

# Power Chronicle

## Power System Overview & Analysis

❖ All India Demand Met Profile	2
❖ Region-wise Demand Met Profile	2
❖ All India Renewable Energy (RE) Generation Profile	3
❖ COVID-19: Impact on Electricity Demand Pattern	3
❖ Short-term Energy Transactions	4
❖ Monthly Short-term (ST) Purchase and Sale Quantum across States	4

## Power Market Overview & Analysis

❖ DAM – Market Clearing Price (MCP) & Market Clearing Volume (MCV)	5
❖ Term – ahead Market	5
❖ POSOCO's Security Constrained Economic Despatch (SCED): EAL's Analysis	5

## Regulatory & Policy Perspective

❖ Procedure for Scheduling of Collective Transactions through Real Time Market	6
❖ EAL News - Power Balance Sankey Diagram	8

## Editorial

COVID-19, a global pandemic, is leaving a lasting impression on the economic activities across nations. Electricity sector is facing significantly lower demand on account of country-wide lockdown leading to almost nil activity for most of the industrial and the commercial activity, which is witnessing a very slow recovery. In response to COVID-19 pandemic, the society observed a *Janta Curfew*, a light off event and an extended lockdown that is to last till 17<sup>th</sup> May 2020 or even beyond.

EAL analysed the impact of lockdown on electricity demand profile across states, regions as well as for the country as a whole. The Indian power sector witnessed a decline in daily electricity demand of 596.4 MU. Daily energy sold witnessed a decline of 37.2 GWh. Home to a significant proportion of nations industrial and commercial activity, western region witnessed the highest decline in energy demand. Peak demand was subdued as it could only touch 46.6 GW on 24<sup>th</sup> March (11:15 - 11:30). Given, that renewable, hydro and nuclear generation have must run status, thermal generators particularly most of the coal based plants are facing the adverse impact.

Pre and post lockdown demand profile across states dominated by industrial and commercial demand highlights a secular demand decline across the day, e.g., Maharashtra and Gujarat witnessed a decline of around 4000-5000 MW (about 25%) decline in demand across the day. Uttar Pradesh did not witness a significant decline in electricity demand during the day, albeit the state witnessed a rise in demand during night hours. This can be attributed to increased hours of supply to rural areas, which had curtailed hours of supply earlier.

As country prepares to the rollout of RTM for electricity, POSOCO released the procedure to be followed. As detailed out in the issue, allocation of transmission capacity ensuring efficient utilisation, definition of net gains in case of bids below variable cost and identification of tradable capacity available for sale across the exchanges needs to be addressed.

**Anoop Singh**

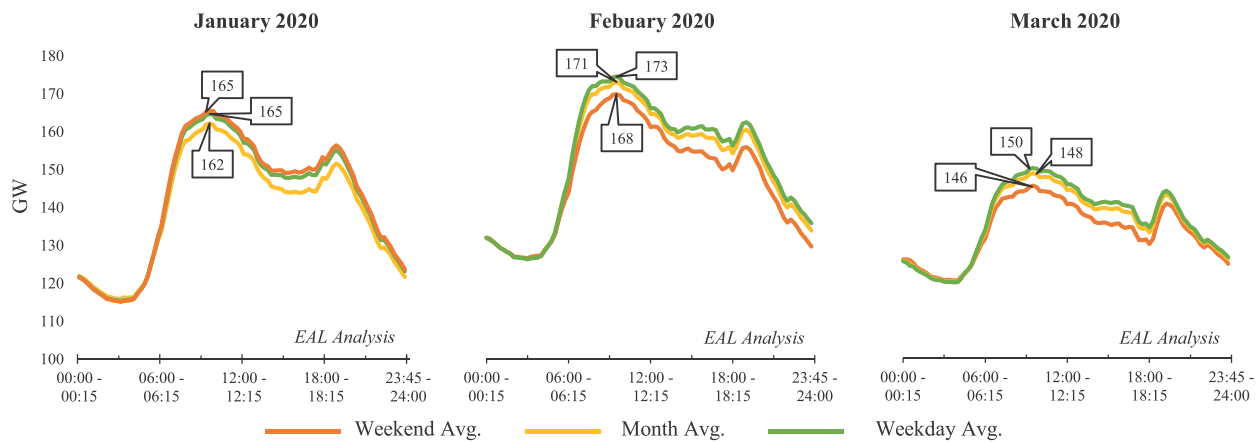
Founder & Coordinator, Energy Analytics Lab



Register at [eal.iitk.ac.in](http://eal.iitk.ac.in) to access data and resources

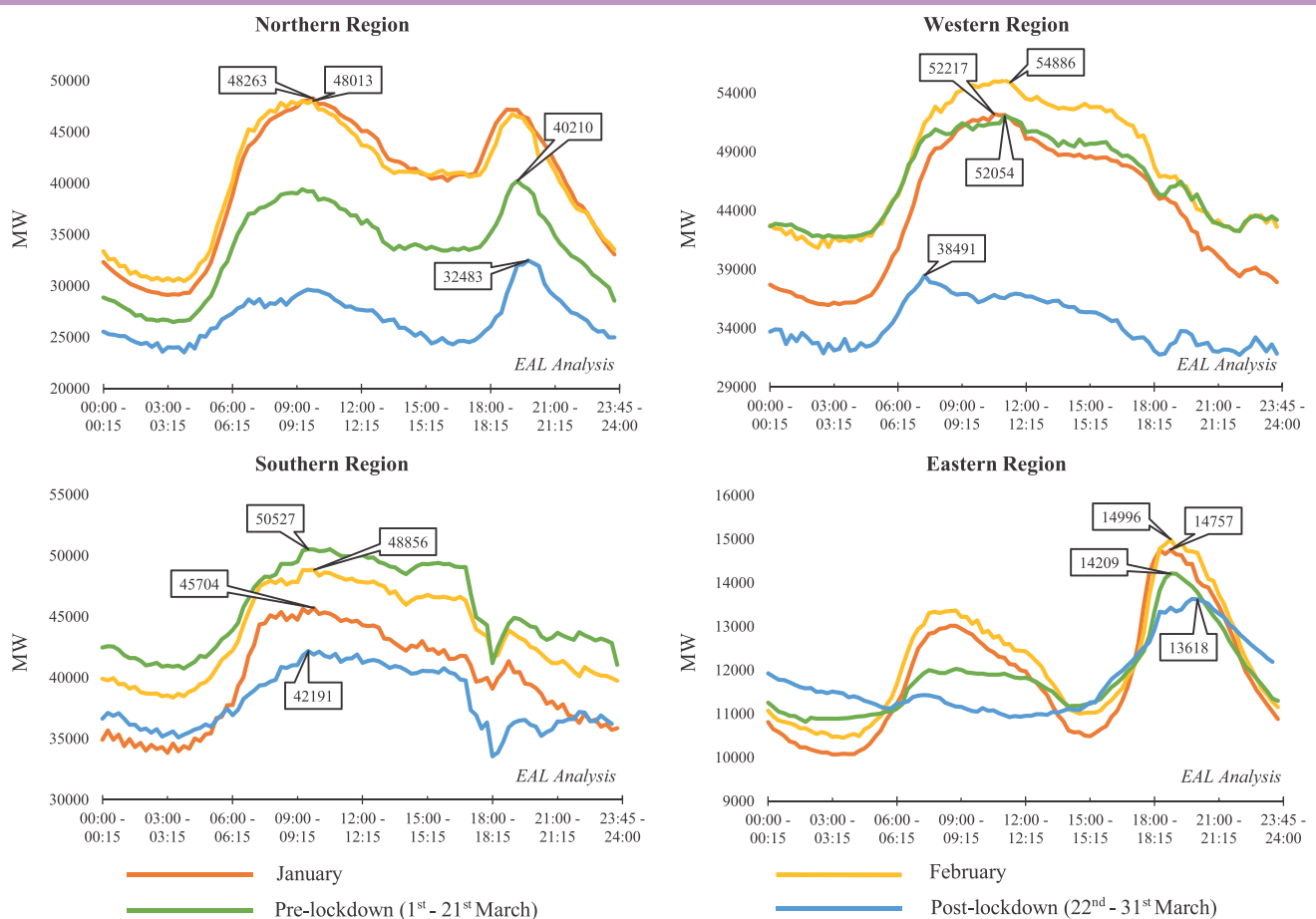
## Power System Overview & Analysis

### All India Demand Met Profile



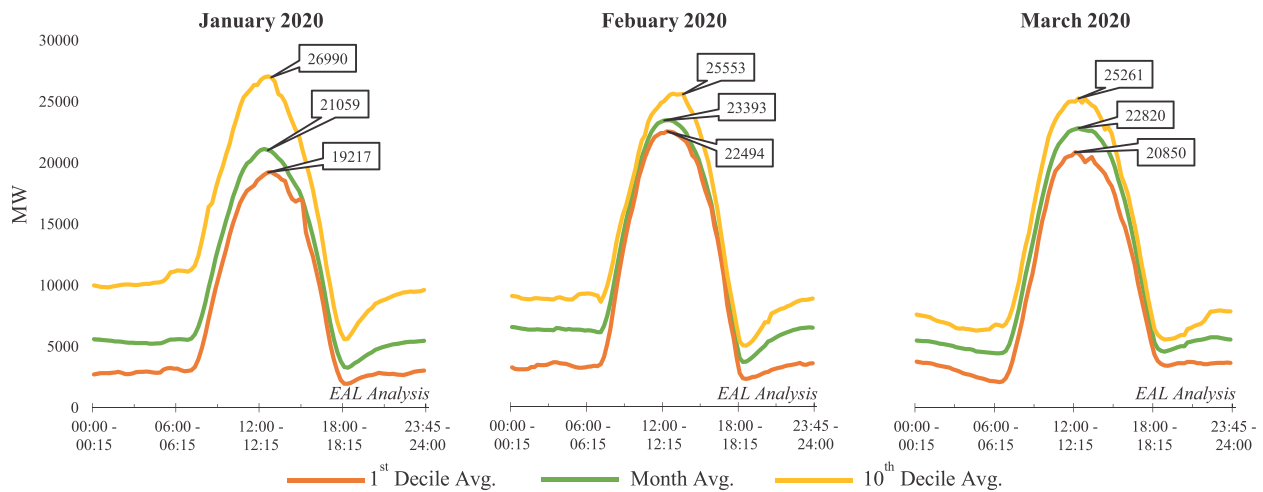
All India peak demand reached 175.84 GW (07:45 - 08:00) on 18<sup>th</sup> February 2020 during January to March quarter, about 7 percent higher than the previous year's peak demand recorded at 163.92 GW (19:00 - 19:15) on 29<sup>th</sup> March 2019 during the same quarter. Post COVID-19 lockdown, demand for electricity witnessed significant decline across regions, as reported below.

### Region-wise Demand Met Profile



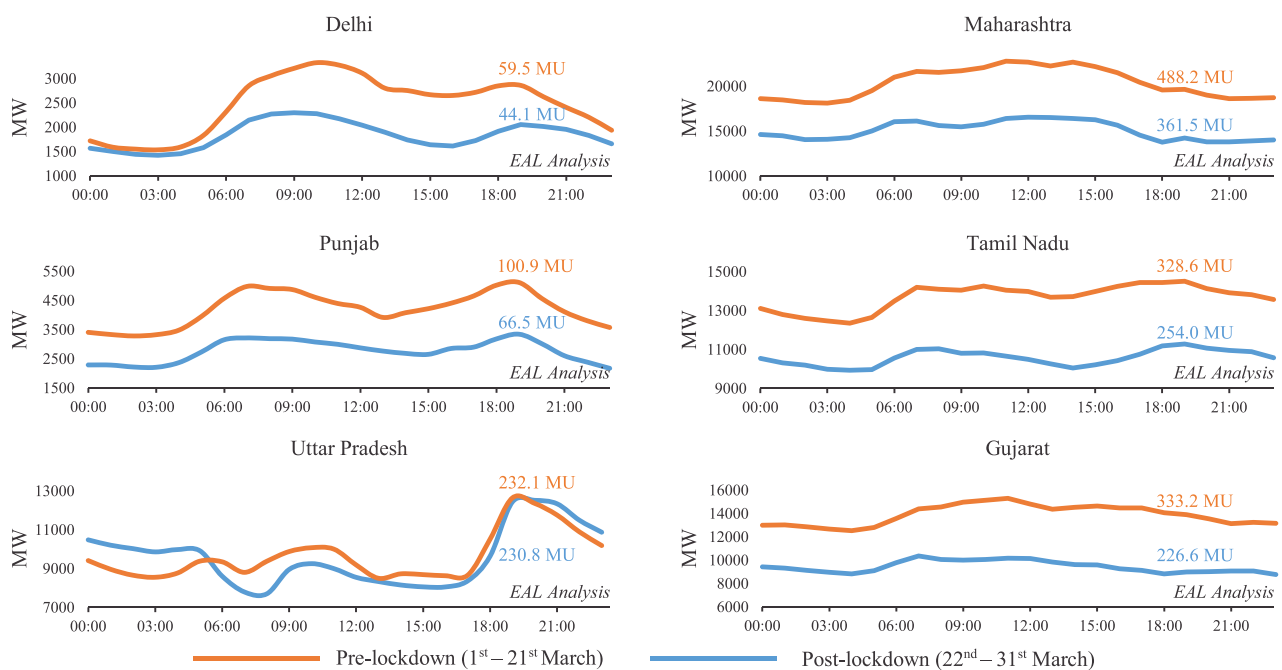
Demand and generation profiles at India and state level can be accessed on EAL's web portal.

## All India Renewable Energy (RE) Generation Profile



All India peak RE generation reached 29.35 GW (12:30 - 12:45) on 22<sup>nd</sup> January 2020 during January to March, about 46 percent higher than the previous year's highest recorded RE generation which was 20.13 GW (11:00 - 11:15) on 16<sup>th</sup> March 2019 during the same quarter.

## COVID-19: Impact on Electricity Demand Pattern

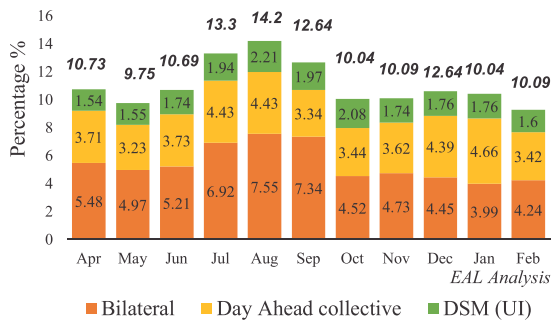


Note: Daily average energy demand (MU) pre and post lockdown days are shown in the respective load curves.

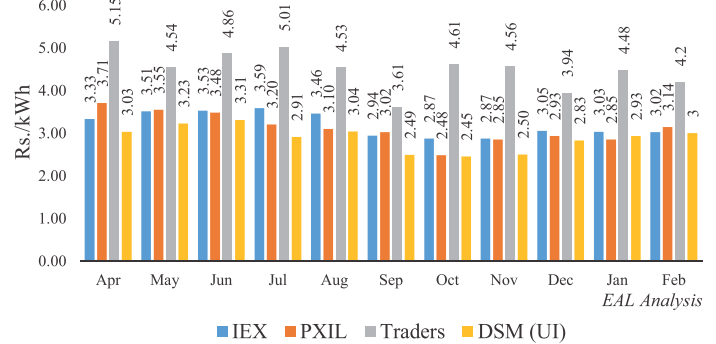
Fall in the demand pattern across states, post COVID-19 lockdown, provides interesting insights to the impact of lockdown on electricity demand and to identify demand attributable to the economic activities. Maharashtra, Gujarat, Tamil Nadu and Punjab show a secular decline in demand across the day. Delhi, dominated by commercial and government offices, shows a clear decline during the day, whereas night load remains at around similar levels. Nearly similar demand pattern in the case of Uttar Pradesh for pre and post lockdown days highlights the relative energy shortage in the state as DISCOMs were able to extend rural electricity supply across larger areas and for higher number of hours during the day.

## Short-term Energy Transactions

Share of Short-term Energy Transaction of Total Electricity Generation (2019-20)

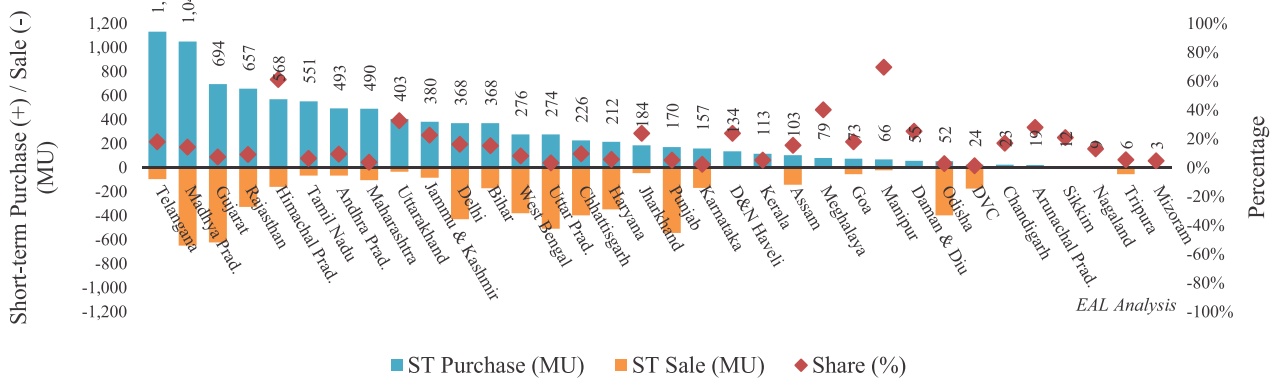


Weighted Average Prices of Short-term Transactions (2019-20)

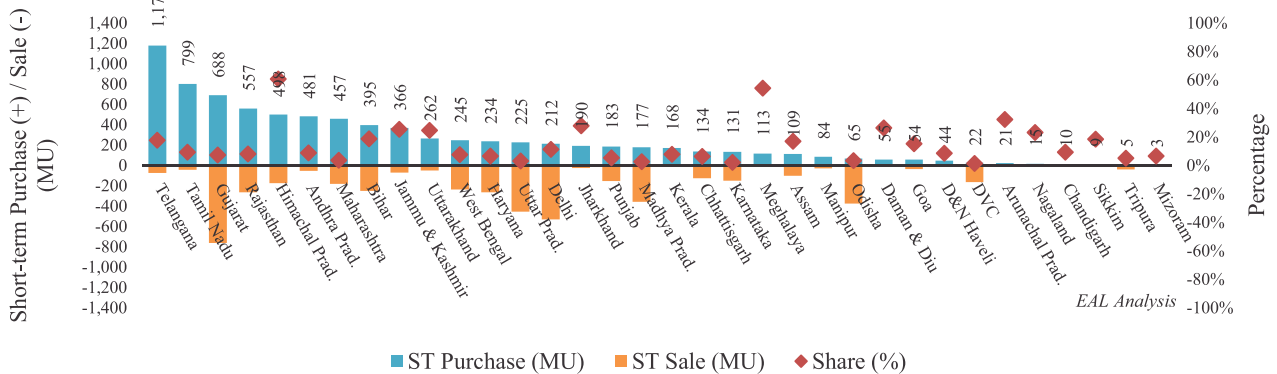


## Monthly Short-term (ST) Purchase and Sale Quantum across States

ST Energy Sale, ST Energy Purchase and share of ST Purchase in Total Energy Supplied (January 2020)

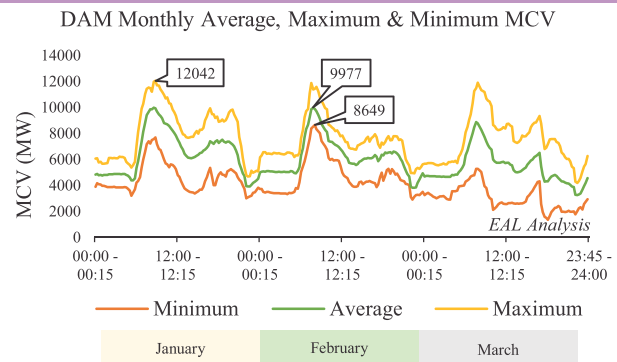
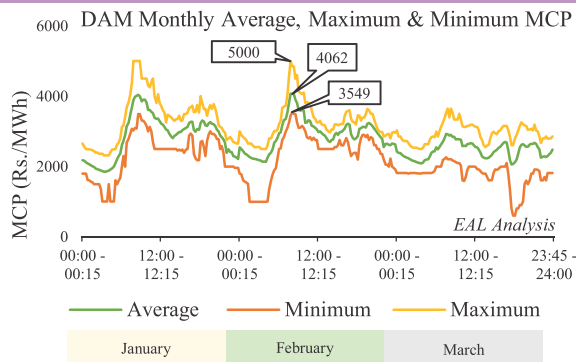


ST Energy Sale, ST Energy Purchase and share of ST Purchase in Total Energy Supplied (February 2020)



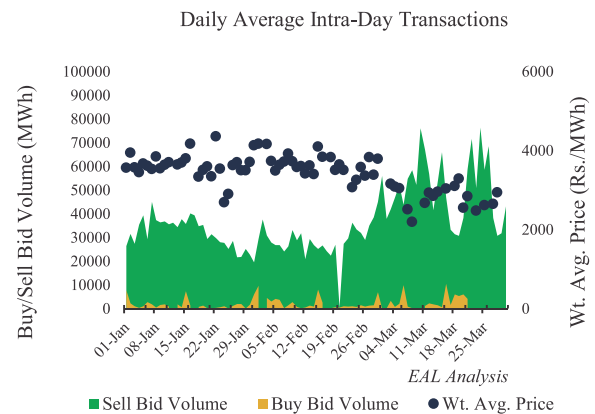
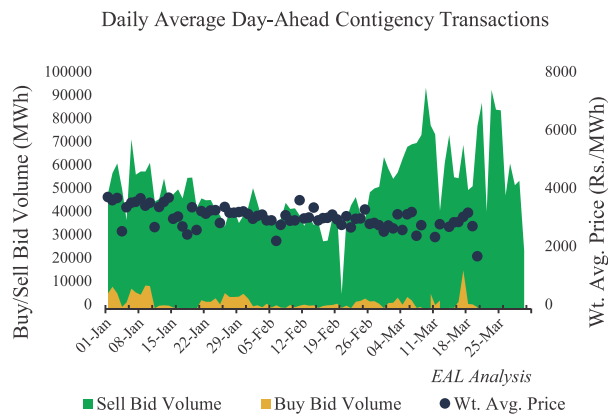
## Power Market Overview & Analysis

### DAM – Market Clearing Price (MCP) & Market Clearing Volume (MCV)



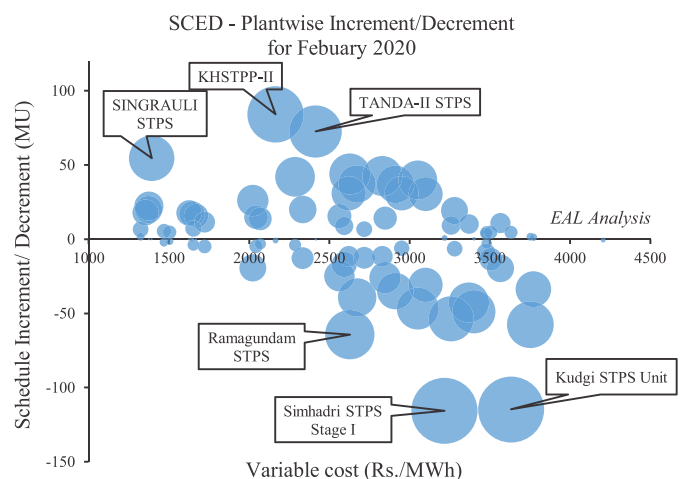
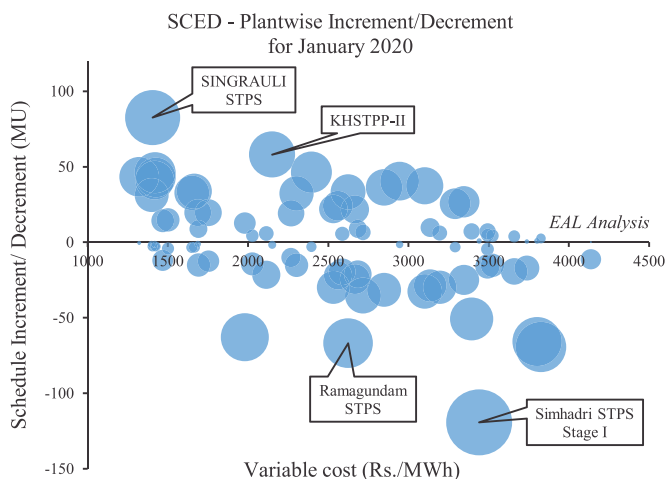
25<sup>th</sup> March 2020 experienced lowest price (Rs. 600 per MWh) in DAM. The highest MCP at Rs. 5000.74 per MWh, was witnessed on 25<sup>th</sup> January 2020.

### Term-ahead Market (TAM)



The weighted average clearing price observed in Intra-day market during January to March quarter is higher in comparison to the Day-ahead contingency market. Also, the proportion of sale bids in Term-ahead market is much higher when compared to purchase bids placed in the Term-ahead market. No trade happened in Day-Ahead Transaction Market after 18<sup>th</sup> March.

### POSOCO's Security Constrained Economic Despatch (SCED): EAL's Analysis



Net savings due to SCED in January and February are around Rs. 80.11 crores and Rs. 72.12 crores respectively.



## Regulatory & Policy Perspectives

### Procedure for Scheduling of Collective Transactions through Real Time Market

POSOCO released draft procedure for scheduling collective transactions in RTM. The draft addresses issues related to processing of application, treatment of losses, congestion management, and revision of schedule, etc.

As per the notification, all GENCOs with URS, including RE generators having un-tied capacity, and DISCOMs with capacity share in a generating station can participate in the RTM. Further, the exchange has to ensure necessary infrastructure for data exchange/communication with NLDC/RLDCs and SLDCs, and will be responsible for energy settlement charges, price discovery and settlement arising due to congestion.

#### Submission/Processing of Application

- ❑ NLDC to intimate power exchange about availability of transmission system to clear the bids.
- ❑ The allocation of transmission corridor between the power exchanges for real time transactions to be in the ratio of their shares in the cleared volumes in DAM subject to a minimum of 10% of the available capacity to the power exchange having smaller share or based on such methodology.
- ❑ Power exchange should ensure scheduling request in RTM to limits intimated by NLDC for any time block, and in case the bid cleared for any session exceeds margin provided by NLDC, then NLDC will consider the trade quantum of bid area to be zero.

#### Scheduling

- ❑ It is proposed that the exchange should submit scheduling request, 3 time blocks ahead for delivery of the power, to the NLDC which will further send the details to the concerned RLDCs.
- ❑ SLDCs to schedule transactions for state/intra-state entities, given the exchange should send detailed breakup of injection and drawl within the state to respective SLDCs 2 time blocks ahead of delivery time.
- ❑ Under extreme circumstances, including communication failure, if the final cleared trades are not received by NLDC, then schedule for such RTM can be taken as zero.

#### Treatment of Losses

- ❑ Inter-State transmission losses to be recovered separately from buyers as well as from sellers of collective transaction for arriving at the schedules. Sellers to inject extra power and the buyers to draw less power (MW) than the contracted power.

#### Real Time Congestion Management

- ❑ In extreme event of curtailment due to transmission constraints and threat to grid security, short-term transactions to be curtailed first, followed by medium and long-term transactions.
- ❑ Short-term bilateral transaction to be curtailed first followed by transaction through exchanges in which day ahead transactions to be curtailed first followed by real time transactions.
- ❑ In case of curtailment, transmission charges to be paid on pro rata basis.

#### Revision of Schedule

- ❑ ISGS(s) are allowed to participate in RTM, and revision in schedule for odd/even time blocks will become effective from 7<sup>th</sup>/8<sup>th</sup> time block.
- ❑ Wind/Solar generators can participate in RTM, if their schedules through DAM and RTM are not revised.
- ❑ A generator participating in DAM and RTM cannot revise its schedule in case of forced outage of units, but will have an option to purchase power through RTM.

#### Commercial Conditions

- ❑ Proposed short-term (ST) open access charges for collective transaction in RTM (payable to NLDCs by power exchange):
  - Non-refundable processing fee of Rs. 5000/day irrespective of the quantum of RTM trade.

- NLDC operating charges at Re. 1/MWh by each successful buyer and seller, capped at maximum of Rs. 200/day.
- Proposed ST open access charges for intra-state transmission system (payable to SLDCs by power exchange):
  - Intra-state entities to pay transmission charges as per orders of state commission or at Rs. 80/MWh.
  - SLDC operating charges to be decided by the Commission or Rs. 1000/- per day.
  - For the purpose of the levy of operating charges and intra-state transmission charges, each point of the injection/ drawl in the state network will be counted separately.
- Participant generators under section 62 will share the net gains (after accounting for the energy charge) with the beneficiaries in the ratio of 50:50 subject to the ceiling of share for 7 paise / kWh to the generator and balance to the beneficiary.

### Default in Payment and its disbursal

- In case of default in payment to NLDC/RLDC/SLDC, the NLDC may suspend the scheduling of transaction, can terminate the already scheduled transaction and may not entertain any application of that exchange in future, until the default is addressed.
- Power exchanges to pay to NLDCs simple interest at the rate of 0.04% for each day of default.
- Refunds arising due to curtailment of transactions during the previous month to be disbursed to the concerned Power Exchange by 15 working days of the current month.

## EAL OPINION

✍ **Allocation of Transmission Capacity:** The framework for allocating transition corridor for RTM proposes to allocate transmission capacity across the Power Exchanges based on their share of volume in DAM. Clarification with respect to its applicability on a block-wise basis needs to be provided.

A mismatch between the allocated transmission capacity (as per the share of DAM) and potential clearing volume in RTM may lead to a situation wherein transmission resources allocated to one of the power exchanges having lower RTM volume vis-a-vis DAM may remain unutilised while the other PX may face a shortage of allocated transmission capacity. A similar problem would be encountered on account of 'minimum 10%' allocation of transmission capacity, even if share in DAM (or potential volume in RTM) was less than that. Such sub-optimal allocation of transmission resources would also lead to inefficient outcome of RTM in terms of cleared volume and prices.

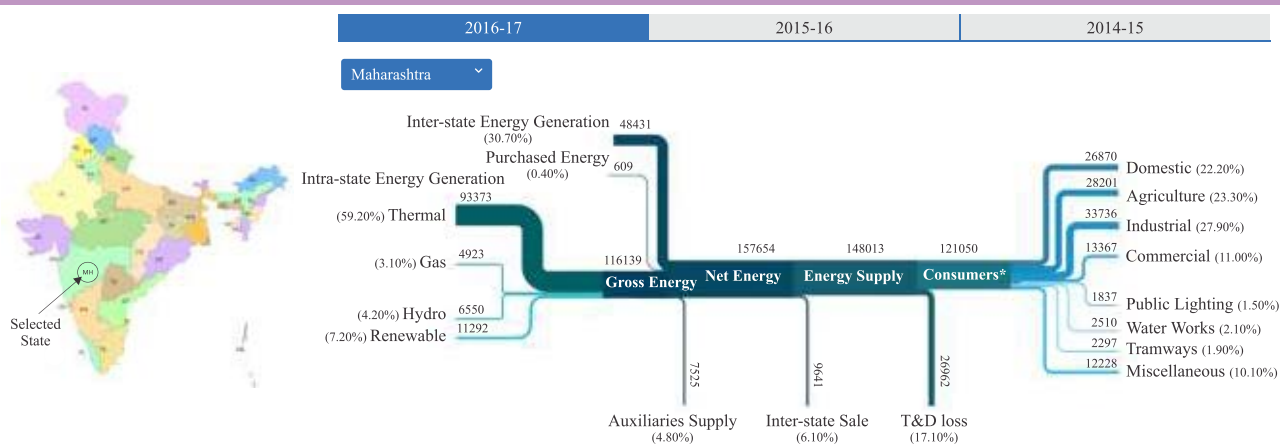
Further, transmission charges for the allocated but unused transmission capacity would be borne by the users who finally use the transmission capacity. POSOCO should evaluate the impact of the allocation scheme and identify the pattern of underutilisation of allocated transmission capacity and seek suggestions to address the same.

The theoretical best solution would be to have common market clearing across the power exchanges, thereby achieving the most efficient market outcome. However, alternate mechanism should aim to mimic that outcome as far as possible.

✍ **Definition of Net Gains and Bids below Variable Cost (VC):** The procedure provides for sharing of 'net gain' by the participating generator with the beneficiary. However, there is ambiguity in terms of its definition. A situation may arise wherein a generator's net VC, after accounting for gains from PLF, is lower than the approved VC. A generator may thus be willing to bid below its VC. Further, a generator may also do so to avoid ramping constraint for the plant. In such a situation, the provision for sharing of 'net gains' should not be construed to be 'netted' against the 'under recovery' from RTM, when a cleared bid being lower than the approved VC. However, this needs to be addressed through Regulatory provisions rather than through scheduling procedure.

- ⚡ **'Determination' of Intra-State Transmission/SLDC Charges:** In the case the intra-state transmission charges or the SLDC system operating charges have not been determined by the respective SERC, the procedure specifies such charges to be applicable. Legal aspects of such a 'determination' should be reviewed to avoid any issues later.
- ⚡ **Standing Clearance by DISCOM/ISGC Generators:** DISCOMs, as beneficiary to a generating plant, can bid for their share in a generator. A generator can also trade the URS post schedule revision window. Theoretically, same generation capacity can be traded by either of the entity, the DISCOMs and the generator, in a sequence. Procedure to update the final quantity available with ISGS for trade under RTM and limiting their transactions under RTM to such extent should be clearly specified. Further, an entity can submit its bid on both power exchanges to the extent of standing clearance. Since standing clearances are not exchange specific there is a possibility of final trade for an entity on both exchanges together, being more than the standing clearance, and thereby possibility of schedule over and above the capacity of the generator. There is no process laid out to handle such situation.
- ⚡ **Communication Failure and Follow-up Procedure:** As the time available for communication between power exchanges and RLDC is limited, the update of power exchange's schedule should be promptly available on RLDC website for crosschecking by power exchanges. In case of communication failure, a small window of 3-5 min for follow-up communication can thus be utilised so that there is no adverse impact on the market outcome and the participants.

### EAL News - Power Balance Sankey Diagram



EAL's portal has extended the power balance Sankey diagram to state-level and this dashboard would help in visualising transitions in the power system. Further, the details of the sources of generation of electricity, sector-wise consumption, and T&D losses are available in it. Please visit [eal.iitk.ac.in](http://eal.iitk.ac.in) for more information.

We request your feedback for making EAL and this newsletter more relevant to the sector. Please write to us at:

#### Team Power Chronicle

#### Energy Analytics Lab (EAL)

Department of Industrial and Management Engineering  
Indian Institute of Technology Kanpur  
E-mail: [eal@iitk.ac.in](mailto:eal@iitk.ac.in)  
Phone: 0512-259 6448



[eal.iitk.ac.in](http://eal.iitk.ac.in)

#### Dr. Anoop Singh

Professor, Dept. of IME  
Indian Institute of Technology Kanpur  
Founder & Coordinator, CER and EAL  
Website: [www.iitk.ac.in/ime/anoops](http://www.iitk.ac.in/ime/anoops)

#### Other Initiatives



Centre for Energy Regulation



[cer.iitk.ac.in](http://cer.iitk.ac.in)



IMPRINT



[ems.iitk.ac.in](http://ems.iitk.ac.in)

**Disclaimer:** Though due care and caution has been taken during the compilation and reporting of data, EAL or IIT Kanpur do not guarantee the accuracy, adequacy or completeness of any information published herein. Any opinions, analyses or estimates contained in this document represent the judgement of Energy Analytics Lab at this time and are subject to change without notice. Readers of this newsletter are advised to seek professional advice before taking any course of action or decision based on the contents presented here. EAL or IIT Kanpur do not accept any responsibility for the consequences of the same.