



# अप्रैल, 2020 मासिक मार्केट मॉनिटरिंग रिपोर्ट

## Monthly Market Monitoring Report

April, 2020



भारत सरकार/ Government of India

विद्युत मंत्रालय/ Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority

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## REPORT FOR MONTH: APRIL, 2020

### OVERVIEW OF ELECTRICITY TRANSACTIONS ON POWER EXCHANGES IN INDIA

#### 1. DAY AHEAD MARKET (DAM)

- 1.1. The total volume of electricity transacted on both the power exchanges, viz., IEX and PXIL in the Day Ahead Market (DAM) in the month of April, 2020 is **3692.04 MU**. The total energy supplied in the country during the month of April, 2020 is **85,164 MU (Provisional)**. Thus, the volume of electricity transacted on the power exchanges in DAM was 4.34 % of the total energy supplied in the country. The total volume of electricity transacted in DAM during March, 2020 was **3,971.24 MU** which was 4.01 % of the total energy supplied in the country during March, 2020 [**98,952 MU**]. Similarly, the total volume of electricity transacted in DAM during April, 2019 was **4,036.84 MU** which was 3.67% of the total energy supplied in the country during April, 2019 [**110,112 MU**].
- 1.2. The volume of electricity transacted on IEX during April, 2020 is 3,692.04 MU, whereas no transaction happened on PXIL during April, 2020. The volume of electricity transacted on IEX during March, 2020 was 3,971.24 MU, whereas no transaction happened on PXIL during March, 2020. Also, the total volume of electricity transacted during April, 2019 on IEX and PXIL was 4,005.41 MU and 31.43 MU, respectively, which means that the total volume transacted on IEX was 99.22% of the total volume on the power exchanges.
- 1.3. The Average Market Clearing Price (MCP) on IEX during the month of April, 2020 is Rs 2.42/kWh, which shows a decline of 1.63 % and 24.84% when compared with average MCP's for the month of March, 2020 and April, 2019, which were Rs 2.46/kWh and Rs 3.22/kWh, respectively. On PXIL, no transaction happened during April, 2020 and March, 2020, respectively, whereas the Average MCP during April, 2019 was Rs 3.73/kWh, respectively.

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

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

**(a) April, 2020 vis a vis March, 2020**

| Daily MCP<br>(Rs/kWh) | IEX            |                |             | PXIL           |                |             |
|-----------------------|----------------|----------------|-------------|----------------|----------------|-------------|
|                       | April,<br>2020 | March,<br>2020 | %<br>Change | April,<br>2020 | March,<br>2020 | %<br>Change |
| <b>Minimum</b>        | 2.11           | 1.92           | 9.90        | -              | -              | NA          |
| <b>Maximum</b>        | 2.67           | 2.92           | -8.56       | -              | -              | NA          |
| <b>Average</b>        | 2.42           | 2.46           | -1.63       | -              | -              | NA          |

- : No transaction happened

- NA: Not Applicable

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

| Daily MCP<br>(Rs/kWh) | IEX            |                |             | PXIL           |                |             |
|-----------------------|----------------|----------------|-------------|----------------|----------------|-------------|
|                       | April,<br>2020 | April,<br>2019 | %<br>Change | April,<br>2020 | April,<br>2019 | %<br>Change |
| <b>Minimum</b>        | 2.11           | 2.73           | -22.71      | -              | 3.04           | NA          |
| <b>Maximum</b>        | 2.67           | 3.78           | -29.37      | -              | 4.18           | NA          |
| <b>Average</b>        | 2.42           | 3.22           | -24.84      | -              | 3.73           | NA          |

- : No transaction happened

- NA: Not Applicable

**Table: 1B**

- 2.2. The maximum Area Clearing Price (ACP) of **Rs 3.87/kWh** in IEX was observed in all 13 regions during the time block **00:00-00:15 Hrs** on 17<sup>th</sup> April, 2020. As there was **no** congestion in transmission system, the MCP for this time-block was also **Rs 3.87/kWh**. However, the Daily MCP on pan India basis on 17<sup>th</sup> April, 2020 was **Rs 2.39/kWh**.
- 2.3. The minimum ACP of **Rs 0.70/kWh** in IEX was observed in all 13 regions during the time block **18:00-18:15 Hrs** on **18<sup>th</sup> April, 2020**. As there was **no** congestion in transmission system on that day, the MCP for this time-block was also **Rs 0.70/kWh**. However, the Daily MCP on pan India basis on 18<sup>th</sup> April, 2020 was **Rs 2.49/kWh**.
- 2.4. A comparison of the Minimum and Maximum ACP during the months of April, 2020 with that of March, 2020 and April, 2019 is given in **Table- 2A& 2B**:

**a) April, 2020 vis a vis March, 2020**

| ACP<br>(Rs/kWh) | IEX            |                |             | PXIL           |                |             |
|-----------------|----------------|----------------|-------------|----------------|----------------|-------------|
|                 | April,<br>2020 | March,<br>2020 | %<br>Change | April,<br>2020 | March,<br>2020 | %<br>Change |
| <b>Minimum</b>  | 0.70           | 0.60           | 16.67       | -              | -              | NA          |
| <b>Maximum</b>  | 3.87           | 4.99           | -22.44      | -              | -              | NA          |

- : No transaction happened

NA: Not Applicable

**Table: 2A**

**b) April, 2020 vis a vis April, 2019**

| ACP<br>(Rs/kWh) | IEX            |                |             | PXIL           |                |             |
|-----------------|----------------|----------------|-------------|----------------|----------------|-------------|
|                 | April,<br>2020 | April,<br>2019 | %<br>Change | April,<br>2020 | April,<br>2019 | %<br>Change |
| <b>Minimum</b>  | 0.70           | 1.80           | -61.11      | -              | 2.01           | NA          |
| <b>Maximum</b>  | 3.87           | 11.84          | -67.31      | -              | 4.24           | NA          |

- : No transaction happened

- NA: Not Applicable

**Table: 2B**

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

**(a) April, 2020 vis a vis March, 2020**

| Final<br>Scheduled<br>Volume (MU) | IEX            |                |             | PXIL           |                |             |
|-----------------------------------|----------------|----------------|-------------|----------------|----------------|-------------|
|                                   | April,<br>2020 | March,<br>2020 | %<br>Change | April,<br>2020 | March,<br>2020 | %<br>Change |
| <b>Minimum</b>                    | 92.47          | 77.55          | 19.24       | -              | -              | NA          |
| <b>Maximum</b>                    | 151.23         | 175.71         | -13.93      | -              | -              | NA          |
| <b>Average</b>                    | 123.07         | 128.10         | -3.93       | -              | -              | NA          |

- : No transaction happened

NA: Not Applicable

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

| Final<br>Scheduled<br>Volume (MU) | IEX            |                |             | PXIL           |                |             |
|-----------------------------------|----------------|----------------|-------------|----------------|----------------|-------------|
|                                   | April,<br>2020 | April,<br>2019 | %<br>Change | April,<br>2020 | April,<br>2019 | %<br>Change |
| <b>Minimum</b>                    | 92.47          | 105.98         | -12.75      | -              | 0.032          | NA          |
| <b>Maximum</b>                    | 151.23         | 167.21         | -9.56       | -              | 4.800          | NA          |
| <b>Average</b>                    | 123.07         | 133.51         | -7.82       | -              | 1.122          | NA          |

- : No transaction happened

NA: Not Applicable

**Table: 3B****3. TERM AHEAD MARKET (TAM)**

- 3.1. The total volume of electricity transacted on both the power exchanges in Term Ahead Market in April, 2020 was **587.18 MU**, out of which, 395.88 MU (67.42 %) was transacted on IEX and 191.30 MU (32.58%) was transacted on PXIL.
- 3.2. The total volume of electricity transacted on both the power exchanges in March, 2020 in Term Ahead Market was **382.50 MU**, out of which 363.59 MU (95.06 %) was transacted on IEX and 18.91 MU (4.94 %) was transacted on PXIL.

- 3.3. Similarly, total volume of electricity transacted during April, 2019 in Term Ahead Market on both the power exchanges was **627.59 MU**, out of which, 334.13 MU (53.24 %) was transacted on IEX and 293.46 MU (46.76 %) was transacted on PXIL.
- 3.4. This shows an increase of **53.51 %** in TAM during April, 2020 as compared to March, 2020 and a decrease of **6.44 %** as compared to April, 2019.
- 3.5. With respect to the total energy supplied during the month of April, 2020 in the country, the volume of electricity traded on the power exchanges in TAM represents 0.69 % of the total energy supplied. The same was 0.39 % in March, 2020 and 0.57 % in April, 2019.
- 3.6. The comparison of total volume of electricity transacted on both the power exchanges in Term Ahead Market (TAM) during April, 2020 with March, 2020 and April, 2019 is given in **Table - 4A & 4B**:

**(a) April, 2020 vis a vis March, 2020**

| Contract Type                     | IEX         |             |          | PXIL        |             |          |
|-----------------------------------|-------------|-------------|----------|-------------|-------------|----------|
|                                   | April, 2020 | March, 2020 | % Change | April, 2020 | March, 2020 | % Change |
| <b>Intra Day (MU)</b>             | 22.06       | 33.21       | -33.60   | 8.95        | 10.57       | -15.33   |
| <b>Day Ahead Contingency (MU)</b> | 2.43        | 47.66       | -94.91   | -           | 0.43        | NA       |
| <b>Daily/ Any Day (MU)</b>        | 174.00      | 181.92      | -4.35    | 182.35      | 7.91        | 2205.34  |
| <b>Weekly (MU)</b>                | 197.40      | 100.80      | 95.83    | -           | -           | NA       |

- : No transaction happened

NA: Not Applicable

**Table: 4A**

**(a) April, 2020 vis a vis April, 2019**

| Contract Type                     | IEX         |             |          | PXIL        |             |          |
|-----------------------------------|-------------|-------------|----------|-------------|-------------|----------|
|                                   | April, 2020 | April, 2019 | % Change | April, 2020 | April, 2019 | % Change |
| <b>Intra Day (MU)</b>             | 22.06       | 54.18       | -59.29   | 8.95        | 90.24       | -90.08   |
| <b>Day Ahead Contingency (MU)</b> | 2.43        | 279.95      | -99.13   | -           | -           | NA       |
| <b>Daily/ Any Day (MU)</b>        | 174.00      | -           | NA       | 182.35      | 44.91       | 306.02   |
| <b>Weekly (MU)</b>                | 197.40      | -           | NA       | -           | 158.31      | NA       |

- : No transaction happened

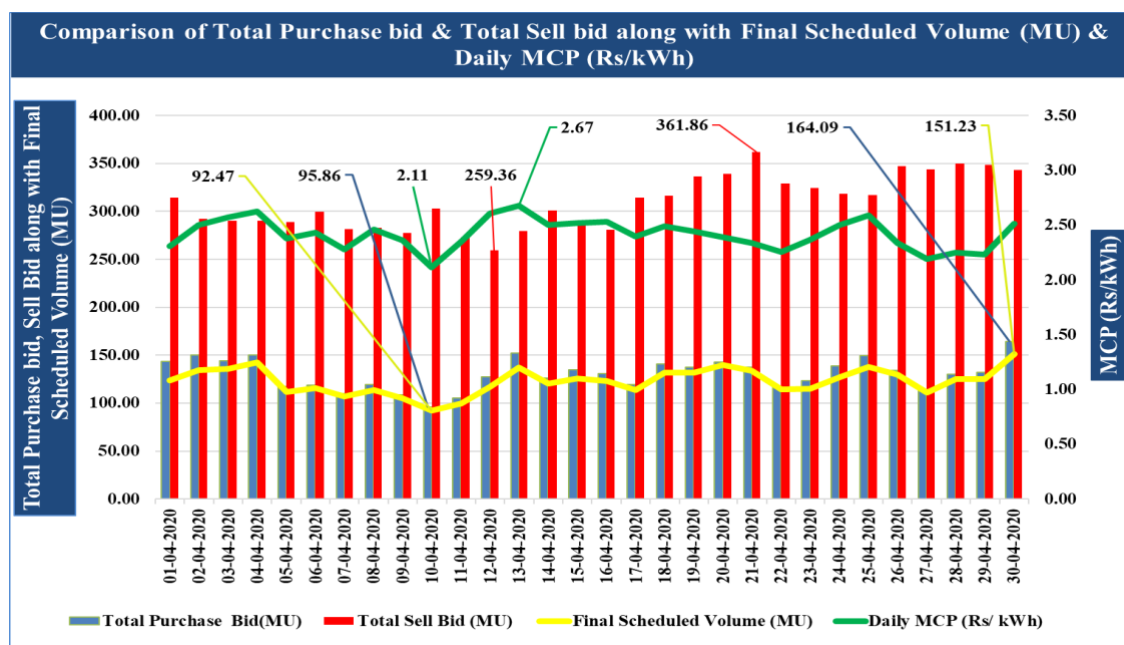
NA: Not Applicable

**Table: 4B**

#### 4. ANALYSIS OF MOVEMENT OF PRICES OBSERVED IN DAM DURING APRIL, 2020

A regression analysis has been carried out on the Day Ahead Market data taken from IEX website. Also, data was plotted in various graphs to observe patterns for each day of the April, 2020 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 the total purchase bid and total sell bid, whereas all the other variables were found to be insignificant. Further, the regression analysis revealed that the elasticity of the Daily MCP with respect to total purchase bid was 0.33. 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 April, 2020.
- 4.3. The same relationship is visible from the analysis carried out from the plot in **Figure 1**.

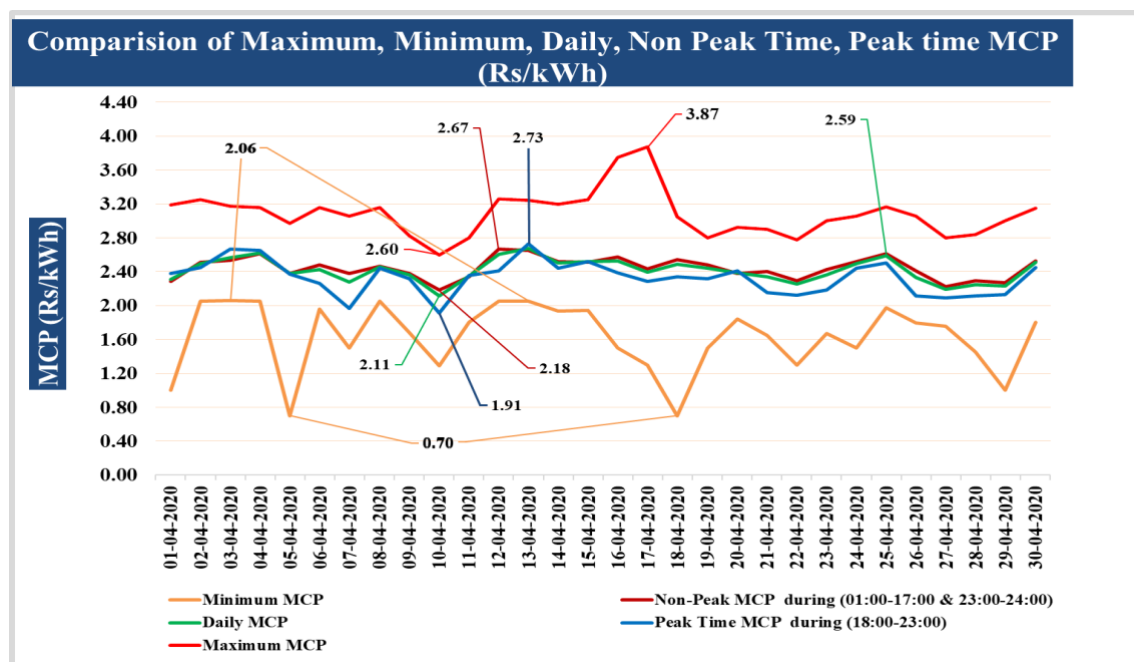


**Figure -1**

- 4.4. Invariably, the Final Scheduled Volume (MU) and the Daily MCP (Rs/kWh) showed decreasing trend on Sundays as the demand of electricity in the country is less compared to other days of week [**Figure 1**]. However, in the month of April, 2020, it is observed that on second and third Sundays (i.e. 12<sup>th</sup> and 19<sup>th</sup> April, 2020), FSV showed increasing trend in comparison to Saturdays (i.e. 11<sup>th</sup> and 18<sup>th</sup> April, 2020). Whereas, on fourth

Monday (i.e. 27<sup>th</sup> April, 2020), FSV showed decreasing trend in comparison to Sunday (i.e. 26<sup>th</sup> April, 2020). The detailed analysis on this is given at **Appendix-I**.

- 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 I**.



**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 II**]. 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 FSV occurred during the **time period 05:45-07:30** [**Annexure III**].
- 4.8. On **27 days** during the month, the minimum FSV occurred during the **time period 17:45-18:30** [**Annexure III**].
- 4.9. On **12 days** during the month, the maximum MCP occurred during the **time period 05:15-06:00** [**Annexure III**].
- 4.10. On **26 days** during the month, the minimum MCP occurred during the **time period 17:30-19:00** [**Annexure III**].
- 4.11. The maximum demand met during the month of April, 2020 in the country occurred on **30<sup>th</sup> April, 2020 at 132.78 GW**, which is 21.97 % less than the maximum demand occurred during **March, 2020 [ i.e. 170.17 GW on 3<sup>rd</sup> March, 2020]** and is 24.90 % less than the maximum demand occurred during April, 2019 i.e. [**176.81 GW on 29<sup>th</sup> April, 2019**].

- 4.12. One nation One Price was observed for **all 30 days** in IEX during the month of April, 2020, as there was no transmission congestion occurred in IEX during the month of April, 2020, whereas no transaction happened on PXIL during April, 2020. In the month of March, 2020 transmission congestion of **13.52 MU** occurred in IEX on **7 days** (i.e. 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup> and 23<sup>rd</sup> March, 2020), so, One Nation One Price observed for **24 days** in March, 2020 in IEX, whereas no transaction happened on PXIL. Similarly, in the month of April, 2019, transmission congestion of **64.75 MU** occurred in IEX on **14 days** (i.e. 1<sup>st</sup> to 11<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup> and 20<sup>th</sup> April, 2019) and transmission congestion of **2.48 MU** occurred in PXIL on **3 days** (i.e. 3<sup>rd</sup>, 6<sup>th</sup> and 9<sup>th</sup> April, 2019). Hence, one nation one price was observed on **16 days** in IEX and 27 days in PXIL, respectively.
- 4.13. There was no real time curtailment in IEX during April, 2020, whereas no transaction happened in PXIL during April, 2020. Also, there was no real time curtailment in IEX during March, 2020, whereas no transaction happened in PXIL during March, 2020. In the month of April, 2019, real time curtailment of **3.09 MU** occurred in IEX, whereas there was no real time curtailment in PXIL.
- 4.14. The **top 10 sellers** on the power exchanges during the month are: **Odisha, Uttar Pradesh, Himachal Pradesh, DGEN Mega Power, Teesta 3, Assam, Uttarakhand, JITPL, Delhi & Chhattisgarh** and these constituted **67.66 %** of the market share. **[Annexure IV]**
- 4.15. The **top 10 purchasers** on the power exchanges during the month are: **RKM Power, Ramagundam Stg-3, Jindal Power Ltd. Stg-II, KBUNL(MTPS-II), Costal Energen, OPGC Unit-4, Pondicherry, Kahalgaon, Chamara-II & NTPC Kudgi** and these constituted **96.17%** of the market share. **[Annexure IV]**

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- Source DAM and TAM 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

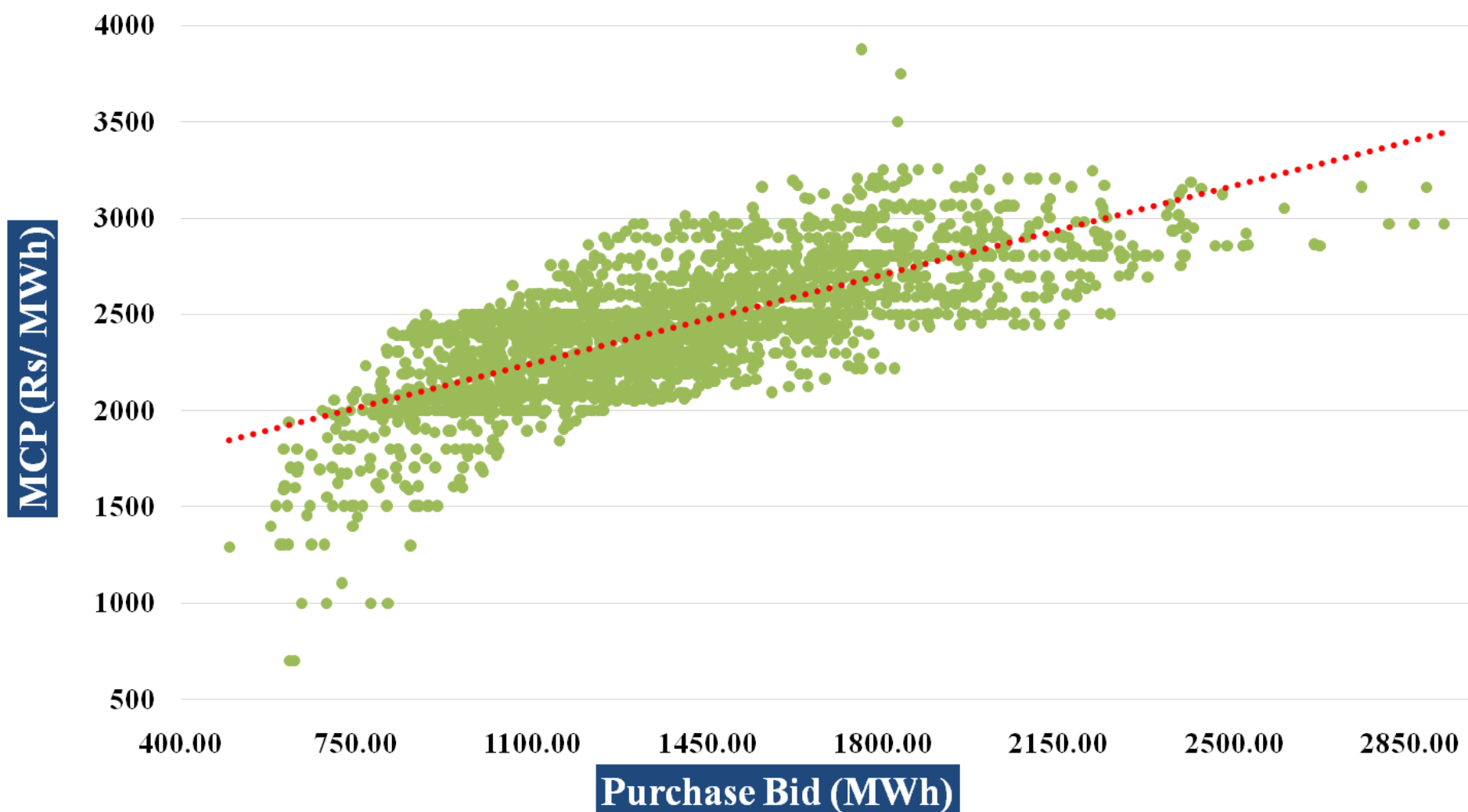
**Peak Time MCP, Non-Peak MCP, Maximum MCP, Minimum MCP, Average MCP and Final Scheduled Volume (MU)**

| Date       | MCP during<br>(01:00-06:00,<br>23:00-24:00) | MCP during<br>(07:00-10:00) | MCP during<br>(11:00-17:00) | Peak Time<br>MCP during<br>(18:00-23:00) | Non-Peak MCP<br>during (01:00-17:00<br>& 23:00-24:00) | Maximum<br>MCP | Minimum<br>MCP | Average<br>MCP | Final<br>Scheduled<br>Volume (MU) |
|------------|---------------------------------------------|-----------------------------|-----------------------------|------------------------------------------|-------------------------------------------------------|----------------|----------------|----------------|-----------------------------------|
| 01/04/2020 | 2.22                                        | 2.60                        | 2.16                        | 2.38                                     | 2.28                                                  | 3.19           | 1.00           | 2.31           | 123.55                            |
| 02/04/2020 | 2.68                                        | 2.84                        | 2.16                        | 2.45                                     | 2.51                                                  | 3.25           | 2.05           | 2.50           | 134.24                            |
| 03/04/2020 | 2.63                                        | 2.78                        | 2.30                        | 2.66                                     | 2.54                                                  | 3.17           | 2.06           | 2.57           | 135.62                            |
| 04/04/2020 | 2.75                                        | 2.79                        | 2.37                        | 2.65                                     | 2.61                                                  | 3.16           | 2.05           | 2.62           | 142.76                            |
| 05/04/2020 | 2.61                                        | 2.55                        | 2.06                        | 2.37                                     | 2.38                                                  | 2.97           | 0.70           | 2.38           | 111.40                            |
| 06/04/2020 | 2.61                                        | 2.77                        | 2.19                        | 2.27                                     | 2.48                                                  | 3.16           | 1.96           | 2.43           | 115.45                            |
| 07/04/2020 | 2.38                                        | 2.61                        | 2.24                        | 1.97                                     | 2.38                                                  | 3.06           | 1.50           | 2.28           | 107.05                            |
| 08/04/2020 | 2.51                                        | 2.52                        | 2.38                        | 2.44                                     | 2.46                                                  | 3.16           | 2.05           | 2.46           | 113.60                            |
| 09/04/2020 | 2.40                                        | 2.52                        | 2.27                        | 2.32                                     | 2.38                                                  | 2.82           | 1.68           | 2.36           | 104.74                            |
| 10/04/2020 | 2.37                                        | 2.15                        | 2.01                        | 1.91                                     | 2.18                                                  | 2.60           | 1.29           | 2.11           | 92.47                             |
| 11/04/2020 | 2.43                                        | 2.43                        | 2.21                        | 2.35                                     | 2.34                                                  | 2.80           | 1.80           | 2.35           | 99.42                             |
| 12/04/2020 | 2.91                                        | 2.75                        | 2.39                        | 2.41                                     | 2.67                                                  | 3.26           | 2.05           | 2.60           | 117.14                            |
| 13/04/2020 | 2.87                                        | 2.74                        | 2.39                        | 2.73                                     | 2.65                                                  | 3.25           | 2.06           | 2.67           | 137.37                            |
| 14/04/2020 | 2.67                                        | 2.61                        | 2.32                        | 2.44                                     | 2.52                                                  | 3.20           | 1.94           | 2.50           | 120.58                            |
| 15/04/2020 | 2.74                                        | 2.49                        | 2.30                        | 2.52                                     | 2.51                                                  | 3.25           | 1.95           | 2.52           | 125.78                            |
| 16/04/2020 | 2.93                                        | 2.61                        | 2.20                        | 2.39                                     | 2.57                                                  | 3.75           | 1.50           | 2.53           | 123.00                            |
| 17/04/2020 | 2.80                                        | 2.34                        | 2.11                        | 2.28                                     | 2.43                                                  | 3.87           | 1.30           | 2.39           | 113.61                            |
| 18/04/2020 | 2.72                                        | 2.56                        | 2.35                        | 2.34                                     | 2.54                                                  | 3.05           | 0.70           | 2.49           | 131.61                            |
| 19/04/2020 | 2.63                                        | 2.56                        | 2.29                        | 2.32                                     | 2.48                                                  | 2.80           | 1.50           | 2.44           | 131.88                            |
| 20/04/2020 | 2.39                                        | 2.52                        | 2.28                        | 2.41                                     | 2.38                                                  | 2.92           | 1.84           | 2.39           | 140.01                            |
| 21/04/2020 | 2.58                                        | 2.35                        | 2.24                        | 2.16                                     | 2.40                                                  | 2.90           | 1.65           | 2.34           | 133.73                            |
| 22/04/2020 | 2.27                                        | 2.44                        | 2.23                        | 2.13                                     | 2.29                                                  | 2.78           | 1.30           | 2.25           | 114.29                            |
| 23/04/2020 | 2.62                                        | 2.37                        | 2.27                        | 2.18                                     | 2.43                                                  | 3.00           | 1.67           | 2.37           | 114.86                            |
| 24/04/2020 | 2.73                                        | 2.50                        | 2.32                        | 2.44                                     | 2.52                                                  | 3.06           | 1.50           | 2.50           | 127.25                            |
| 25/04/2020 | 2.85                                        | 2.62                        | 2.37                        | 2.51                                     | 2.61                                                  | 3.17           | 1.98           | 2.59           | 137.89                            |
| 26/04/2020 | 2.62                                        | 2.42                        | 2.19                        | 2.12                                     | 2.41                                                  | 3.06           | 1.80           | 2.34           | 130.01                            |
| 27/04/2020 | 2.39                                        | 2.21                        | 2.06                        | 2.09                                     | 2.22                                                  | 2.80           | 1.76           | 2.19           | 111.19                            |
| 28/04/2020 | 2.37                                        | 2.27                        | 2.22                        | 2.12                                     | 2.29                                                  | 2.84           | 1.45           | 2.25           | 125.03                            |
| 29/04/2020 | 2.36                                        | 2.31                        | 2.15                        | 2.13                                     | 2.27                                                  | 3.00           | 1.00           | 2.23           | 125.29                            |
| 30/04/2020 | 2.72                                        | 2.44                        | 2.39                        | 2.45                                     | 2.53                                                  | 3.15           | 1.80           | 2.51           | 151.23                            |
| Maximum    | 2.93                                        | 2.84                        | 2.39                        | 2.73                                     | 2.67                                                  | 3.87           | 2.06           | 2.67           | 151.23                            |
| Minimum    | 2.22                                        | 2.15                        | 2.01                        | 1.91                                     | 2.18                                                  | 2.60           | 0.70           | 2.11           | 92.47                             |
| Average    | 2.59                                        | 2.52                        | 2.25                        | 2.33                                     | 2.44                                                  | 3.08           | 1.63           | 2.42           | 123.07                            |

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

## Comparison of MCP w.r.t. Purchase Bid for 2,880 Time Blocks during the month of April, 2020



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

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

| 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 |
| 01/04/2020 | 07:15 - 07:30 | 2.22  | 21:00 - 21:15     | 3.19  | 17:45 - 18:00 | 0.74  | 17:45 - 18:00     | 1.00  |
| 02/04/2020 | 07:15 - 07:30 | 2.36  | 05:15 - 05:30     | 3.25  | 22:15 - 22:30 | 0.91  | 17:30 - 17:45     | 2.05  |
| 03/04/2020 | 06:45 - 07:00 | 2.16  | 19:15 - 19:30     | 3.17  | 18:00 - 18:15 | 0.93  | 14:15 - 14:30     | 2.06  |
| 04/04/2020 | 07:15 - 07:30 | 2.36  | 05:30 - 05:45     | 3.16  | 18:00 - 18:15 | 0.87  | 18:00 - 18:15     | 2.05  |
| 05/04/2020 | 06:45 - 07:00 | 1.80  | 21:45 - 22:00     | 2.97  | 21:00 - 21:15 | 0.62  | 21:00 - 21:15     | 0.70  |
| 06/04/2020 | 06:45 - 07:00 | 2.08  | 06:45 - 07:00     | 3.16  | 18:00 - 18:15 | 0.79  | 20:15 - 20:30     | 1.96  |
| 07/04/2020 | 06:30 - 06:45 | 1.99  | 06:30 - 06:45     | 3.06  | 18:00 - 18:15 | 0.61  | 18:15 - 18:30     | 1.50  |
| 08/04/2020 | 06:45 - 07:00 | 1.77  | 05:30 - 05:45     | 3.16  | 18:00 - 18:15 | 0.74  | 18:00 - 18:15     | 2.05  |
| 09/04/2020 | 06:45 - 07:00 | 1.80  | 05:45 - 06:00     | 2.82  | 18:00 - 18:15 | 0.63  | 18:15 - 18:30     | 1.68  |
| 10/04/2020 | 07:00 - 07:15 | 1.55  | 22:30 - 22:45     | 2.60  | 18:00 - 18:15 | 0.50  | 18:00 - 18:15     | 1.29  |
| 11/04/2020 | 07:00 - 07:15 | 1.55  | 19:30 - 19:45     | 2.80  | 18:00 - 18:15 | 0.61  | 18:00 - 18:15     | 1.80  |
| 12/04/2020 | 06:45 - 07:00 | 1.86  | 05:45 - 06:00     | 3.26  | 18:00 - 18:15 | 0.71  | 18:00 - 18:15     | 2.05  |
| 13/04/2020 | 06:45 - 07:00 | 2.11  | 05:45 - 06:00     | 3.25  | 18:00 - 18:15 | 0.94  | 18:00 - 18:15     | 2.06  |
| 14/04/2020 | 06:15 - 06:30 | 2.00  | 05:45 - 06:00     | 3.20  | 18:00 - 18:15 | 0.73  | 18:30 - 18:45     | 1.94  |
| 15/04/2020 | 07:00 - 07:15 | 1.93  | 00:00 - 00:15     | 3.25  | 18:00 - 18:15 | 0.67  | 18:00 - 18:15     | 1.95  |
| 16/04/2020 | 06:30 - 06:45 | 2.22  | 00:00 - 00:15     | 3.75  | 18:00 - 18:15 | 0.59  | 18:00 - 18:15     | 1.50  |
| 17/04/2020 | 06:15 - 06:30 | 1.73  | 00:00 - 00:15     | 3.87  | 18:00 - 18:15 | 0.60  | 18:15 - 18:30     | 1.30  |
| 18/04/2020 | 06:45 - 07:00 | 2.08  | 05:30 - 05:45     | 3.05  | 18:00 - 18:15 | 0.59  | 18:00 - 18:15     | 0.70  |
| 19/04/2020 | 06:45 - 07:00 | 2.23  | 00:00 - 00:15     | 2.80  | 18:00 - 18:15 | 0.72  | 18:15 - 18:30     | 1.50  |
| 20/04/2020 | 06:45 - 07:00 | 2.17  | 22:45 - 23:00     | 2.92  | 18:45 - 19:00 | 0.93  | 03:30 - 03:45     | 1.84  |
| 21/04/2020 | 05:45 - 06:00 | 2.07  | 22:30 - 22:45     | 2.90  | 18:00 - 18:15 | 0.83  | 18:45 - 19:00     | 1.65  |
| 22/04/2020 | 06:15 - 06:30 | 1.97  | 05:45 - 06:00     | 2.78  | 18:15 - 18:30 | 0.61  | 18:30 - 18:45     | 1.30  |
| 23/04/2020 | 06:15 - 06:30 | 1.89  | 05:30 - 05:45     | 3.00  | 18:00 - 18:15 | 0.62  | 18:30 - 18:45     | 1.67  |
| 24/04/2020 | 06:00 - 06:15 | 1.96  | 00:00 - 00:15     | 3.06  | 18:15 - 18:30 | 0.66  | 18:15 - 18:30     | 1.50  |
| 25/04/2020 | 06:15 - 06:30 | 2.10  | 05:45 - 06:00     | 3.17  | 18:00 - 18:15 | 0.76  | 18:00 - 18:15     | 1.98  |
| 26/04/2020 | 05:45 - 06:00 | 2.01  | 05:30 - 05:45     | 3.06  | 18:00 - 18:15 | 0.70  | 18:30 - 18:45     | 1.80  |
| 27/04/2020 | 06:15 - 06:30 | 1.65  | 00:45 - 01:00     | 2.80  | 18:00 - 18:15 | 0.66  | 18:30 - 18:45     | 1.76  |
| 28/04/2020 | 22:45 - 23:00 | 1.79  | 23:00 - 23:15     | 2.84  | 18:00 - 18:15 | 0.65  | 18:30 - 18:45     | 1.45  |
| 29/04/2020 | 06:30 - 06:45 | 1.91  | 22:15 - 22:30     | 3.00  | 18:00 - 18:15 | 0.64  | 18:00 - 18:15     | 1.00  |
| 30/04/2020 | 22:45 - 23:00 | 2.16  | 22:45 - 23:00     | 3.15  | 18:00 - 18:15 | 0.85  | 18:30 - 18:45     | 1.80  |

MCP: Market Clearing Price (Rs/kWh)

FSV: Final Scheduled Volume (MU)

**Annexure-IV****Top Ten Entities (Sellers and Purchasers) during the month of April,2020**

| Entity Name                | Sell            |               | Entity Name                   | Purchase        |               |
|----------------------------|-----------------|---------------|-------------------------------|-----------------|---------------|
|                            | (MU)            | Percent       |                               | (MU)            | Percent (%)   |
| <b>Odisha</b>              | <b>448.52</b>   | <b>12.15%</b> | <b>RKM Power</b>              | <b>1335.01</b>  | <b>36.16%</b> |
| <b>Uttar Pradesh</b>       | <b>431.14</b>   | <b>11.68%</b> | <b>Ramagundam Stg-3</b>       | <b>755.28</b>   | <b>20.46%</b> |
| <b>Himachal Pradesh</b>    | <b>362.85</b>   | <b>9.83%</b>  | <b>Jindal Power Ltd. Stg-</b> | <b>552.40</b>   | <b>14.96%</b> |
| <b>DGEN Mega Power</b>     | <b>262.58</b>   | <b>7.11%</b>  | <b>KBUNL(MTPS-II)</b>         | <b>343.11</b>   | <b>9.29%</b>  |
| <b>Teesta -3</b>           | <b>229.47</b>   | <b>6.22%</b>  | <b>Costal Energen</b>         | <b>186.93</b>   | <b>5.06%</b>  |
| <b>Assam</b>               | <b>213.99</b>   | <b>5.80%</b>  | <b>OPGC Unit-4</b>            | <b>107.32</b>   | <b>2.91%</b>  |
| <b>Uttarakhand</b>         | <b>161.61</b>   | <b>4.38%</b>  | <b>Puducherry</b>             | <b>89.42</b>    | <b>2.42%</b>  |
| <b>JITPL</b>               | <b>145.26</b>   | <b>3.93%</b>  | <b>Kahalgaon</b>              | <b>72.34</b>    | <b>1.96%</b>  |
| <b>Delhi</b>               | <b>127.04</b>   | <b>3.44%</b>  | <b>Chamera-II</b>             | <b>56.16</b>    | <b>1.52%</b>  |
| <b>Chhattisgarh</b>        | <b>115.44</b>   | <b>3.13%</b>  | <b>NTPC Kudgi</b>             | <b>52.76</b>    | <b>1.43%</b>  |
| <b>Total</b>               | <b>2,497.90</b> | <b>67.66%</b> | <b>Total</b>                  | <b>3,550.73</b> | <b>96.17%</b> |
| <b>Total Volume in PXs</b> | <b>3,692.04</b> |               | <b>Total Volume in PXs</b>    | <b>3,692.04</b> |               |

**Appendix-I****Analysis for change in trend of Final Scheduled Volume on 2<sup>nd</sup>, 3<sup>rd</sup> Sunday and on 4<sup>th</sup> Monday of April, 2020 (i.e. on 12<sup>th</sup>, 19<sup>th</sup> and 27<sup>th</sup> April, 2020)**

1. In the month of April, 2020, it is observed that on Sundays (i.e. 12<sup>th</sup> and 19<sup>th</sup> April, 2020), FSV showed increasing trend in comparison to Saturdays (i.e. 11<sup>th</sup> and 18<sup>th</sup> April, 2020). Whereas, on Monday (i.e. 27<sup>th</sup> April, 2020) FSV showed decreasing trend in comparison to Sunday (i.e. 26<sup>th</sup> April, 2020). On analysis of this variation in trends of FSV on 12<sup>th</sup>, 19<sup>th</sup> and 27<sup>th</sup> April, 2020, it has been observed as under:
  - (i) On Sunday (12<sup>th</sup> April, 2020), there was increase in purchase on power exchange by some of the States and entities in comparison to Saturday (11<sup>th</sup> April, 2020) by **31.196 MU** [i.e. Maharashtra (12.812 MU), Telangana (9.326 MU), Andhra Pradesh (6.298 MU), Bihar (0.958 MU), etc.]. There was also marked decrease in purchase on power exchange by some of the States by **13.472 MU** [i.e. Gujarat (11.111 MU), Uttar Pradesh (2.042), Karnataka (0.106), etc.] This resulted in an overall increase in FSV by **17.724 MU** on Sunday (12<sup>th</sup> April, 2020).
  - (ii) Similarly, on Sunday (19<sup>th</sup> April, 2020) there was increase in purchase on power exchange by some of the States in comparison to Saturday (18<sup>th</sup> April, 2020) by **14.215 MU** [i.e. Maharashtra (9.933 MU), Gujarat (2.606 MU), Rajasthan (1.388 MU), etc.]. There was also marked decrease in purchase on power exchange by some of the States and entities by **13.952 MU** [i.e. Bihar (4.348 MU), Punjab (3.550), Uttar Pradesh (3.544), etc.] This resulted in an overall increase in FSV by **0.263 MU** on Sunday (19<sup>th</sup> April, 2020).
  - (iii) Further, on Monday (27<sup>th</sup> April, 2020), there was increase in purchase on power exchange by some of the States and entities in comparison to Sunday (26<sup>th</sup> April, 2020) by **9.300 MU** [i.e. Telangana (4.485 MU), Maharashtra (2.043 MU), Gujarat (1.238 MU), ArcelorMittal Nippon Steel (0.608 MU), etc.]. There was also marked decrease in purchase on power exchange by some of the States by **28.119 MU** [i.e. Andhra Pradesh (15.850 MU), Punjab (9.050 MU), Haryana (1.817 MU), Uttar Pradesh (0.890), etc.] This resulted in an overall decrease in FSV by **18.819 MU** on Monday (27<sup>th</sup> April, 2020).

## Definitions/ Terminologies used in the Report

1. **MCP** is the price discovered in each of the 15 Minute Time Block. The day is divided in 96 time blocks of 15minutes each.
2. **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.

3. **Daily MCP** is the average of MCP of all 96 Time Blocks of the day during which transaction happened.
4. **Average MCP** is the average of daily MCP of the days during the month on which transaction happened.
5. **Final Scheduled Volume** is the total of scheduled volume of all 96 time blocks in a day during the month in which transaction happened.
6. **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.
7. **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.
8. **Energy Supplied** is the total energy (MU) available at the States' periphery.
9. **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.