79
26-12-2021	4.08	3.51	2.94	2.19	4.99	1.55	3.08	43.88
27-12-2021	3.87	3.81	3.68	1.55	4.83	1.00	3.13	43.10
28-12-2021	3.98	3.44	2.94	2.00	4.50	1.00	2.99	59.52
29-12-2021	3.36	3.46	3.36	1.47	5.00	1.00	2.84	55.71
30-12-2021	3.48	3.20	3.18	1.62	4.47	1.00	2.78	52.52
31-12-2021	4.07	3.91	3.69	1.66	5.00	0.47	2.95	46.02
Maximum	8.90	4.43	8.39	2.75	20.00	2.30	5.12	67.45
Minimum	2.81	2.68	2.67	1.47	3.62	0.47	2.51	33.95
Average	4.46	3.66	4.56	2.23	9.34	1.59	3.59	48.79

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 December, 2021 in RTM



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

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
01-12-2021	15:00 - 15:15	1.01	18:00 - 18:15	20.00	00:15 - 00:30	0.31	03:45 - 04:00	1.33
02-12-2021	17:00 - 17:15	1.08	18:15 - 18:30	5.50	04:00 - 04:15	0.33	00:00 - 00:15	1.70
03-12-2021	07:45 - 08:00	0.98	18:15 - 18:30	15.00	04:15 - 04:30	0.41	05:00 - 05:15	1.58
04-12-2021	09:45 - 10:00	0.92	18:15 - 18:30	8.52	00:15 - 00:30	0.38	01:00 - 01:15	2.04
05-12-2021	15:00 - 15:15	0.82	17:15 - 17:30	5.50	06:00 - 06:15	0.25	13:00 - 13:15	1.50
06-12-2021	08:00 - 08:15	0.98	18:15 - 18:30	5.00	01:00 - 01:15	0.21	03:00 - 03:15	1.13
07-12-2021	08:15 - 08:30	0.88	18:15 - 18:30	6.52	06:00 - 06:15	0.27	04:15 - 04:30	1.29
08-12-2021	12:30 - 12:45	0.83	18:30 - 18:45	18.00	22:30 - 22:45	0.21	00:45 - 01:00	1.56
09-12-2021	10:00 - 10:15	0.95	18:15 - 18:30	18.00	00:00 - 00:15	0.29	02:45 - 03:00	2.03
10-12-2021	08:00 - 08:15	0.78	18:00 - 18:15	20.00	00:00 - 00:15	0.26	01:00 - 01:15	1.73
11-12-2021	08:45 - 09:00	0.66	18:15 - 18:30	8.00	00:00 - 00:15	0.26	01:30 - 01:45	2.12
12-12-2021	18:15 - 18:30	0.69	17:30 - 17:45	4.49	23:30 - 23:45	0.31	03:45 - 04:00	2.30
13-12-2021	11:45 - 12:00	0.89	18:15 - 18:30	10.00	23:45 - 24:00	0.33	03:00 - 03:15	1.95
14-12-2021	09:30 - 09:45	0.66	17:45 - 18:00	8.10	00:45 - 01:00	0.30	22:45 - 23:00	2.04
15-12-2021	09:00 - 09:15	0.81	17:30 - 17:45	20.00	17:45 - 18:00	0.27	03:30 - 03:45	1.91
16-12-2021	09:45 - 10:00	0.75	17:30 - 17:45	8.02	02:45 - 03:00	0.30	22:30 - 22:45	1.75
17-12-2021	12:30 - 12:45	0.73	17:30 - 17:45	10.00	06:15 - 06:30	0.24	00:30 - 00:45	1.50
18-12-2021	08:00 - 08:15	0.57	08:00 - 08:15	4.90	23:00 - 23:15	0.21	13:45 - 14:00	1.70
19-12-2021	04:45 - 05:00	0.60	17:30 - 17:45	3.62	21:30 - 21:45	0.13	19:00 - 19:15	1.00
20-12-2021	19:15 - 19:30	0.70	18:15 - 18:30	8.00	03:30 - 03:45	0.19	03:45 - 04:00	0.95
21-12-2021	19:45 - 20:00	0.73	18:15 - 18:30	12.54	01:15 - 01:30	0.30	03:45 - 04:00	2.03
22-12-2021	07:30 - 07:45	0.90	09:30 - 09:45	8.55	04:45 - 05:00	0.32	03:30 - 03:45	2.19
23-12-2021	15:30 - 15:45	0.71	07:30 - 07:45	16.00	00:00 - 00:15	0.23	03:45 - 04:00	2.00
24-12-2021	09:15 - 09:30	0.76	19:00 - 19:15	9.00	00:00 - 00:15	0.23	23:00 - 23:15	2.01
25-12-2021	15:45 - 16:00	0.75	18:15 - 18:30	7.50	05:15 - 05:30	0.34	02:45 - 03:00	2.03
26-12-2021	12:30 - 12:45	0.71	08:15 - 08:30	4.99	00:15 - 00:30	0.22	23:30 - 23:45	1.55
27-12-2021	09:45 - 10:00	0.68	18:15 - 18:30	4.83	22:30 - 22:45	0.27	04:30 - 04:45	1.00
28-12-2021	10:15 - 10:30	0.94	08:45 - 09:00	4.50	01:45 - 02:00	0.34	02:15 - 02:30	1.00
29-12-2021	08:15 - 08:30	0.87	18:15 - 18:30	5.00	12:00 - 12:15	0.35	04:00 - 04:15	1.00
30-12-2021	07:30 - 07:45	0.94	18:15 - 18:30	4.47	16:00 - 16:15	0.30	03:45 - 04:00	1.00
31-12-2021	08:15 - 08:30	0.90	17:45 - 18:00	5.00	12:00 - 12:15	0.36	04:45 - 05:00	1.00

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

Annexure-XI**Sellers and Purchasers in Real Time Market (RTM) in the month of December, 2021**

S. No.	Entity Name	Sell		Entity Name	Purchase	
		(MU)	Percent (%)		(MU)	Percent (%)
1.	Madhya Pradesh	199.26	13.18%	J&K	444.53	29.39%
2.	Bihar	127.03	8.40%	Telangana	160.33	10.60%
3.	Uttar Pradesh	125.69	8.31%	Rajasthan	147.78	9.77%
4.	Orissa	101.49	6.71%	Maharashtra	87.52	5.79%
5.	Karnataka	84.51	5.59%	Orissa	87.38	5.78%
6.	West Bengal	82.76	5.47%	Andhra Pradesh	81.67	5.40%
7.	Chhattisgarh	69.35	4.59%	Uttar Pradesh	73.29	4.85%
8.	Rajasthan	57.05	3.77%	Gujarat	72.71	4.81%
9.	Kameng HEP	53.19	3.52%	Haryana	65.01	4.30%
10.	Tripura	52.27	3.46%	Punjab	63.72	4.21%
11.	RKM Power	47.32	3.13%	Tamilnadu	61.27	4.05%
12.	Kerala	43.88	2.90%	Delhi	32.30	2.14%
13.	Telangana	40.39	2.67%	West Bengal	30.43	2.01%
14.	Delhi	36.68	2.43%	Assam	20.57	1.36%
15.	Jindal Power Ltd. Stg-	29.66	1.96%	Madhya Pradesh	18.31	1.21%
16.	Bongaigaon	19.81	1.31%	Himachal Pradesh	16.31	1.08%
17.	NTPC Kudgi	16.73	1.11%	Bihar	11.65	0.77%
18.	NLC TPS-II Stg-2	16.70	1.10%	Manipur	9.16	0.61%
19.	NLC TPS-II	16.61	1.10%	Karnataka	6.24	0.41%
20.	JITPL	16.36	1.08%	Sikkim	4.23	0.28%
21.	NLC	15.90	1.05%	ArcelorMittal Nippon	3.27	0.22%
22.	Sasan UMPP	15.30	1.01%	Uttarakhand	3.04	0.20%
23.	Ramagundam Stg-1	14.73	0.97%	Jharkhand	2.86	0.19%
24.	Maharashtra	14.67	0.97%	Kerala	2.63	0.17%
25.	Jhabua Power	14.04	0.93%	Chhattisgarh	2.01	0.13%
26.	Neyveli New Thermal	13.37	0.88%	Meghalaya	0.85	0.06%
27.	Jindal Power	13.19	0.87%	Daman & Diu	0.76	0.05%
28.	Sembcorp Gayatri	12.48	0.83%	Goa SR	0.43	0.03%
29.	Himachal Pradesh	9.79	0.65%	Railways	0.38	0.02%
30.	Barh Stg-2	9.71	0.64%	Jindal Power	0.38	0.02%
31.	Khargone STPP	8.58	0.57%	Goa WR	0.36	0.02%
32.	Tanda Stg-2	8.24	0.54%	Nagaland	0.35	0.02%
33.	NTPC Sholapur	7.86	0.52%	Maruti Clean Coal	0.25	0.02%
34.	DB Power	7.45	0.49%	Arunachal Pradesh	0.23	0.02%
35.	Andhra Pradesh	7.29	0.48%	Jindal Power Ltd. Stg-II	0.13	0.01%
36.	Assam	7.14	0.47%	Dadra & Nagar Haveli	0.07	0.00%
37.	Manipur	6.25	0.41%			
38.	Raipur Energen	6.07	0.40%			
39.	MB Power	5.97	0.39%			
40.	NLC TPS-II Expn	5.72	0.38%			
41.	Ramagundam Stg-3	5.33	0.35%			

42.	NTPC Gadarwara	5.25	0.35%			
43.	NPGC Nabinagar	5.05	0.33%			
44.	Jharkhand	4.78	0.32%			
45.	Sembcorp Energy India	4.48	0.30%			
46.	Gujarat	3.97	0.26%			
47.	Raigarh Energy Ltd.	3.24	0.21%			
48.	Haryana	3.24	0.21%			
49.	GMR Warora	3.09	0.20%			
50.	ACBIL	2.99	0.20%			
51.	Palatana	2.97	0.20%			
52.	GMR Kamalanga	2.88	0.19%			
53.	Simhadri Stg-2	2.70	0.18%			
54.	KBUNL(MTPS-II)	2.59	0.17%			
55.	Adhunik Power	2.36	0.16%			
56.	Barh STPS Stg - I	2.19	0.14%			
57.	Sorang HEP,	2.10	0.14%			
58.	BALCO 2	1.59	0.10%			
59.	J&K	1.54	0.10%			
60.	Sikkim	1.45	0.10%			
61.	Jorethang	1.44	0.10%			
62.	Tamilnadu	0.98	0.06%			
63.	Dikchu	0.96	0.06%			
64.	Singoli Bhagwati	0.89	0.06%			
65.	Maruti Clean Coal	0.82	0.05%			
66.	AGBPP	0.65	0.04%			
67.	KSK Mahanadi	0.48	0.03%			
68.	Karcham Wangtoo	0.29	0.02%			
69.	Tashiding HEP	0.22	0.01%			
70.	Ostro Energy Private	0.20	0.01%			
71.	Dadra & Nagar Haveli	0.20	0.01%			
72.	Arunachal Pradesh	0.17	0.01%			
73.	RGPPPL_Others	0.17	0.01%			
74.	Essar Power MP Ltd	0.16	0.01%			
75.	RGPPPL	0.13	0.01%			
76.	Teesta -3	0.10	0.01%			
77.	DVC	0.08	0.01%			
78.	Sainj HEP	0.06	0.00%			
79.	Ayana Renewable	0.05	0.00%			
80.	AGTPP	0.03	0.00%			
81.	Renew Solar Energy	0.03	0.00%			
82.	AD Hydro	0.02	0.00%			
83.	Uttarakhand	0.01	0.00%			
84.	Dhariwal	0.01	0.00%			
85.	Chuzachen	0.01	0.00%			
Total Volume of top 10		952.59	62.99%	Total Volume of top 10	1,283.95	84.90%
Total Volume in PXs		1,512.39		Total Volume in PXs	1,512.39	

Annexure-XII**Cross Border Electricity Transactions in Day Ahead Market (DAM) in IEX with Nepal during the month of December, 2021**

S. No	Delivery Date	Buy Volume (MU)	Sell Volume (MU)
1	01-12-2021	-	0.94
2	02-12-2021	-	0.94
3	03-12-2021	-	0.94
4	04-12-2021	-	0.94
5	05-12-2021	-	0.74
6	06-12-2021	-	0.74
7	07-12-2021	-	0.60
8	08-12-2021	0.94	-
9	09-12-2021	0.56	-
10	10-12-2021	1.61	-
11	11-12-2021	-	-
12	12-12-2021	2.81	-
13	13-12-2021	2.21	-
14	14-12-2021	2.56	-
15	15-12-2021	2.70	-
16	16-12-2021	3.02	-
17	17-12-2021	2.73	-
18	18-12-2021	2.01	-
19	19-12-2021	3.91	-
20	20-12-2021	3.03	-
21	21-12-2021	3.07	-
22	22-12-2021	3.39	-
23	23-12-2021	3.73	-
24	24-12-2021	4.08	-
25	25-12-2021	4.37	-
26	26-12-2021	5.07	-
27	27-12-2021	3.91	-
28	28-12-2021	4.41	-
29	29-12-2021	4.55	-
30	30-12-2021	4.09	-
31	31-12-2021	1.24	-
Total		69.03	5.83
Total		74.86	

:- No transaction happened.

Note: Cross Border Transactions of Electricity of 74.86 MU (69.03 MU purchase and 5.83 MU sell) happened with Nepal only during December, 2021 in IEX, which is included in DAM Volume of December, 2021 in IEX

Appendix-I**Analysis for change in trend of Final Scheduled Volume in DAM on 01st Sunday of December, 2021 (i.e. 5th December, 2021)**

Final Scheduled Volume (MU) and the Daily MCP (Rs/kWh) invariably shows decreasing trend on Sundays and increasing trend on Mondays as the demand of electricity in the country is less on Sundays as compared to other days of week. However, during the month of December, 2021, it is observed that on first Sunday (5th December, 2021), FSV showed increasing trend in comparison to first Saturday (4th December, 2021). On analysis, it has been found as under:

- (i) On first Sunday (5th December, 2021), although there was decrease in purchase on power exchange by some of the States in comparison to first Saturday (4th December, 2021) by **20.59 MU** [i.e. Gujarat (4.53 MU), Haryana (4.18 MU), Rajasthan (3.53 MU), Tamil Nadu (3.36 MU), Uttarakhand (1.90 MU), Uttar Pradesh (0.84 MU) and Telangana (0.73 MU), etc.], there was also increase in purchase on power exchange by some of the States by **29.68 MU** [i.e. Punjab (21.16 MU), Andhra Pradesh (3.36 MU), Maharashtra (1.59 MU), J&K (1.21 MU), Odisha (0.81 MU), Karnataka (0.72 MU) and Kerala (0.35 MU), etc.]. This resulted in an overall increase in FSV by **9.09 MU** on Sunday (5th December, 2021).

Appendix-II**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. **Bilateral Transaction** means a transaction for exchange of electrical energy (MWh) between a specified buyer and a specified seller, from a specified point of injection to a specified point of drawal for a fixed or varying quantum of power (MW) for any time block during a month.
4. **Daily MCP** is the average of MCP of all 96 Time Blocks of the day during which transaction happened.
5. **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.
6. **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.
7. **Energy Supplied** is the total energy (MU) available at the States' periphery.
8. **Final Scheduled Volume** is the total of scheduled volume of all 96 time blocks in a day during the month in which transaction happened.
9. **Green Term Ahead Market (GTAM)** is based on the principles of current Term Ahead Market (TAM) and will offer trade through Intra-Day Contracts, Day ahead contingency Contracts, Daily Contracts and Weekly Contracts for both solar and non-Solar Renewable Energy (RE) generation. GTAM is a market-based mechanism, where RE surplus and RE deficit States can trade RE Power and balance their RPO targets.
10. **Green Day Ahead Market (GDAM)** is based on the principles of current Term Ahead Market (TAM), where market participants purchase and sell electricity generated from renewable sources at financially binding day-ahead prices for the following day.
11. **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.

- 12. Real Time Market (RTM)** 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.
- 13. 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.