

## Study Committee C1

Power System Development and Economics

Paper 10475\_2022

# Experience of Covid-19 Pandemic along with other extreme events in Indian Electricity Market and Progress of Market Reforms

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## Motivation

- COVID-19 pandemic had a multifaceted impact on global society and, consequently, power systems.
- Power system operations and electricity markets had to adapt to changing demand and supply patterns.
- This paper aims to analyze the impact of COVID-19 on different Electricity Market segments in India.

## Method/Approach

- Outlined measures taken by the system operator to cope up with the grid situation
- Highlighted protocols for physical safety and cyber security at the workplace
- Highlighted policy initiatives of the Ministry of Power, Government of India

## Objects of investigation

- Impact of COVID-19 on different electricity market segments
- Policy and Regulatory Initiatives introduced
- Impact on Ancillary Services Dispatch and Imbalance Volumes

## Experimental setup & test results

- Increase in the short term volumes through Over-The-Counter (OTC) and power exchanges platforms.
- 'bounce back' in long term contracts indicating increased economic activity.
- OTC and Spot Market volumes regained to their pre-pandemic levels

## Discussion

- Reaction of Market entities to low probability high impact events.
- Intelligent portfolio management practices adopted by state utilities.
- Closer cooperation among market players for Optimization

## Conclusion

- There has been material impact of COVID-19 on Indian Electricity Market.
- Changing resource mix would need rigorous resource adequacy at granular level starting from energy security to load forecasting and portfolio balancing.
- The large synchronous grid of the Indian subcontinent provides for a larger balancing area besides harnessing diversity of various kinds .

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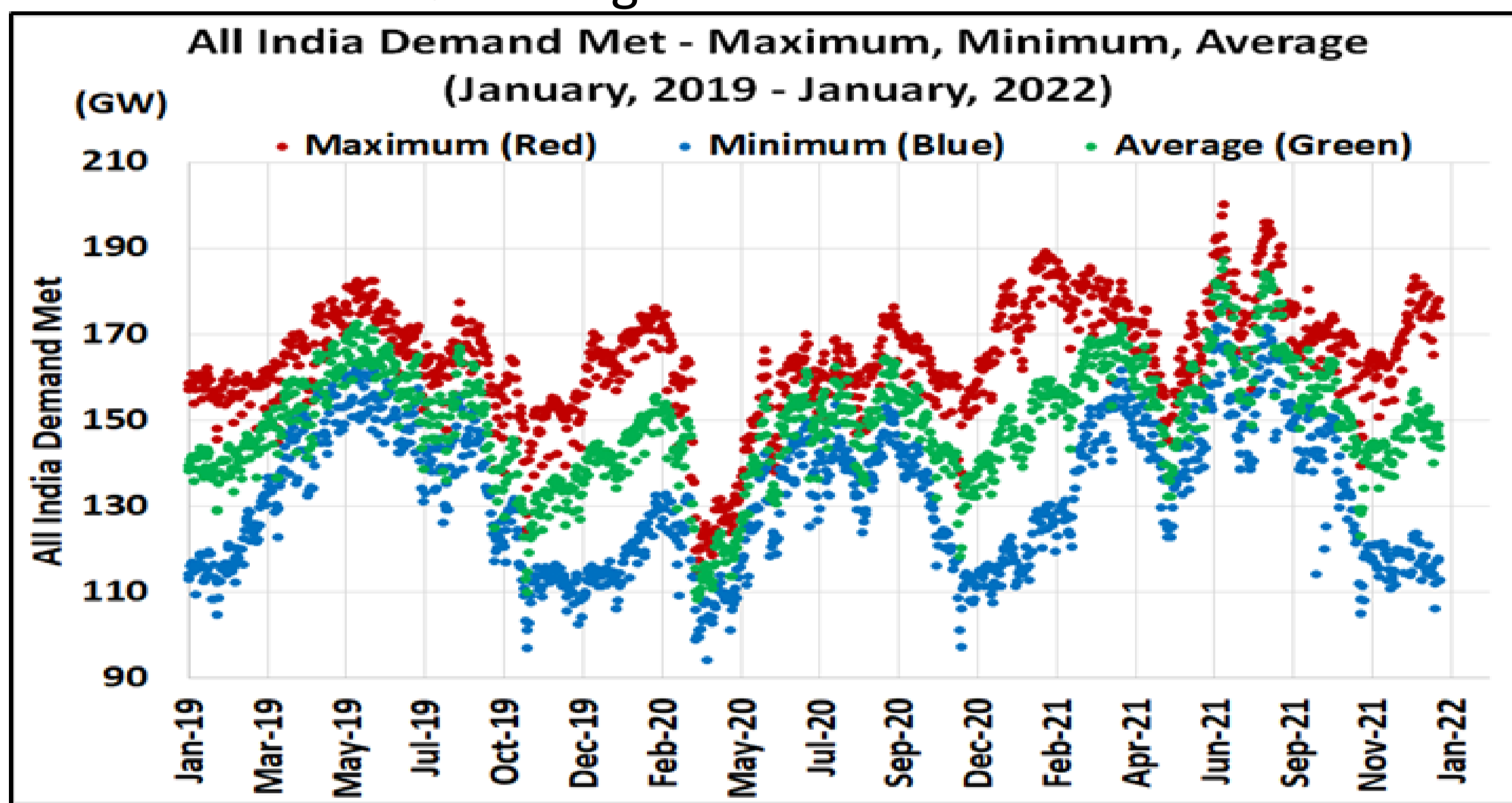
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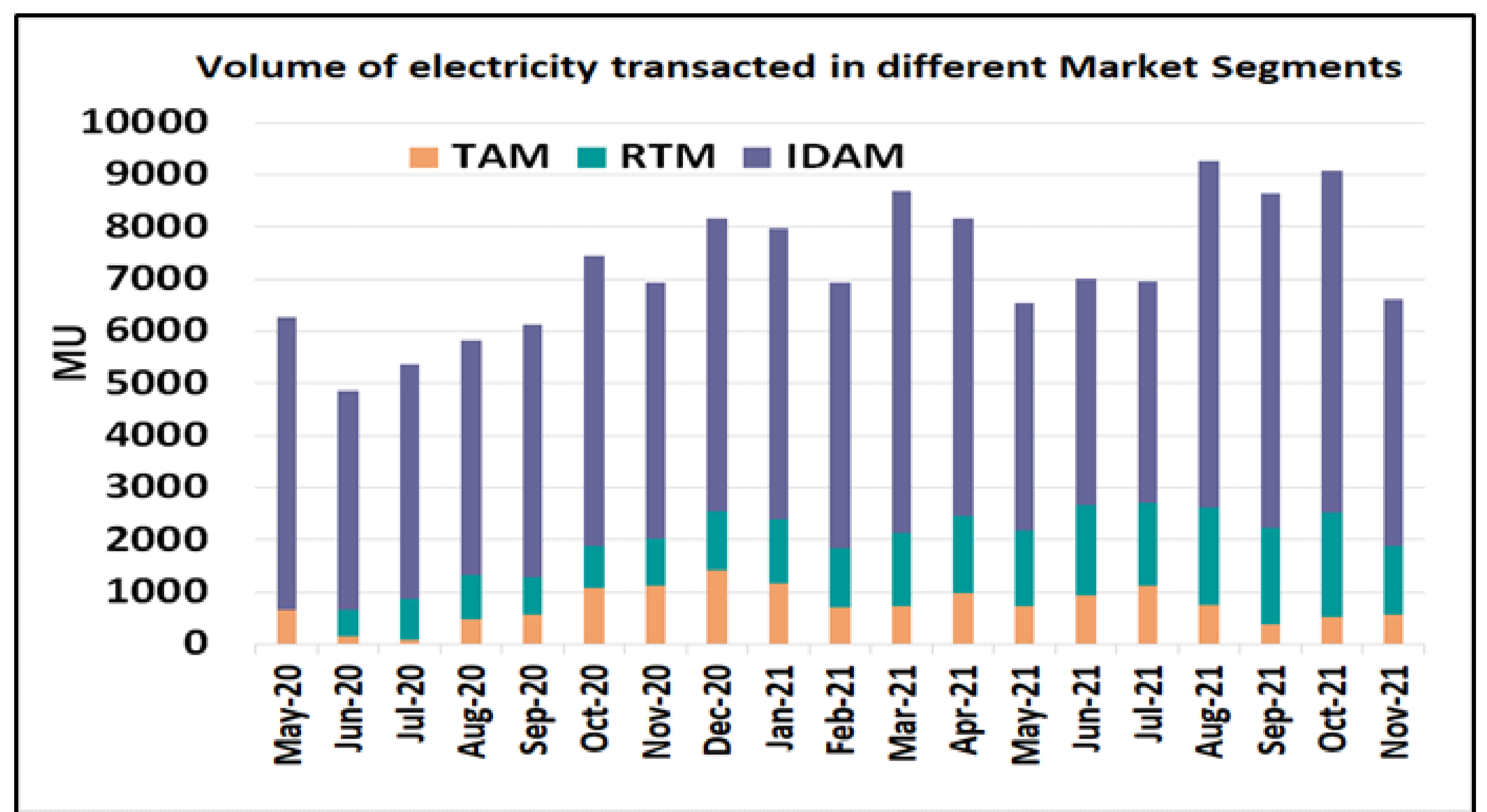
## Introduction

- COVID-19 had significant impact on Indian Power Sector
- Reduction in demand was close to 30% during first wave in 2020 and 6% during second wave in 2021.



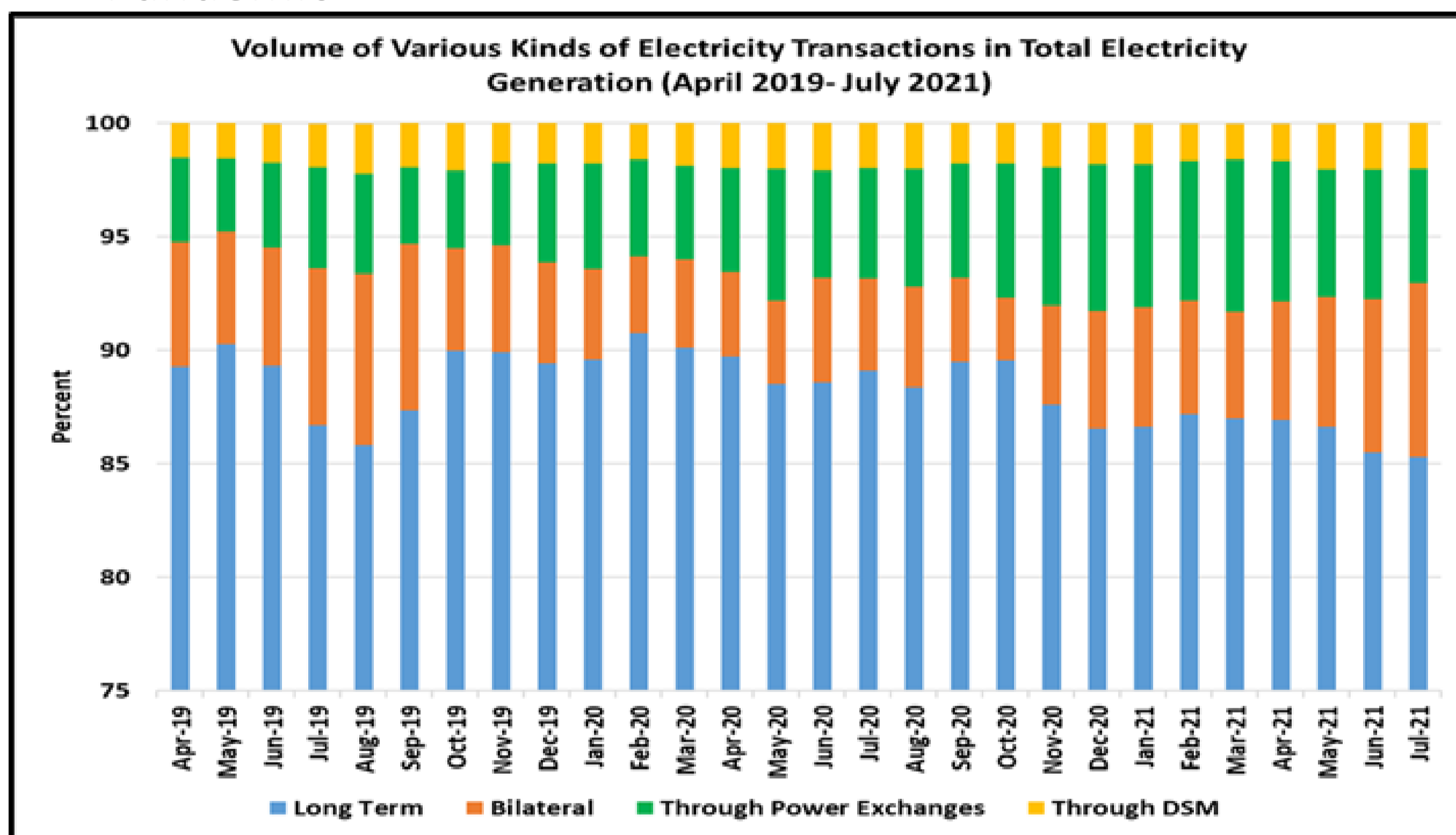
## Power Exchange Spot Market

- Volumes and Prices regained pre-COVID levels
- Around 20% of DAM Volume is being transacted through RTM



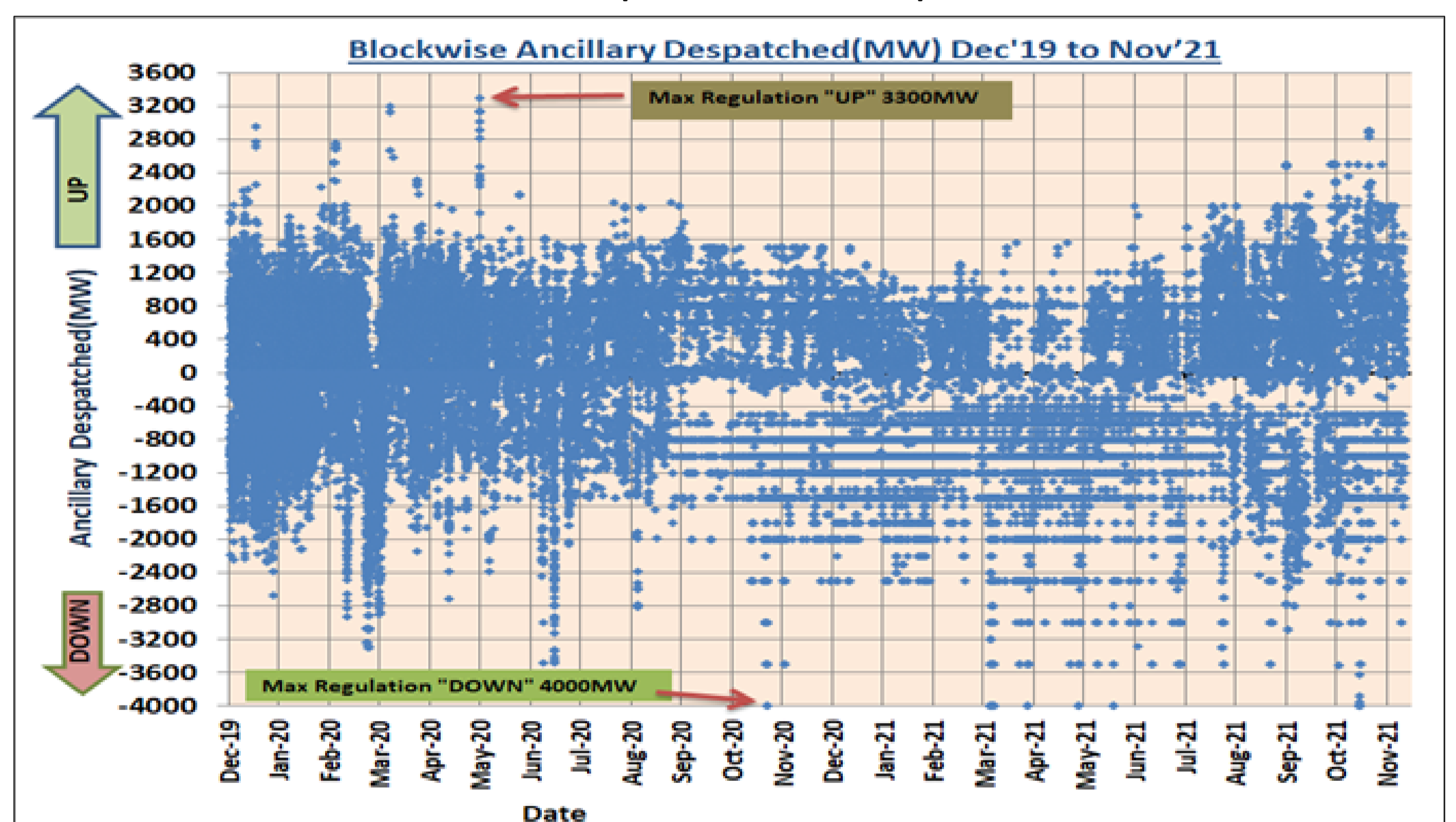
## Impact of COVID-19 on different Indian electricity market segments

- Share of Short term market increased significantly amid Pandemic



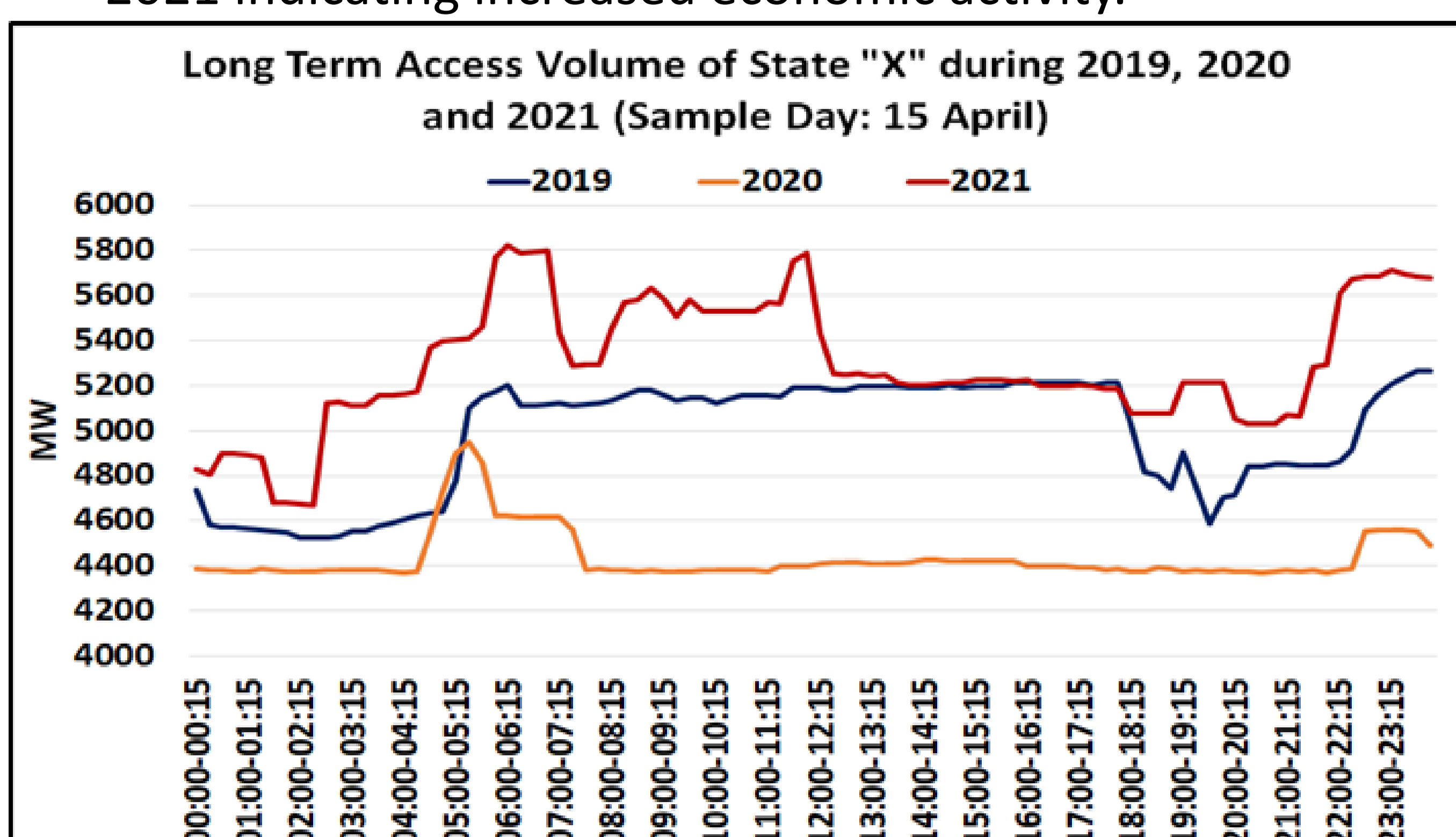
## Covid-19 Pandemic Impact on Ancillary Services Despatch and Imbalance Volumes

- During the pandemic situation, low demand induced high frequency conditions in the grid.
- The Pattern of RRAS despatched is depicted below

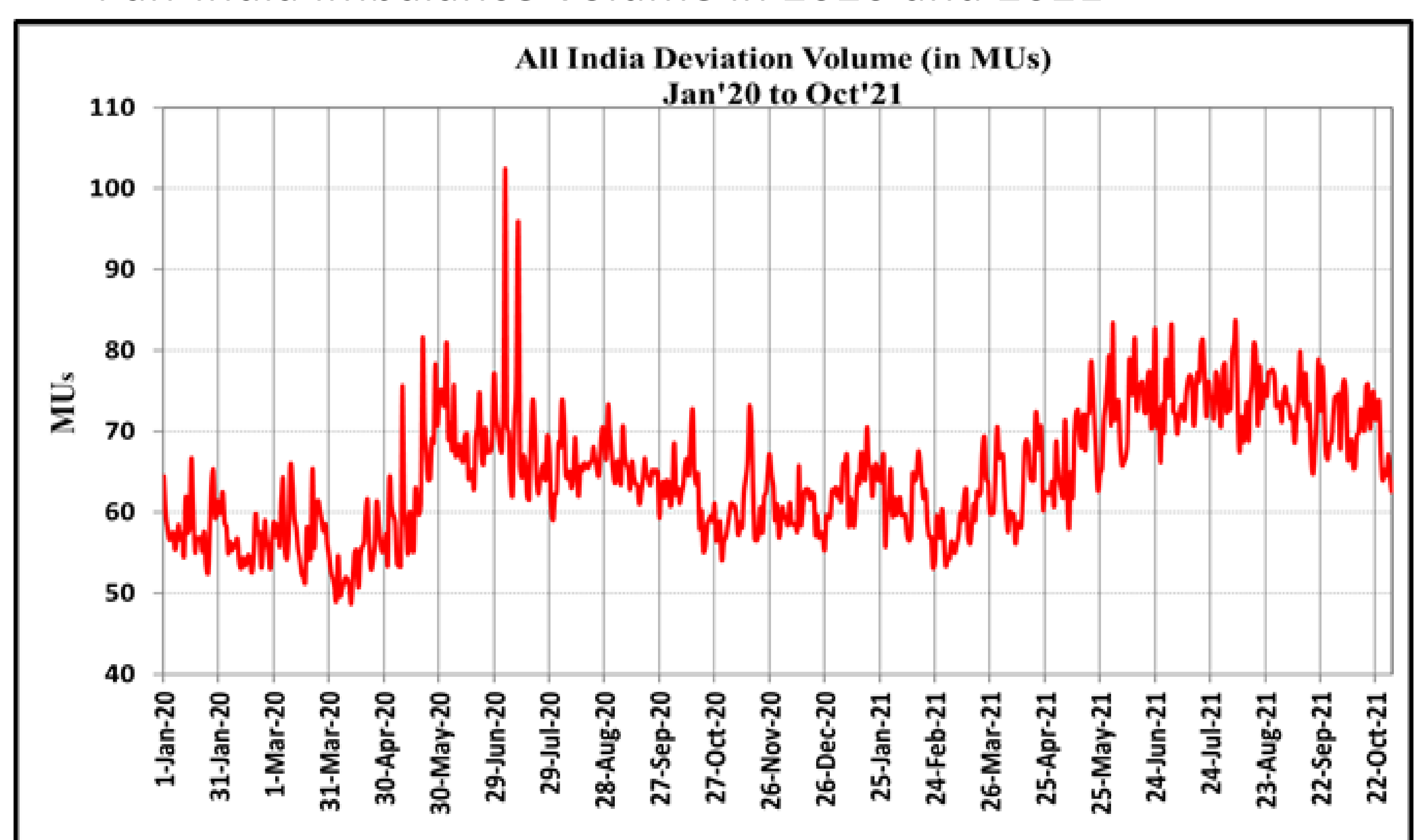


## Long Term Market

- During the lockdown Phases, states surrendered their long term contracts share due to low demand.
- Eventually the Long term contracts share rose in April 2021 indicating increased economic activity.



- Pan-India Imbalance Volume in 2020 and 2021



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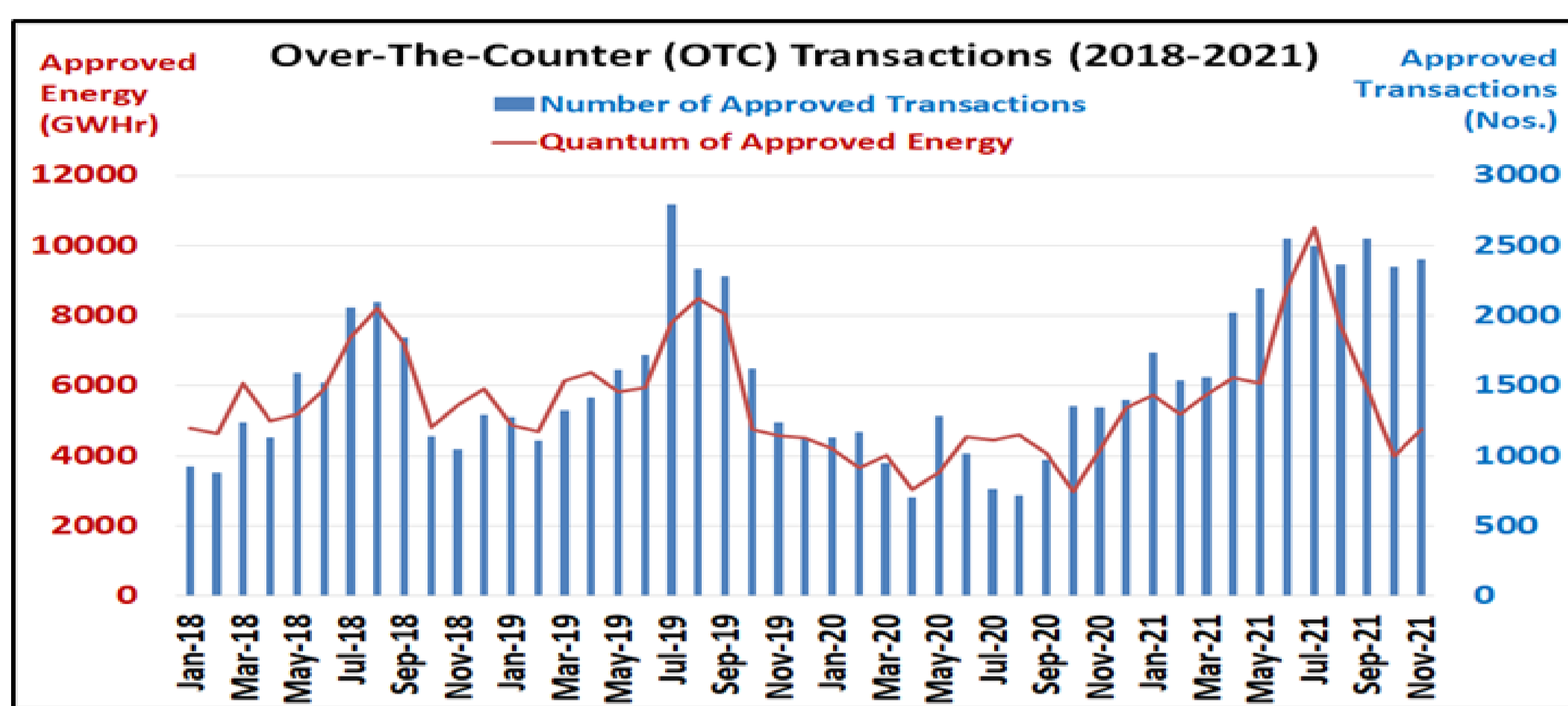
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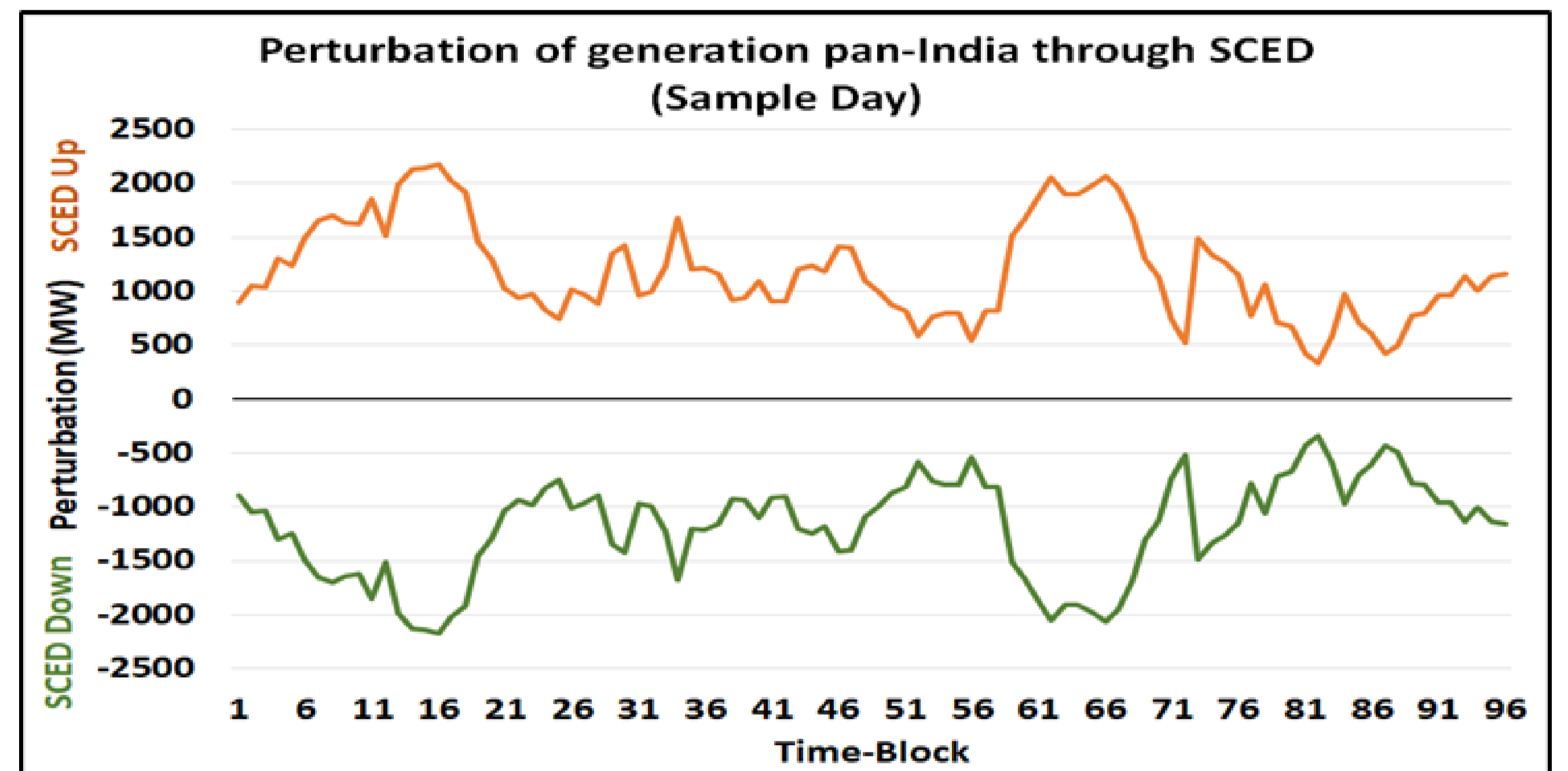
## Over-The-Counter (OTC) Bilateral Market

- In OTC Market, volumes were affected by the variation in the demand
- Major dip was observed during first wave i.e. March-June 2020



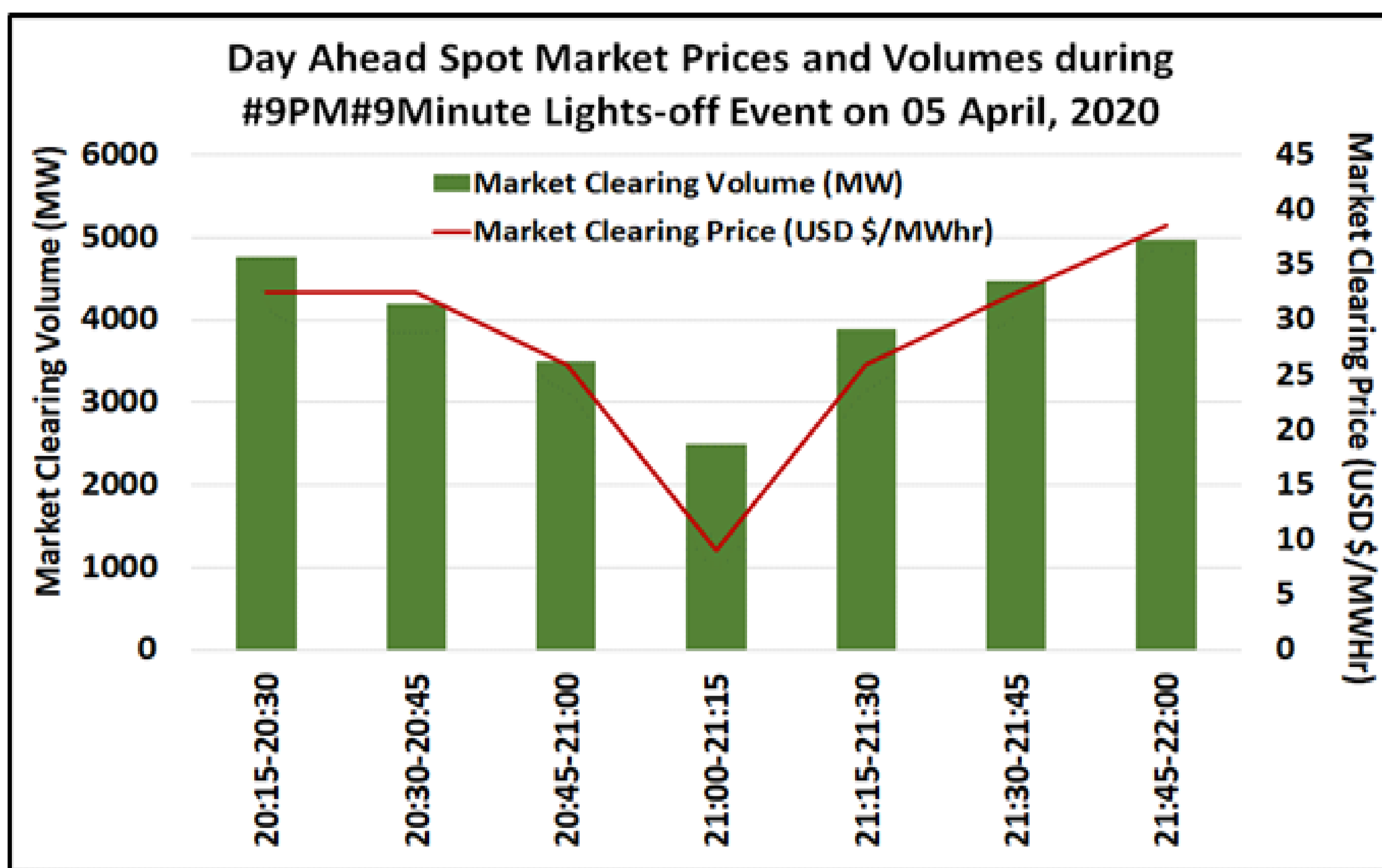
## Market Reforms Process during Covid-19 Pandemic

- Optimization of pan-India generation through Security Constrained Economic Despatch (SCED) pilot project.



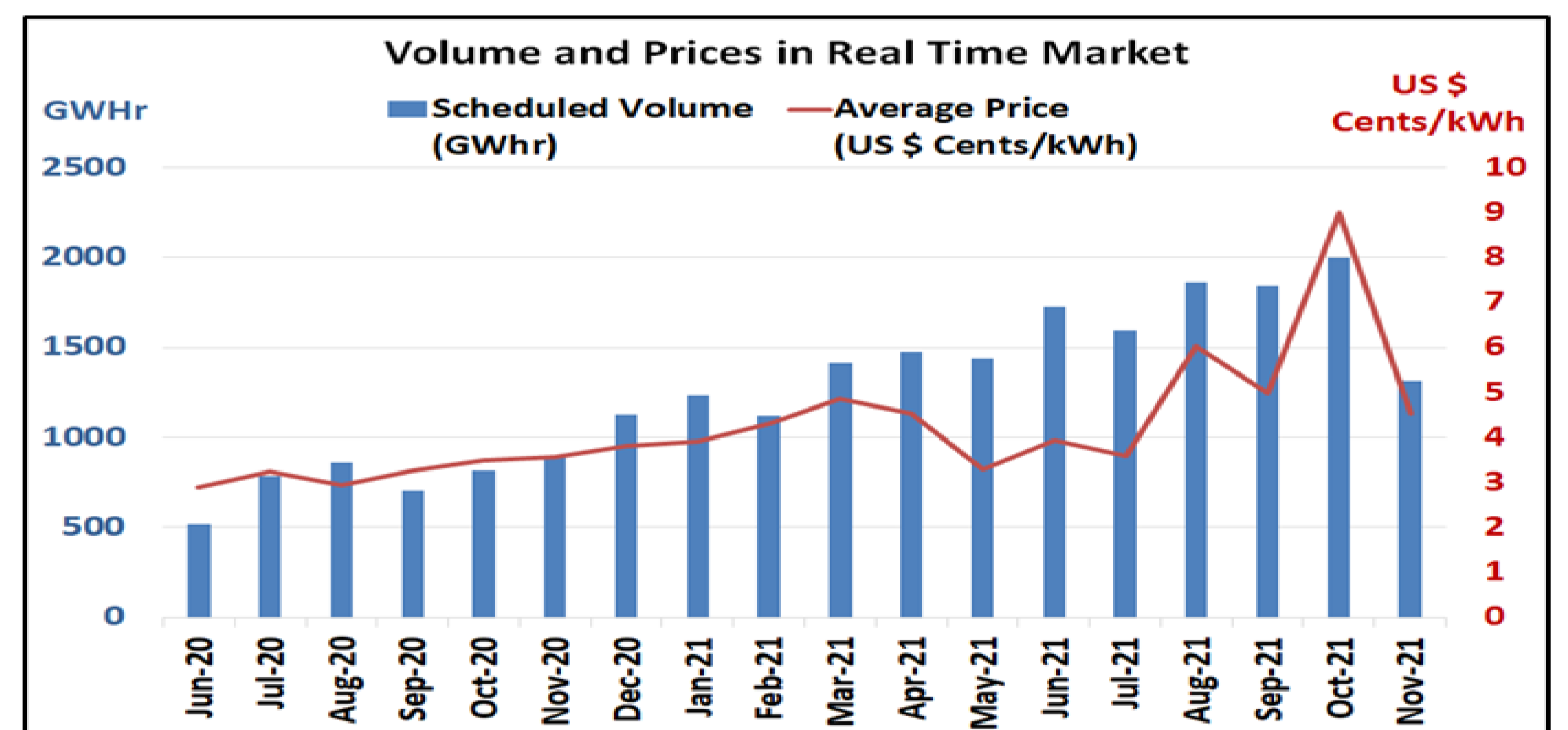
## Grid resilience and electricity market impact

- During 9 minutes at 9 PM event on 05 April 2020, Indian Grid witnessed 31 GW of demand ramp down and then Up in few minutes



## Real Time Market (RTM)

- Central regulator notified to commence RTM from 1st April 2020 but due to Pandemic differed it to 1st June 2020
- RTM provides market-based platform for the utilities/buyers to procure power closer to real time i.e. one hour in advance.



## Green Term-Ahead Market (G-TAM) and Green Day Ahead Market (G-DAM)

- G-TAM was introduced in August, 2020 and G-DAM was introduced in October, 2021 for solar, non-solar and hydro

- During Tauktae cyclone on Western Coast of India, there were sharp movements in volumes in DAM and RTM

