# Report on Trend Analysis of Power Exchange Prices in India: 2018-20

एनटीपीसी NTPC
विद्युत व्यापार
Vidyut Vyapar

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# Introduction

Usually "Short-term transactions of electricity" refers to contracts of less than one year period for electricity transacted under bilateral transactions through Inter-State Trading Licensees (only inter-State part) and directed by the Distribution Licensees (also referred as Distribution Companies or DISCOMs), Power Exchanges (Indian Energy Exchange Ltd (IEX) and Power Exchange India Ltd (PXIL)), and Deviation Settlement Mechanism (DSM).

Some of the Salient Features of the short-term power market are as under:

- Of the total electricity procured in India in 2018-19, the short-term power market comprised 12%. The balance 88% of generation was procured mainly by distribution companies through long-term contracts and short-term intra-State transactions.
- Based on the CERC MMR (Market Monitoring Report), during 2009-10 to 2018-19, the volume of short-term transactions of electricity increased at a higher rate (9%) when compared with the gross electricity generation (6%).
- In terms of volume, the size of the short-term market in India was 145.20BU in the year 2018-19. As compared to the volume of electricity transacted through a short-term market in the year 2017-18 (127.62BU), this was about 14% higher.

Under Short-Term-Market, Day-Ahead-Market (DAM) is a physical electricity trading market for deliveries for any/some/all 15-minute time blocks in 24 hours of next day starting from midnight. The prices and quantum of electricity to be traded are determined through a double-sided closed auction bidding process.

The operations are carried out under the 'Procedure for scheduling of collective transactions' issued by the Central Transmission Utility (PGCIL), 'CERC (Open Access In Inter-State Transmission) Regulations, 2008, as amended from time to time and the Bye-Laws, Rules and Business Rules of the Exchange.

Features of Day-Ahead-Market

- Trading of 15-minute contracts
- Double-sided anonymous auction bidding process
- Clearance obtained from SLDC by buyers and sellers based on the availability of network and ABT meters
- Congestion Management through market splitting and determining Area Clearing Price (ACP) specific to an area
- Risk management through the requisite Margin, including any additional Margin as specified for the respective trading segment or the type of contracts

The report comprises of overview of various trends of power exchange prices in the short-term power market in India. Since most of the transaction on Exchange platform is under Day-Ahead-Market i.e. approximately up to 50%, therefore this overview mainly highlights the analysis of

Day-Ahead-Market price variation trends along with demand trend in different areas over the recent years.

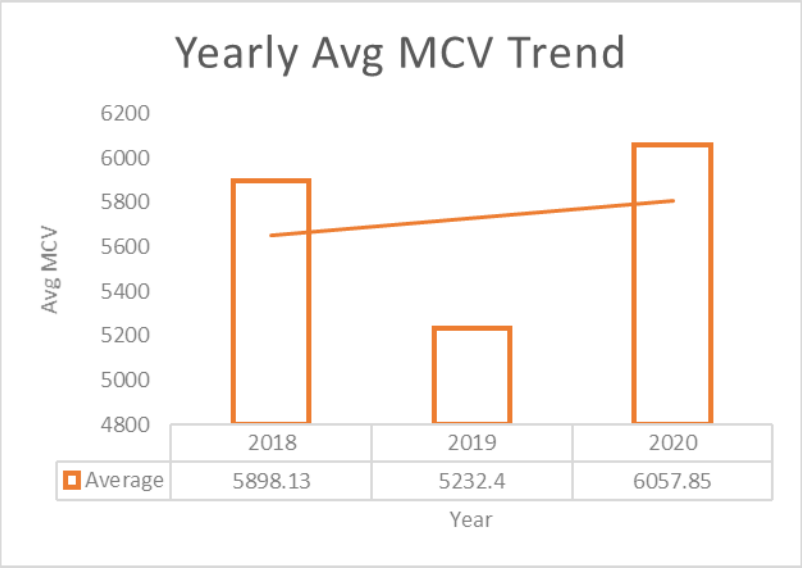
Usually, prices vary based on the intersection of demand and supply of electricity and also if the demand is in surplus but supply is deficit than the price will increase and vice-versa.

The analysis in the report includes

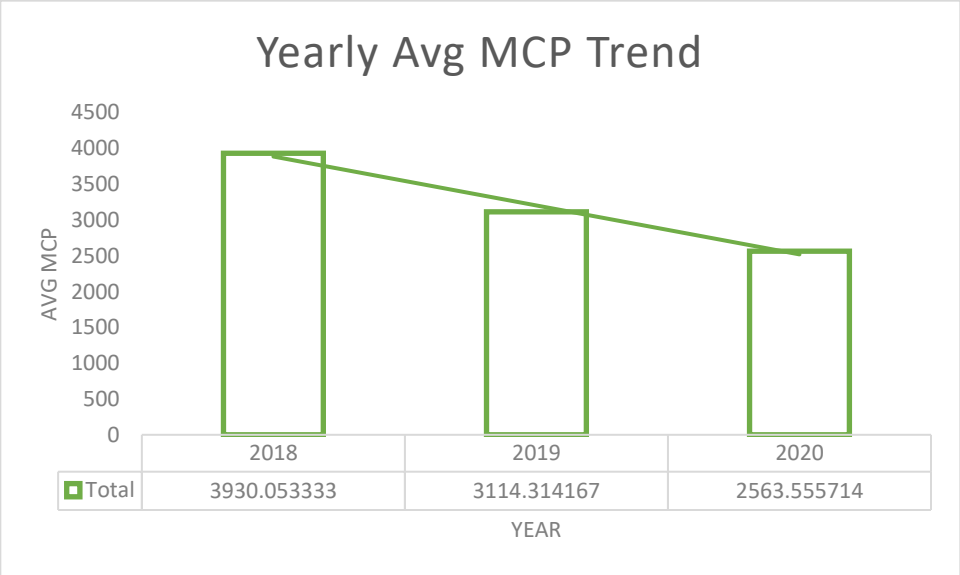
- Yearly/quarterly/monthly trends along with seasonal variations in the short-term market (mainly day-ahead transactions of electricity through power exchange) - based on the power exchange prices and the market-clearing volume.
- Bid area wise demand pattern analysis over the recent years with recent top buys and sellers at Exchange platform.

## Yearly Trends in Short-term Transactions of Electricity (2018-2020 through Power Exchanges)

*Volume of Day Ahead Transactions of Electricity*

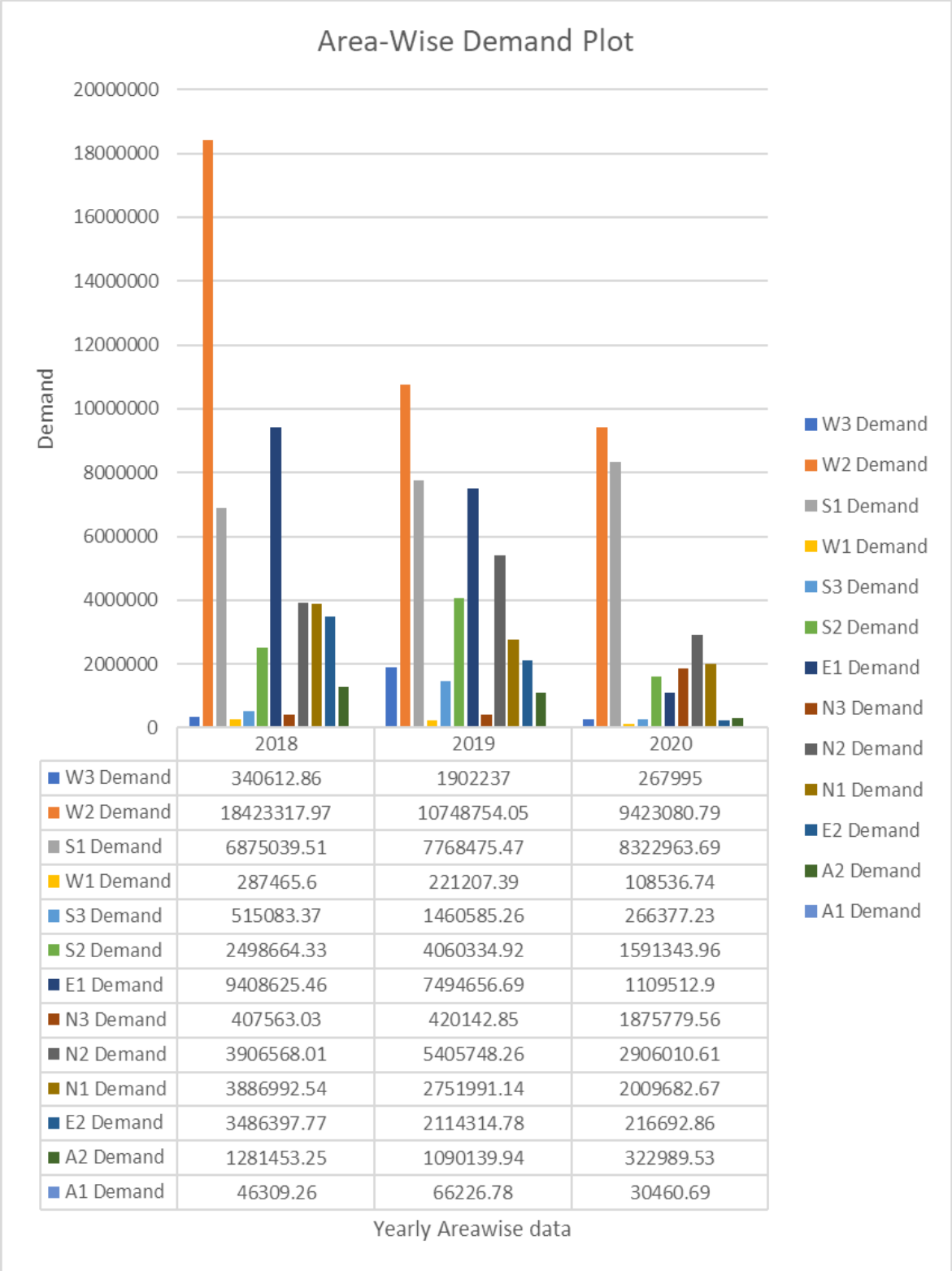



*Price of Day Ahead Transactions of Electricity*



- ***Between Jan-18 to Jan-19 -*** Cleared volume between ***registered 3% decline YoY.***
- Also by looking at the trend of yearly average MCV trend, it can be said that all India electricity demand bounced back in ***Q4 FY'19-20 with a 1.6% YoY growth after a decline of 5.9% in Q3 FY'19-20***. The first two months in the quarter –(Jan and Feb), witnessed a demand growth of 7.7% YoY. Hence, leading to increased MCV.
- Although March began with positive growth, however, COVID-19 related preventive lockdown led to 9.2% YoY decline in demand during the month.
- From a full-year FY'19-20 perspective, the power sector was characterised by muted electricity demand growth of 1.3% YoY, for the first time since FY'14 as we faced headwinds on account of several unprecedented developments related to ***economic and industrial growth slowdown as well as weather-related changes.***
- Although based on the analysis, a robust ***40% YoY electricity volume growth*** in Q4 FY'19-20 from 9,908MU in Q4 FY'18-19 to 13,835MU in FY'19-20 was reported.
- If we look at the price front, based on the yearly average MCP, there is *a* ***decline of 17.69%*** in the average MCP between the year 2019-20 with an ***average of Rs 2.5/kwh for the first 5 months of the year 2020***.
- If we look at the FY'19-20, the day-ahead market saw an overall ***decline in prices by 14%*** during Q4FY'19-20. ***Hence, Attractive prices helped the commercial and industrial consumers increase procurement by 41% during the same quarter.***

*Area-Wise Trend*



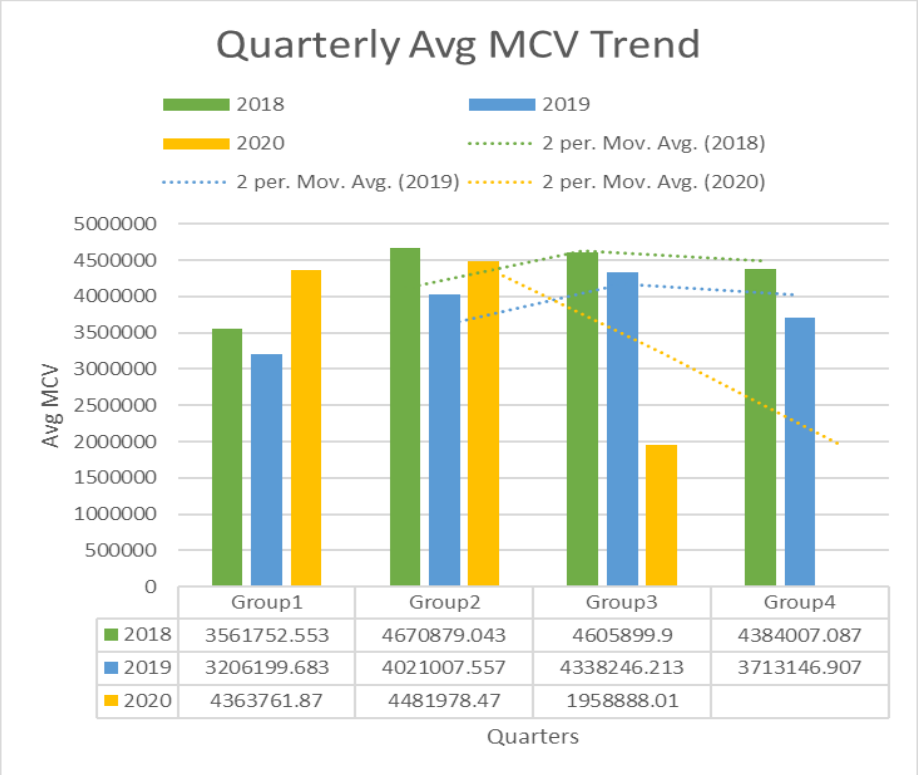

| | 2018 | 2019 | 2020 |
|---|---|---|---|
| W3 Demand | 340612.86 | 1902237 | 267995 |
| W2 Demand | 18423317.97 | 10748754.05 | 9423080.79 |
| S1 Demand | 6875039.51 | 7768475.47 | 8322963.69 |
| W1 Demand | 287465.6 | 221207.39 | 108536.74 |
| S3 Demand | 515083.37 | 1460585.26 | 266377.23 |
| S2 Demand | 2498664.33 | 4060334.92 | 1591343.96 |
| E1 Demand | 9408625.46 | 7494656.69 | 1109512.9 |
| N3 Demand | 407563.03 | 420142.85 | 1875779.56 |
| N2 Demand | 3906568.01 | 5405748.26 | 2906010.61 |
| N1 Demand | 3886992.54 | 2751991.14 | 2009682.67 |
| E2 Demand | 3486397.77 | 2114314.78 | 216692.86 |
| A2 Demand | 1281453.25 | 1090139.94 | 322989.53 |
| A1 Demand | 46309.26 | 66226.78 | 30460.69 |

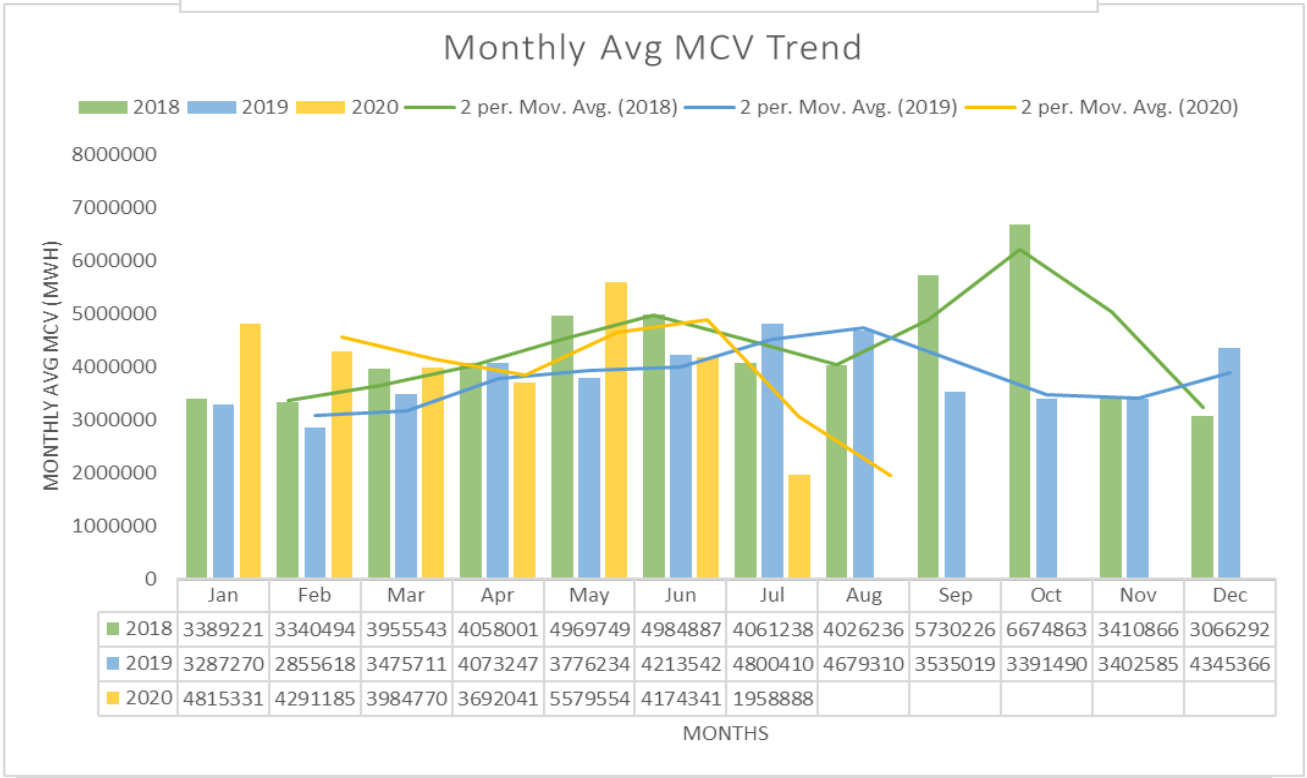
| *Sr. no* | *Bid Area* | *Region* | *States covered under Bid Area* |
|---|---|---|---|
| 1. | N1 | North Region | Jammu and Kashmir, Himachal Pradesh, Chandigarh, Haryana |
| 2. | N2 | North Region | Uttar Pradesh, Uttaranchal, Rajasthan, Delhi |
| 3. | N3 | North Region | Punjab |
| 4. | E1 | East Region | West Bengal, Sikkim, Bihar, Jharkhand |
| 5. | E2 | East Region | Orissa |
| 6. | W1 | West Region | Madhya Pradesh |
| 7. | W2 | West Region | Maharashtra, Gujarat, Daman and Diu, Dadar and Nagar Haveli, North Goa |
| 8. | W3 | West Region | Chhattisgarh |
| 9. | S1 | South Region | Andhra Pradesh, Telangana, Karnataka, Pondicherry (Yanam), South Goa |
| 10. | S2 | South Region | Tamil Nadu, Pondicherry (Puducherry), Pondicherry (Karaikal), Pondicherry (Mahe) |
| 11. | S3 | South Region | Kerala |
| 12. | A1 | North-East Region | Tripura, Manipur, Mizoram, Nagaland |
| 13. | A2 | North-East Region | Assam, Arunachal Pradesh, Meghalaya |

- By looking at the trend of area wise demand pattern analysis, ***W2 bid zone is most prevalent among the others***. After W2, S1 and E1 are also showing high demand in the power exchange market.

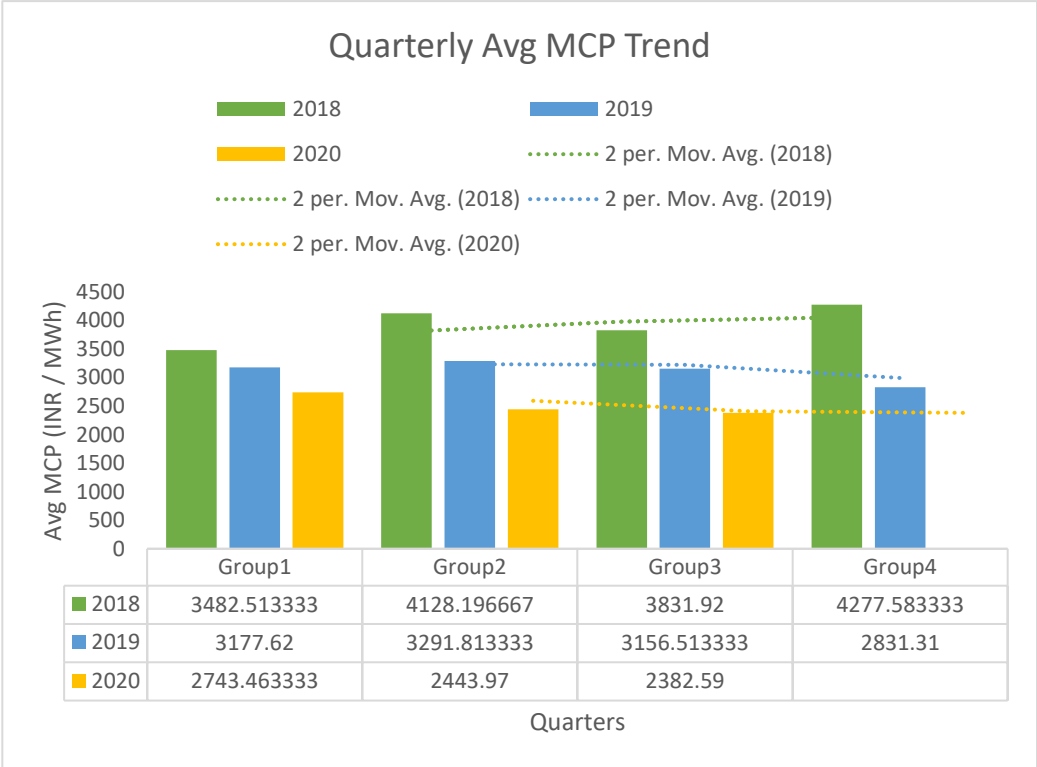
# Quarterly / Monthly Trends in Short-term Transactions of Electricity (2018-2020 through Power Exchanges)

*Volume of Short-term Transactions of Electricity*

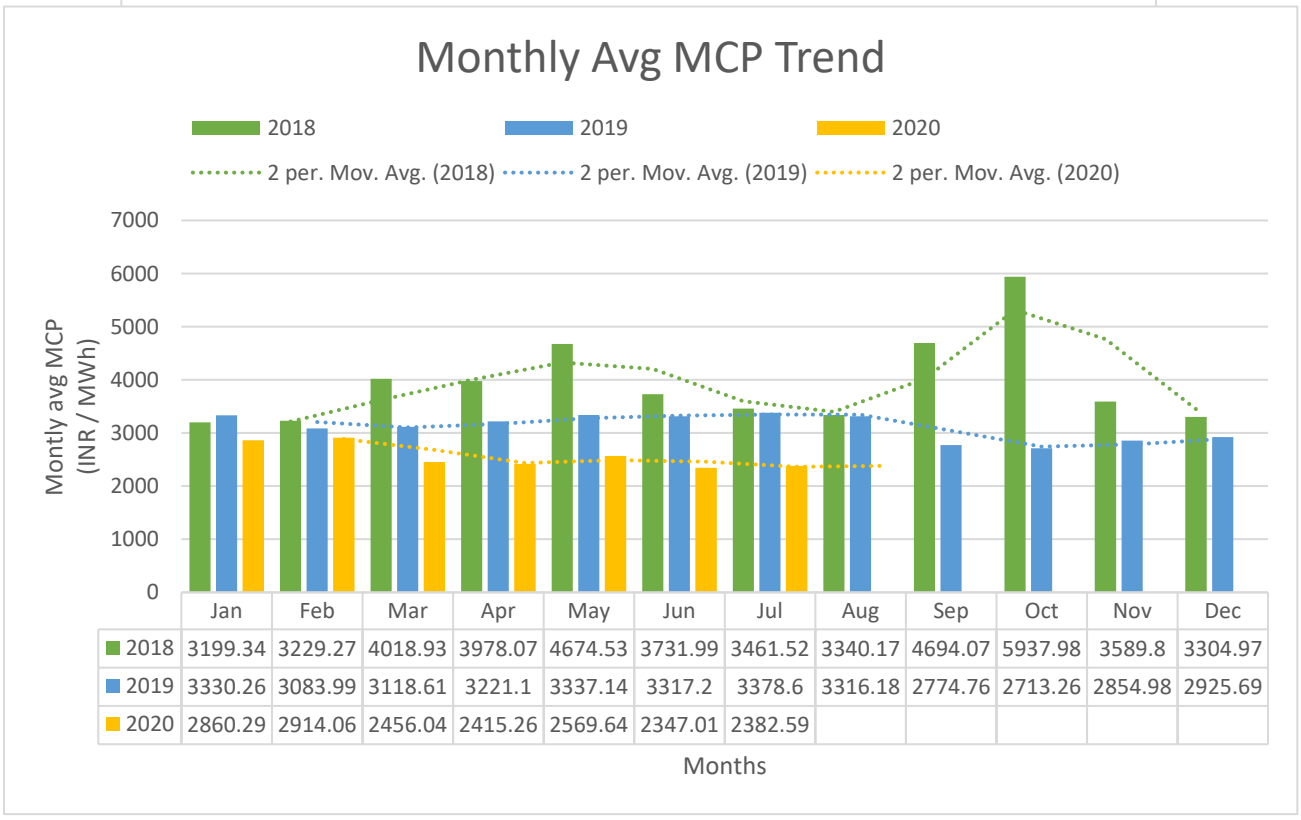


*Price of Short-term Transactions of Electricity*




| | Group1 | Group2 | Group3 | Group4 |
|---|---|---|---|---|
| 2018 | 3482.513333 | 4128.196667 | 3831.92 | 4277.583333 |
| 2019 | 3177.62 | 3291.813333 | 3156.513333 | 2831.31 |
| 2020 | 2743.463333 | 2443.97 | 2382.59 | |




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | 3199.34 | 3229.27 | 4018.93 | 3978.07 | 4674.53 | 3731.99 | 3461.52 | 3340.17 | 4694.07 | 5937.98 | 3589.8 | 3304.97 |
| 2019 | 3330.26 | 3083.99 | 3118.61 | 3221.1 | 3337.14 | 3317.2 | 3378.6 | 3316.18 | 2774.76 | 2713.26 | 2854.98 | 2925.69 |
| 2020 | 2860.29 | 2914.06 | 2456.04 | 2415.26 | 2569.64 | 2347.01 | 2382.59 | | | | | |

## Analysis based on the trend

- By looking at the trend of above-plotted graphs, it can be seen that average MCP is decreasing on the YoY basis, whereas market clearing volume is decreased in 2019 due to the economic slowdown and changing weather patterns and after that again in 2020 it is showing the increasing trend.

- ***March -April -2018*** - In April 2018, the DAM at IEX almost followed the trend set in March 2018. The DAM saw the trade of 4,055 MU an increase of about 2.53% from 3,955 MU traded in March '18 and ~9% increase over 3,717 MU traded in April'17. The average Market Clearing Price (MCP) at Rs. 3.98 per unit saw a decline of 1% over 4.02 per unit price in March'18 and ~44 % above Rs. 2.77 per unit in the same month last year.
    - The spot market prices though firm remained less than Rs. 4 per unit. *The key reasons for high prices were: increase in demand associated with seasonal variation and inadequate availability of coal with the thermal generators.*

- ***Sept -18*** -
    - Continuing the demand and supply dynamics, Southern, Eastern and Western States saw an increase in the demand for electricity making them the key buyers in the market
    - The Day-ahead Market trades all-time high record volume of 268.3 MU at an average price of Rs. 4.93 per unit.
    - *This new high trade benchmark had been achieved in wake of surge in demand for electricity in the Eastern, Southern and Western States mainly due to inadequate supply of coal and, decrease in wind power generation. The Northern States such as Delhi, Haryana, Punjab, and Rajasthan who have been receiving good rainfall over the last three days were the key sellers in the market.*
    - *Whereas in **Oct-18** the key reasons for the increase in volume as well as prices in the day-ahead market were the same as of Sept-18.*

- ***Jan -19*** - The market-clearing price and volume in January'19 remained almost the same as that in December'18 *mainly on account of winter and subdued demand for power especially in the northern states.*
    - Average MCP in December'18 registered 10% increase on YOY basis and 8% decline on MOM basis *mainly on account of winter season leading to subdued demand for power particularly in the Northern and Western States*.
    - ***Feb-19** also had the same reason for the trend.* The average Market Clearing Price (MCP) at Rs. 3.08 per unit registered 4% decline over Rs. 3.23 per unit in the same month last year.

- ***April -19*** - total electricity volume traded ***increased by 4% YoY.*** The day-ahead market witnessed a trade of 4,005 MU in April'19 over 3,356 traded in March'19 registering a 19% increase on MoM basis and almost at par with 4,055 MU traded in April'18.
    - *The increase in traded volume over the previous month was mainly due to an increase in demand for power across States in the context of increasing temperature as well as the ongoing Lok-Sabha Elections.*
    - On a daily average basis134MU were traded in April'19. The average Market Clearing Price (MCP) at Rs. 3.22 per unit saw 19% decline over Rs 3.98 per unit in April'18 *mainly due to increased domestic and imported coal availability with thermal generators and improved hydro-power and renewable energy generation.*

- ***June -19*** - A total of 4,207 MU were traded in DAM saw a 12% increase on MoM basis and ***decline of 15% YoY***.
    - *Greater availability of power from hydro, solar, coal-based power generating stations having long term contracts with discoms along with better availability of domestic and imported coal were the key reasons that led to decline in traded volume on the Exchange platform.*
    - The hydro, solar and coal generators saw an increase of 5%, 52% and 9% respectively according to NLDC reports. On a daily average basis, 140MU was traded in June'19. The average MCP at Rs.3.32 was on par with Rs. 3.33 per unit in May'19 and was 11% lower than Rs. 3.73 per unit in June'18.

- ***July -19*** - Electricity volume at 5,271 MU ***increased by 27% YoY***. The increase in volume corroborated well with an increase in demand for electricity in the select eastern, western and southern states.

- ***Sept -19*** – Average price at Rs.2.77 per kWh ***declined 41% YoY***.

- ***(July-Aug-September) --- Q2'19-20***

    - Overall growth in ***energy consumption and peak demand during the quarter was subdued at 1.6% YoY and 1.1% YoY*** respectively, largely *due to changing weather patterns and impact of economic slowdown, specifically manufacturing.*
    - The index of industrial production (IIP) growth at -1.1%, in August 2019 was the lowest since November 2012 and also we must note that RBI made a downward revision to the GDP forecast by 80 bps to 6.1 % for the fiscal year 2020. Also, the effect of climate shift made the country experience September as the wettest month in more than 100 years which led to ***significant growth of 9% YoY in hydro generation during the quarter***.

- States / UTs such as Karnataka, Bihar, Madhya Pradesh, Chandigarh, Nagaland, Assam registered more than 15% increase in the demand for power in Q2 fiscal year 2020.
- Total volume traded in the electricity market increased by 3% YoY in Q2'19-20. The *average market clearing price discovered in Q2'19-20 at Rs 3.16 per unit declined 18% YoY which provided an opportunity for C&I consumers to procure electricity at lower rates.*
- The day-ahead market traded 3,488 MU with an average MCP at only Rs. 2.77 per unit -lowest in the last 2 years, *hence, market continues to be favourably inclined to buyers both the Distribution utilities & open access consumers in terms of price competitiveness as well as flexibility in power procurement.* The ***average market clearing price was down by 41% vis-à-vis price of Rs. 4.69 per unit in September'18 and 16% on MoM basis***.
- *The reduction in prices was mainly on account of low demand, improved coal supply, extended monsoon and improved hydropower generation.*
- *Subdued demand for power was another reason for low prices in the market.* All India peak demand at 173 GW in September'19 declined 1% over demand of 175.6 GW in Sep'18. In a similar vein, the energy met at 105 BU also declined 5% YoY according to the NLDC data. In the Exchange DAM market, total monthly sell bids at 8,570 MU were almost twice of total buy bids at 4,066 MU.

- ***Oct -19*** - Volume registered a ***decline of 46% YoY*** mainly was *due to the economic slowdown and changing weather patterns.* Average MCP at Rs.2.71 per kWh ***declined 54% YoY*** and was the lowest in the last two years.

- ***Feb -20*** – The average market clearing price in the DAM at ~Rs 2.91 per unit saw a significant 6% decline over the price of Rs. 3.08 per unit in February 2019 and resulted in substantial savings for the market participants.
  - The *increase in trade volume was mainly due to distribution utilities opting for replacement of their costlier power with Exchange-based procurement.*
  - The other key reason was the increase in demand on account of *early onset of summer and agricultural demand in the southern as well the western states, particularly in Telangana due to lifting irrigation.*
  - The volume growth is indeed a testament to Exchange continuing to be the most attractive platform for the distribution utilities for procuring competitively priced electricity coupled with the highest degree of flexibility.

- ***March -20*** - The average market clearing price in the DAM at ~Rs 2.46 per unit saw a noteworthy decline of 21% this month over the price of Rs. 3.12 per unit in March'19, offering the distribution utilities and discoms a compelling opportunity to reduce their

financial burden. Also, the company estimated that rates may continue to be on the lower side as the COVID situation unfolds. The utilities were urged to leverage current low costs to ensure that critical sectors like healthcare, public utilities, businesses can ensure business continuity in the wake of COVID-19 and provide 24X7 power supply so that end-consumers do not struggle with power-cuts at this critical time.

- ***April -20*** – It was noted that with the ***decline in peak demand by almost 25%, the*** Exchange has witnessed high sell-side liquidity -almost at 2.7 times the demand side, which is helping to keep the price in the market under check. The average price in IEX day-ahead market has been as low as Rs 2.36 per unit during the period of March and April. Power procurement by distribution utilities from southern, western and northern states such as Andhra Pradesh, Telangana, Tamil Nadu, Maharashtra, Gujarat, Uttar Pradesh, Bihar and Punjab amongst others have continued and increased over the last several weeks owing to ample power availability and attractive prices.

- ***June -20*** - The average market clearing price during the month was at Rs. 2.35 per unit registered a whopping 29% YoY decline over a price of Rs. 3.32 in June'19.
    - *The increased availability of power and attractive prices in the market ensured that the industries, as well as the distribution utilities, continue to have access to lower electricity prices leading to greater savings as well as assisting them in building the much needed financial liquidity which is critical at this hour. The open-access volume in June witnessed 30% m-o-m increase.*

- ***May -20*** - The electricity market at the IEX registered a total trade of 6005 MU in May'20 marking a significant 47% YoY increase despite the ***national peak demand recording a 9% YoY decline*** during the month.
    - The market demonstrated a significant uptick mainly owing to the increase in demand and consumption in the month driven by ***seasonality factor*** *-peaking summers leading to increased consumption across essential services, especially healthcare institutions, and households due to increasing in work from home for corporate employees.*
    - *Moreover, the steady lifting of the COVID-19 preventive lockdown enabled industries and commerce to get back to business, and thus consumption from C&I customers through open access also witnessed a rise.*
    - The Day-Ahead Market (DAM) traded 5574 MU recording a significant ***48% YoY increase***. The total monthly sell bids at 10580 MU and buy bids were at 6137 MU. The buy-sell dynamics indicate ***ample power availability in the market -1.7 times more sell than buy***. *The consequent lower prices provided a compelling proposition for the industries as well as the distribution utilities to meet their short-term*

*demand as well as replace costlier generation with attractively priced power procured through the exchange.*

- The average market clearing price during the month was at Rs. 2.57 per unit registered a 23% decline YoY over the price of Rs. 3.34 in May'19. The low prices have prompted utilities from Southern, Western and Northern states such as Andhra Pradesh, Telangana, Tamil Nadu, Maharashtra, Gujarat, Uttar Pradesh, Bihar and Punjab amongst others to continue procuring power through Exchange. This has enabled them to save significantly while procuring uninterrupted 24*7 power for all the critical sectors.

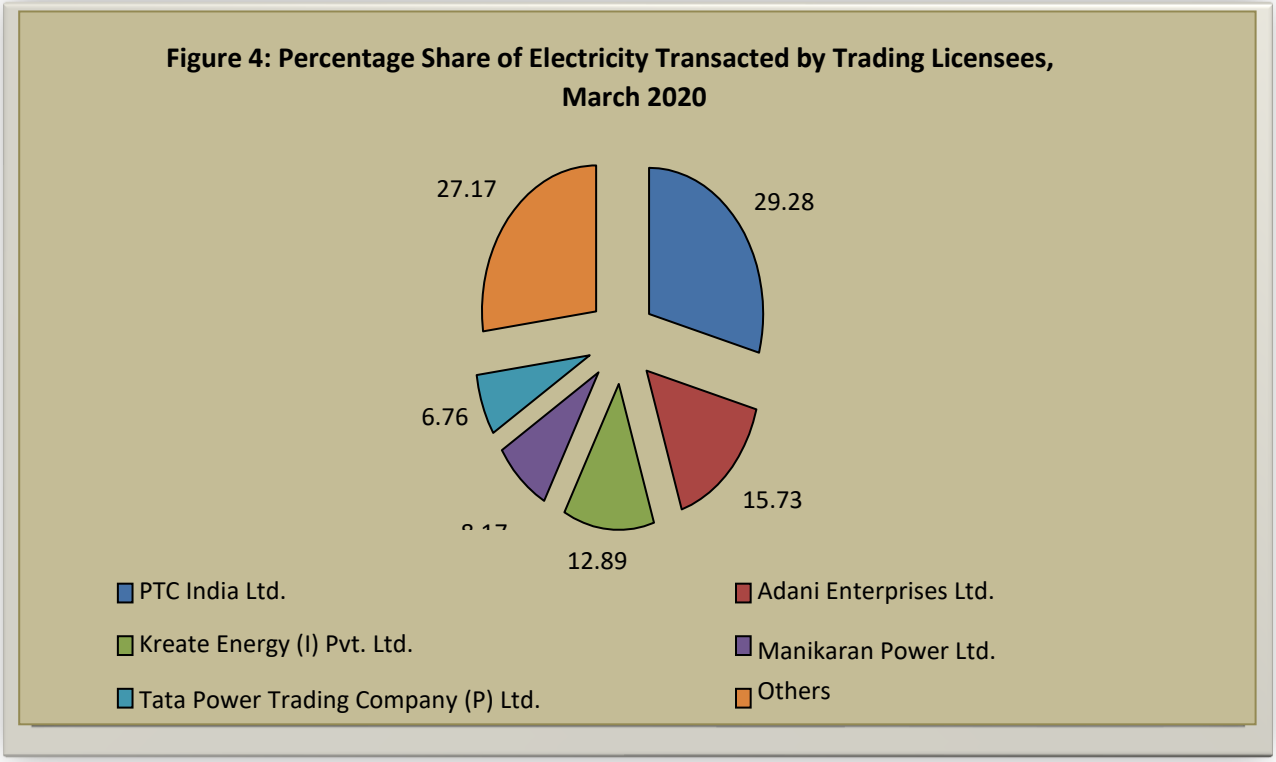
## Topmost Buyers and Sellers

***For March 2020 -***

- Of the total **Power Exchange transactions**,
  - Top 5 regional entities sold 38.66% of the volume, and these were ***Odisha, Uttar Pradesh, GMR Chhattisgarh Energy Limited, Bihar and Himachal Pradesh***.
  - Top 5 regional entities purchased 70.86% of the volume, and these were ***Telangana, Gujarat, Maharashtra, Andhra Pradesh and Tamil Nadu***.

- **Regional entity-wise total volume of net short-term transactions of electricity** i.e. volume of net transactions through bilateral, power exchanges and DSM.
  - Top 5 electricity selling regional entities were ***Delhi, Odisha, Madhya Pradesh, Sembcorp Gayatri Power Ltd. and GMR Chhattisgarh Energy Limited.***
  - Top 5 electricity purchasing regional entities were ***Telangana, Andhra Pradesh, Tamil Nadu, Maharashtra and Kerala.***

**Figure 4: Percentage Share of Electricity Transacted by Trading Licensees, March 2020**



| PERCENTAGE SHARE OF ELECTRICITY TRANSACTED BY TRADING LICENSEES, MARCH 2020 | | |
|---|---|---|
| **Sr.No** | **Name of the Trading Licensee** | **% Share in total Volume transacted by Trading Licensees** |
| 1 | PTC India Ltd. | 29.28 |
| 2 | Adani Enterprises Ltd. | 15.73 |
| 3 | Kreate Energy (I) Pvt. Ltd. | 12.89 |
| 4 | Manikaran Power Ltd. | 8.17 |
| 5 | Tata Power Trading Company (P) Ltd. | 6.76 |
| **Top 5 trading licensees** | | **72.83%** |

| VOLUME OF ELECTRICITY SOLD THROUGH POWER EXCHANGES, MARCH 2020 | | |
|---|---|---|
| **Name of the Entity** | **Volume of Sale (MUs)** | **% of Volume** |
| ODISHA | 374.83 | 9.44 |
| UTTAR PRADESH | 346.05 | 8.71 |
| GMR CHATTISGARH | 313.68 | 7.90 |
| BIHAR | 267.99 | 6.75 |
| HIMACHAL PRADESH | 232.83 | 5.86 |
| **Volume sold by top 5 Regional Entities** | **1535.39** | **38.66** |

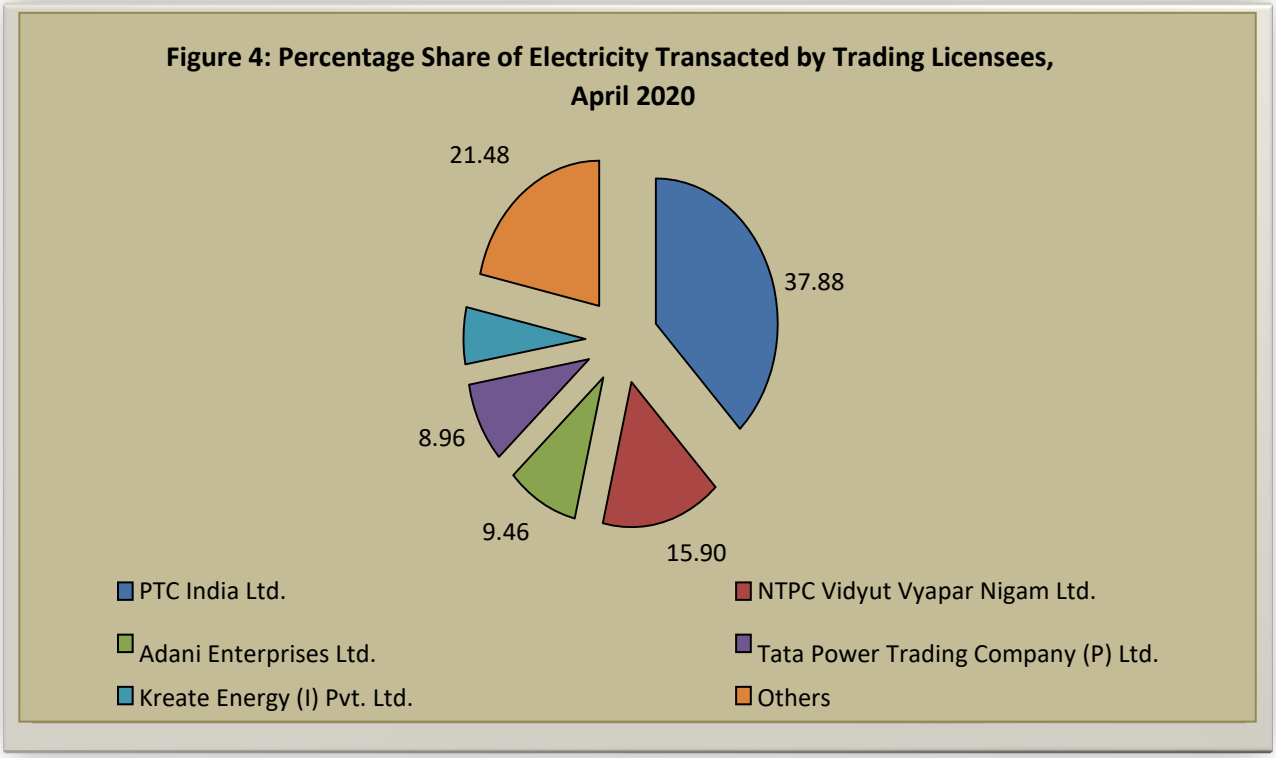
| VOLUME OF ELECTRICITY PURCHASED THROUGH POWER EXCHANGES, MARCH 2020 | | |
|---|---|---|
| **Name of the Entity** | **Volume of Purchase(MUs)** | **% of Volume** |
| TELANGANA | 1134.30 | 28.56 |
| GUJARAT | 548.81 | 13.82 |
| MAHARASHTRA | 429.20 | 10.81 |
| ANDHRA PRADESH | 404.56 | 10.19 |
| TAMIL NADU | 297.02 | 7.48 |
| **Volume purchased by top 5 Regional Entities** | **2813.88** | **70.86** |

***For April 2020***

- Of the total **Power Exchange transactions**,
  - Top 5 regional entities sold 46.98% of the volume, and these were ***Odisha, Uttar Pradesh, Himachal Pradesh, DGEN Mega Power Project and Teesta Stage 3 Hydro Power Project.***
  - Top 5 regional entities purchased 85.93% of the volume, and these were ***Maharashtra, Andhra Pradesh, Gujarat, Telangana and Punjab.***

- **Regional entity-wise total volume of net short-term transactions of electricity** i.e. volume of net transactions through bilateral, power exchanges and DSM.
  - Top 5 electricity selling regional entities were ***Himachal Pradesh, Odisha, Sembcorp Gayatri Power Ltd., Raipur Energen Ltd. and DGEN Mega Power Project.***
  - Top 5 electricity purchasing regional entities were ***Maharashtra, Andhra Pradesh, Tamil Nadu, Telangana and Bihar Recent development of new market segment on Power Exchange platform.***

**Figure 4: Percentage Share of Electricity Transacted by Trading Licensees, April 2020**



| PERCENTAGE SHARE OF ELECTRICITY TRANSACTED BY TRADING LICENSEES, APRIL 2020 | | |
|---|---|---|
| **Sr.No** | **Name of the Trading Licensee** | **% Share in total Volume transacted by Trading Licensees** |
| 1 | PTC India Ltd. | 37.88 |
| 2 | NTPC Vidyut Vyapar Nigam Ltd. | 15.90 |
| 3 | Adani Enterprises Ltd. | 9.46 |
| 4 | Tata Power Trading Company (P) Ltd. | 8.96 |
| 5 | Kreate Energy (I) Pvt. Ltd. | 6.33 |
| **Top 5 trading licensees** | | **78.52%** |

| VOLUME OF ELECTRICITY SOLD THROUGH POWER EXCHANGES, APRIL 2020 | | |
|---|---|---|
| **Name of the Entity** | **Volume of Sale (MUs)** | **% of Volume** |
| ODISHA | 448.52 | 12.15 |
| UTTAR PRADESH | 431.14 | 11.68 |
| HIMACHAL PRADESH | 362.85 | 9.83 |
| DGEN MEGA POWER | 262.58 | 7.11 |
| TEESTA STG3 | 229.47 | 6.22 |
| **Volume sold by top 5 Regional Entities** | **1734.56** | **46.98** |

| VOLUME OF ELECTRICITY PURCHASED THROUGH POWER EXCHANGES, APRIL 2020 | | |
|---|---|---|
| **Name of the Entity** | **Volume of Purchase (MUs)** | **% of Volume** |
| MAHARASHTRA | 1335.01 | 36.16 |
| ANDHRA PRADESH | 755.28 | 20.46 |
| GUJARAT | 552.40 | 14.96 |
| TELANGANA | 343.11 | 9.29 |
| PUNJAB | 186.93 | 5.06 |
| **Volume purchased by top 5 Regional Entities** | **3172.73** | **85.93** |

# Development of new market segment for transaction on Power Exchange platform

## *Real-time Market (RTM) (started on 01st June 2020)*

- Real-time Market (RTM) received an overwhelming response from the participants and in its first month. It achieved 515.46MU volume comprising over 10% of the total volume traded on IEX in the first month of the launch at an attractive average market clearing price of Rs.2.22 per unit
- With the attractive prices, RTM benefits the utilities through efficient demand management at 1-hour notice, renewable integration, utilisation of generation capacity, facilitating GENCO to purchase power and grid security.
- 237 customers participate in the new market segment in the first month.

**First day of the RTM Analysis *(1st June 2020)***

- The double-sided closed auction ensured efficient price discovery, transparency, flexibility and seamless trading experience for the market participants. The market saw substantial sell-side liquidity at 1810MU -2.4times of the buy volumes at 742MU and competitive price discovery. Consequently, the average market clearing price was at Rs 2.22 per unit, lower than the day-ahead market average price for June, at Rs 2.35 per unit. The attractive prices enabled great savings and good financial liquidity for the utilities as well as the open-access consumers.

# References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