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WEBINAR REPORT ON

Current Challenges in the Indian Power Sector

February 18, 2022 | 12:00 PM Onwards IST



Organised by:

Forum of Indian Regulators (FOIR) Centre,
Indian Institute of Corporate Affairs (IICA)

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Speaker



Shri Arun Goyal

Member, Central Electricity Regulatory Commission (CERC)

Shri Arun Goyal is a Member of the Central Electricity Regulatory Commission. He is a Former Secretary to the Government of India. He retired as an Indian Administrative Service (IAS) officer (1985 batch) with more than 34 years of wide-ranging experience, particularly in the areas of power, finance, infrastructure, trade and industry. He has been part of historic reforms in India - Transition from GATT to WTO regime; Carrying forward Delhi power reforms involving unbundling & privatization of distribution; Setting up India's Financial Intelligence Unit, and establishing Anti- Money Laundering regime and Rolling out of GST in a time bound manner.

He graduated in electrical engineering from Delhi College of Engineering in 1980 and completed his PGDM (MBA) from the Indian Institute of Management, Ahmedabad in 1982. He also subsequently obtained a post-graduate degree in Economics from Himachal Pradesh University and a post-graduate degree in Development Management from Glasgow Caledonian University, Glasgow, United Kingdom.

He has been passionate about reforms, institution building & bringing about systemic changes.

Convenor & Moderator



Dr Abha Yadav

*Associate Professor, School of Competition Law & Market Regulation
and Director Forum of Indian Regulators (FOIR) Centre,
Indian Institute of Corporate Affairs (IICA)*

Dr Abha Yadav (PhD) is a faculty at IICA who leads research and capacity-building initiatives at the School of Competition Law & Market Regulation. She is also the Director of the Forum of Indian Regulators (FOIR) Centre at IICA which is the knowledge and capacity-building hub for the Central and State government regulators of the country. She steers policy discussions, thematic discourses and enhancement of capacity-building initiatives that are an integral and vibrant part of this unique Centre. She serves as Course Director of the prestigious Certificate Course in Competition Law and Advanced Professional Course in Competition Law and Market Regulation.

She is faculty for Competition Law, Law and Public Policy, Freedom of Information, Regulatory Affairs, Laws for Women, Regulatory Impact Assessment, Labour laws etc. She is a recipient of the prestigious Fox International Fellowship at Yale University, U.S.A. and the Lok Sabha of India Fellowship. She is an eminent scholar who has lectured widely on various legal issues in India and internationally.

Participants Profile

Officials from regulatory bodies across India, researchers, experts in the power sector & FOIR Member Organization's representatives facilitated the session with their kind presence.

97 participants attended the webinar.

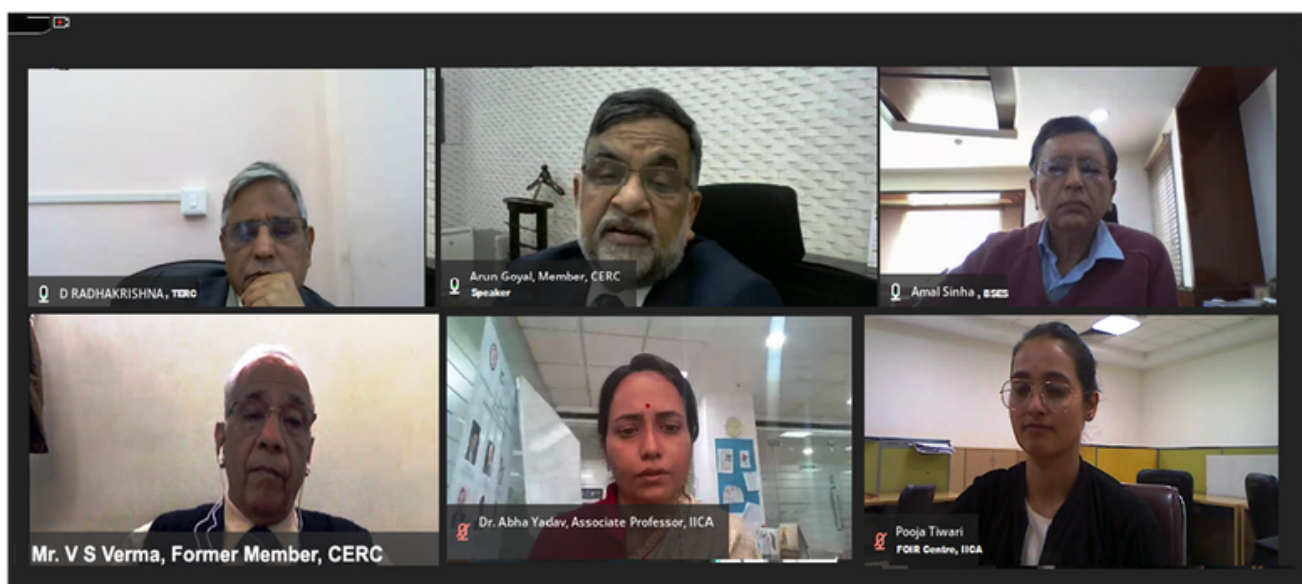


Program Outline & Flow

The Forum of Indian Regulators (FOIR) Centre, IICA and the School of Competition Law & Market Regulation, Indian Institute of Corporate Affairs (IICA) organized the fourth quarterly webinar of FOIR titled "Current Challenges in the Indian Power Sector" on the 18th February 2022.

The aim of the webinar was to analyze the current issues and challenges faced by the power sector essentially concerning the generation, transmission and distribution of electricity and further suggest the measures that can be undertaken.

The participants of the webinar include members and officials from various regulatory bodies in India, students, working professionals and FOIR member organizations.



Introduction to the Webinar

The program began with a welcome speech by Dr Abha Yadav, Associate Professor, School of Competition Law & Market Regulation & Director, FOIR Centre. She started by giving a brief introduction about the relevance of the topic highlighting that the Indian power sector is on course for a decade of transition and transformation. India's progress in renewable energy generation over the past decade has been inspiring and the Hon'ble Prime Minister's continuous commitment to achieving 450 GW has underpinned this momentum. Recent efforts, including the draft National Electricity Policy 2021, the announcement of the Ancillary Services Market Regulation (ASMR) and the Market-Based Economic Dispatch (MBED), signal promising progress. Once implemented, these developments will allow new assets such as batteries and demand response to participate in providing grid services and will provide transition power procurement to a market-based mechanism that enables least-cost, clean generation.

Today, almost every citizen has access to grid electricity, power deficiency has decreased sharply, and the installed renewable energy capacity has reached a fourth of the total capacity. However, the sector still faces significant challenges. Most power distribution companies (or DISCOMS) incur losses every year—the total loss is estimated to be ₹ 90,000 crores in FY 2021. Due to these accumulated losses, the government itself is unable to make the investments, which is necessary for ensuring high-quality power or building the infrastructure required to facilitate the transition from fossil fuel to renewable (but intermittent) energy sources, such as solar or wind. Another reason for these losses is the tension between two different outlooks:

1. whether electricity is an essential public service whose provision at low rates is necessary for citizen welfare or
2. whether it is a commodity to be bought and sold on the market like any other.

Many efforts have been made to turn around the distribution sector.

Since the '90s, most of the State Electricity Boards have been unbundled into separate entities for generation, transmission, and distribution. The Electricity Act, 2003, brought about major changes in the power sector, including delicensing of generation, open access to distribution, and independent regulators at the state and central levels. A series of schemes were launched, by central and state governments, to upgrade the distribution infrastructure and help the DISCOMS in improving their finances. Some of these initiatives include Ujjwal DISCOM Assurance Yojana (UDAY), Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) and Integrated Power Development Scheme (IPDS).

Primarily, the Indian power sector faces two major challenges that are fuel supply uncertainty and deteriorating distribution companies (DISCOMS) finances. While considering the dominance of coal in India's fuel mix, coal shortages can severely impede investments in the generation segment.

Importing coal is not a viable long-term option as the major exporting countries are increasingly adopting energy security and resource nationalism-related policies. The need of the hour is to identify and implement solutions with utmost urgency. Therefore, investments in fuel reforms, better infrastructure and technological advancements in the power sector are key requisites for improving sector health.

Currently, the power sector is at a crucial juncture of its evolution where many private producers and domestic manufacturers are playing a significant role in various capacities, leading to greater reliance on markets that could be subjected to regulation. Recently (October 2021), the country was alarmed, when the power crisis hit the country due to the coal shortage that surfaced. Union Ministry of Power in a statement listed four core reasons for the depletion of coal stocks at the power plant end-

- An unprecedented increase in demand for electricity due to the revival of the economy;
- Heavy rains in coal mine areas during monsoon season (especially September 2021) thereby adversely affecting the coal production as well as the despatch of coal from mines;
- Increase in prices of imported coal to unprecedented high levels leading to a substantial reduction in power generation from imported coal-based power plants leading to more dependence on domestic coal;
- Non-building of adequate coal stocks before the onset of monsoon.

The developments suggested in the National Electricity Policy 2021, reflect the efforts of the Government of India in transforming the power sector by incorporating new business models and clean energy portfolios that can modernise the grid and improve the sector's financial and operational performance. The 3 lakh crore power DISCOM reform scheme that the Indian Cabinet has recently approved, attests to the importance of DISCOM transformation efforts. The benefits of DISCOM turnaround and is driven by clean energy portfolios which will stand to pay a long-term dividend in the sector's initiative towards a clean energy transition.

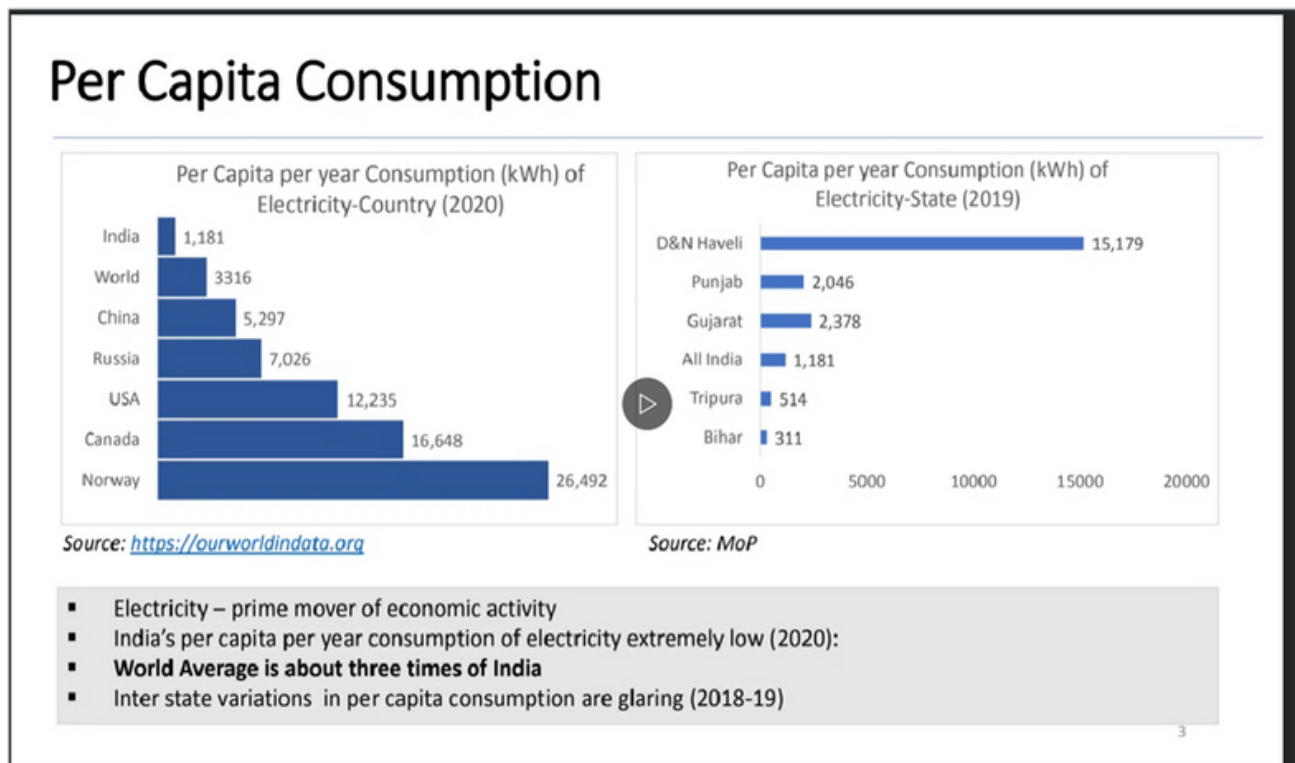
Against this backdrop, this webinar aims to analyse the current issues and challenges faced by the power sector essentially concerning the generation, transmission and distribution of electricity and further suggest the measures that can be undertaken.

Presentation by Speaker

The speaker of the day, Mr Arun Goyal, during the course of his presentation covered the following sub-topics:

- 1) Power Generation
- 2) Power Transmission
- 3) Power Distribution

The per capita consumption in India of electricity is very low. The same has a direct correlation with the economic growth of the country. The following graph depicts statistics pertaining to per capita consumption of electricity in the country and around the world.



In furtherance to defining challenges in the sector, Mr Goyal began by putting forth a brief historical perspective of the power sector in the early 1990s, when the power system was unstable, and the existing capacity underutilized. The whole sector was ruled by meter readers and trade unions coupled with major corrupt practices.

Situation of Power Sector in early 1990s



All of these challenges called for reforms in the sector. In furtherance of this in the year 1991, the Electricity Act was amended with the following amendments:

1. Allow private participation in the generation of electricity
2. Major concessions to attract private investors in the generation of electricity
3. Guaranteed 16% return on equity with a full five-year tax holiday
4. Debt to Equity Ratio of 4:1
5. Sovereign guarantees and escrow benefits in case SEBs default.

However, the policy failed due to the high tariff of power and the poor health of SEBs. Later in the year 1996, at the Chief Minister's Conference minimum agricultural tariff of 50 paise per unit was proposed but no state implemented the same. Later in 1998, the transmission sector opened for private investment followed by the establishment of the State Electricity Sector. After much await, Electricity Act, 2003 was notified with the desired reforms.

Key Features of the Electricity Act, 2003:

- Facilitating investment by creating a competitive environment
- Generation de-licensed
- Determination of tariff by bidding process
- Unbundling of SEBs into separate generation, transmission and distribution entities
- Mandatory establishment of SERCs
- Freedom to have captive and group captive generation
- Open access in transmission
- Recognizing trading as an independent activity
- Stringent provisions to control theft of electricity.

Mr Goyal further explained the Indian power sector scenario in comparison to the global scenario. Following excerpt from the slide deck gives a brief of the comparative analysis:

Power Sector Scenario- Global v/s India

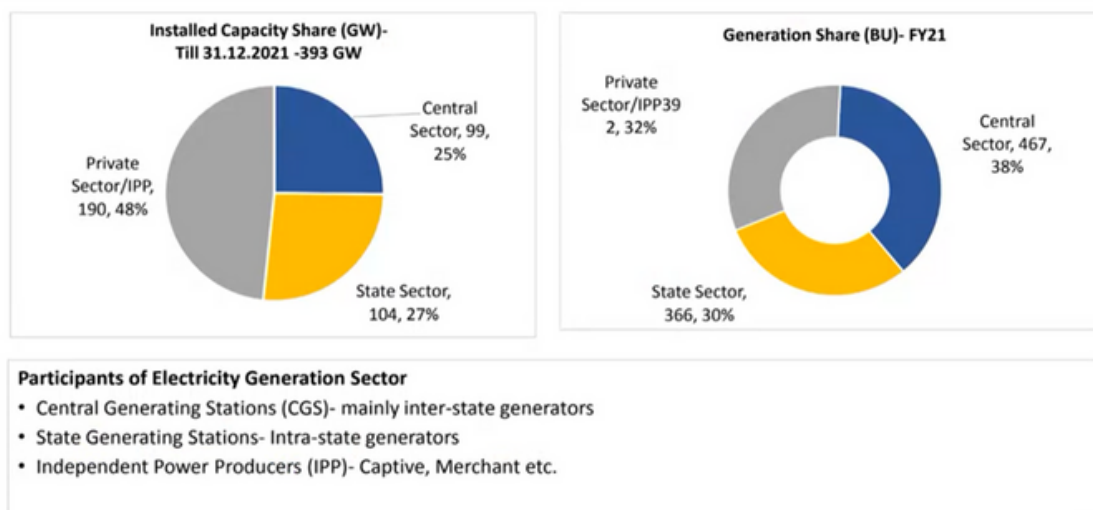
	World (2020)	India (2020)
Generation	25.88 TU	1.37 TU (5.3%)
Fuel Mix		
Coal	33% (8.5TU)	72% (0.99TU)
Gas	23% (5.91 TU)	3% (0.048 TU)
Nuclear	10% (2.71 TU)	3% (0.046 TU)
Renewable	31% (8.13 TU)	21% (0.29 TU)
Others	3% (0.63TU)	2% (0.014TU)

- 1st - India has the fastest-growing renewable energy capacity addition in the world in 2020
- 3rd largest coal-based electricity generator in the world; share (~11%)
- 4th largest Renewable power generator; (~5% share) in the world, 5th largest in solar, 4th largest in wind
- Ease of Doing Business - Getting electricity rank- 22nd (2020)
- India achieved 100% household electrification in 2019

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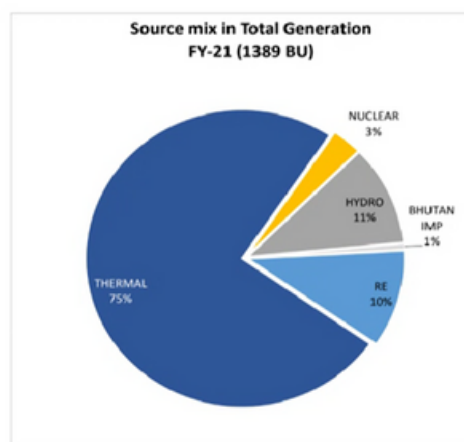
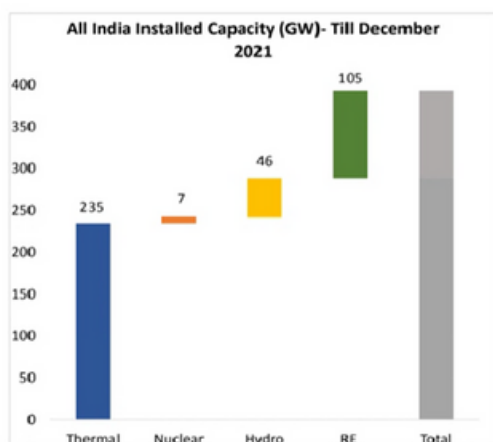
POWER GENERATION IN INDIA

Generation Sector at a Glance



The above figures clearly indicate that the central sector plants in the country are performing better than the state sector plants, whereas the private sector is functioning much below its capacity. The following snap from Mr Goyal's slide deck presents the installed capacity & generation in India:

Installed Capacity & Generation

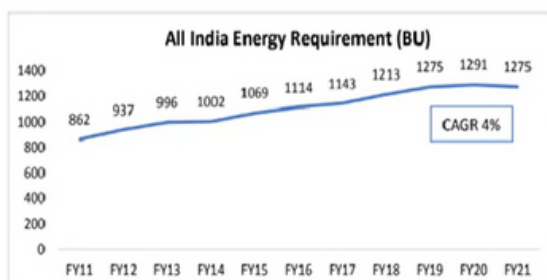
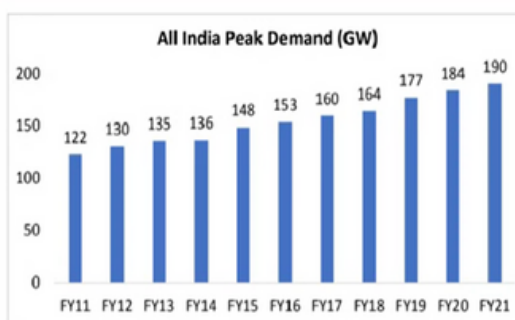
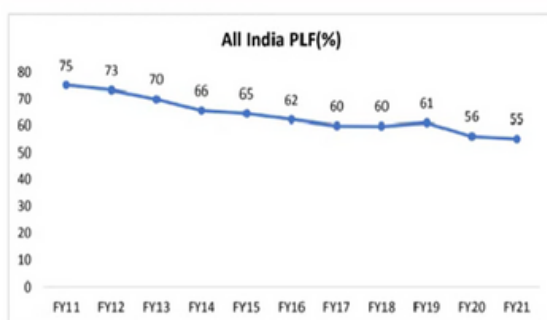


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Next in line, Mr Goyal by way of the following charts discussed All India-PLF, Energy Requirement and Peak Demand. Following were the two conclusive remarks:

- Reducing PLF implies underutilization of capacities/ low demand
- Covid-19 has impacted the energy demand in FY 21 though peak demand has increased.

All India- PLF, Energy Requirement and Peak Demand



- ✓ Reducing PLF implies under utilization of capacities/ low demand
- ✓ Covid-19 has impacted the energy demand in FY'21 though peak demand has increased.

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Despite the decrease in plant load factor, the shortage in peak demand and energy shortage has gone down considerably since the year 2001-2002. Following is the graphical representation of facts:

What has been achieved since 2001-02 ?

Particulars	2001-02	2015-16	2020-21
Energy Requirement(BUs)	522.54	1114.23	1275.53
Energy Available (BUs)	483.35	1090.71	1270.66
Shortage	7.5%	2.1%	0.4%
Peak Demand (MW)	78,411	153,366	190,198
Peak Met (MW)	69,189	148,463	189,395
Peak Shortage	11.8%	3.2%	0.4%

Post-briefing the status quo of the power sector, Mr Goyal elucidated the challenges. Following are the challenges that he identified:

- 1) Decreasing plant load factor- Lower than expected growth of electricity demand
- 2) Declining share of hydropower in India- Installed hydro capacity far below the hydro potential in India
- 3) Gas-Based Plants- Investment of the tune of ₹ 60k Cr (~ 24,900 MW gas based) is under stress asset:
 - PLF of only 23.34% in 2020-21 e.g. Bawana 1371 MW but actual generation 300 to 400 MW
 - Non-availability of domestic gas
- 4) Availability of coal- The availability of adequate coal is a concern for coal-based thermal plants
 - The growing reluctance of states to sign long-term PPAs
- 5) Installed capacity will increase to more than 800 GW over the next 10 years - More capacity shall be added in the next 10 years than what we did in the last 70 years
- 6) Decentralized nature of wind and solar energy sources - The challenge of integrating vast amounts of renewable energy into the grid
 - Large investments in the transmission system.
- 7) Intermittent nature of solar insolation & unpredictability of wind speeds - Solar and wind energy alone unfit for 24X7 power supply
 - Combined hybrid systems & decentralized energy storage systems to have 'Round the Clock' renewable power.
- 8) Net Zero by the year 2070- Non-fossil fuel energy capacity of 500 GW by 2030

The following are crucial steps that have been taken to promote Renewable Energy:

- The present share of fossil-based installed capacity is ~60% (235 GW) and the remaining 40% (158 GW) is non-fossil
- 50 per cent energy requirements via renewable energy by 2030
- Installed renewable energy capacity of 100 GW in India in August 2021
- Norms for Renewable Purchase Obligation (RPO)
- Foreign Direct Investment (FDI) of up to 100% through the automatic route
- Waiver of Inter-State Transmission System (ISTS) charges on the transmission of electricity generated from solar and wind power for projects commissioned up to 30th June 2025
- Standard bidding guidelines to enable the distribution licensees to procure power at competitive rates
- Framework for Renewable Energy Certificates
- The deviation settlement mechanism has special dispensation for wind and solar generators
- Introduction of different green contracts in the power exchanges.

Power Transmission

Mr Goyal pre-discussing power transmission in India highlighted the following figures to set the background of success that power sector has achieved in power transmission:

Growth of Transmission System (In Ckt Kms)

	March 1985	March 1990	March 1997	March 2002	March 2007	March 2012	March 2017	March 2021
± 800 kV HVDC	0	0	0	0	0	0	6,124	9,655
± 500kV HVDC	0	0	1,634	4,738	5,872	9,432	9,432	9,432
± 765 kV	0	0	0	1,160	2,184	5,250	3,1240	46,090
± 400 kV	6,029	19,824	36,142	49,378	73,438	1,06,819	1,57,787	1,89,910
± 220 kV	46,005	59,631	79,600	96,993	1,14,629	1,35,980	1,63,268	1,86,446
Total	52,034	79,455	1,17,376	1,52,269	1,96,123	2,57,481	3,67,851	4,41,533

Transmission Infrastructure has also grown tremendously, between 2011-12 to 2019-20, line length grew at a CAGR of 6.5%, whereas substation capacity grew at about 11.3%. Also, the share of private players has increased with total line length share increasing from 3.3% to 7.4% along with substation capacity share that increased from 0.5% to 4%. In addition, the Power grid continues to dominate the country's transmission sector. As far as Inter-regional transmission is concerned, at 102,500 MW as on March 2020: 27,000 MW was added during the past from April 2017 to March 2020 and Inter-regional power transfer increased from 138 BUs in 2016-17 to 197 BUs in 2019-20.

- Tariff Based Competitive Bidding was introduced in the power sector in the year 2006. As on August 2020, 50 transmission projects were awarded under TBCB.
 - Out of 50 projects: 35 (20 commissioned) to private players and 15 (8 Commissioned) to the Power grid
 - TBCB projects form about 5.4% of Power grid's assets

Major Issues in Transmission

Following are the major issues as identified by Mr Goyal:

- 1. Good progress in Inter State Transmission System in the last few years, Intra-State Transmission is still a concern
- 2. Renewable generating plant set-up time is about 18 months, but it takes nearly 2.5 to 3 years to add transmission lines
- 3. Issues in acquiring land and getting right of way becoming difficult with increasing urbanization
- 4. Economic viability of transmission system for evacuating renewable energy (20 to 30% capacity utilization)
- 5. Mismatch of the date of commercial operation of the generating station and the transmission system
- 6. Sharing of Transmission Charges.

Power Distribution

The distribution sector in India has the following prime characteristics:

- Distribution is the most important link in the entire power sector value chain
- The only interface between utilities and consumers
- Cash register for the entire sector
- Power is a concurrent subject and the responsibility for the distribution and supply of Electricity rests with the states.

The following picture reflects the financials of distribution utilities as extracted from the report of Power Finance Corporation on the State of the Power Sector Utilities:

Financials of Distribution Utilities

Losses of Distribution utilities- FY 20	➤ Aggregate Losses: ₹ 31,672 Crore ➤ Losses excluding Revenue Grants under UDAY and Regulatory Income: ₹ 74,443 Crore	➤ Distribution infrastructure is in pathetic state ➤ Huge financial burden on the Government
Cumulative Losses & Borrowings	➤ Cumulative losses: ₹ 5,07,416 crore ➤ Total borrowings: ₹ 5,14,237 crore	
Receivables sale of power	➤ Rs 1,79,392 crore as on March 31, 2019 ➤ Rs 2,16,272 crore as on March 31, 2020.	
Receivables (No.of Days)	➤ 127 days sale as on March 31, 2019 ➤ 148 days sale as on March 31, 2020.	
Payables for Sale of Power	➤ Rs 2,28,512 crore as on March 31, 2019 ➤ Rs 2,59,071 crore as on March 31, 2020.	
Payables (No.of Days)	➤ 148 days as on March 31, 2019 ➤ 165 days as on March 31, 2020.	

Following table highlights the issues pertaining to the tariff:

Tariff Related Issues

Loss on every unit being sold (2019-20)

Particulars	Per unit	State	Gap (Rs)
Average Cost of Supply (ACOS)	Rs. 6.15	Gujarat	0.10
Average Revenue (Subsidy Billed)	Rs.5.90	Kerala	-0.10
Gap (Subsidy Billed)	Rs. 0.25	Delhi	-0.20
Average Revenue (Subsidy Received)	Rs. 5.85	U. P	-0.43
Gap (Subsidy Received)	Rs. 0.30	Bihar	-0.92
Average Revenue (Subsidy Recd.) without Revenue Grant under UDAY and Regulatory Income	Rs. 5.55	Rajasthan	-1.49
		Tamil Nadu	-2.09
Gap	Rs. 0.60	A & N Islands	-19.58

- During 2019-20, Rs 12,628 crore was booked by distribution utilities as income recoverable through future tariff as compared to Rs 4,948 crore booked during 2018-19
- Units sold in 2019-20 were approximately 1.02 lakh crore
- 10 paise increase in tariff puts Rs 10,200 Crore into the system

State-wise Revenue Gap/ Surplus with subsidy received basis (excluding Regulatory Income and UDAY Grant) in 2019-20

Other major issues in distribution:

1) High AT&C Losses

- High Aggregate Technical & Commercial Losses (AT&C losses)- 20.93%
- Billing Efficiency: 85.36%
- Collection Efficiency: 92.64%
- Rampant theft
- 1% reduction in losses adds nearly Rs 6000 Crore to the system

2) Technology Related Issues

- There is the cost to reliable power supply- Need for redundancy
- Investment in redundancy, technology & IT yields results
- Tata Power Distribution Ltd – AT&C brought down from 53% in July 2002 to ~11% in 12 years
- Poor capacity within the power sector with regard to the latest technologies and the commercial nature of the sector

3) Government Related Issues Capacity

- Public-Private Partnership
- Delhi Privatisation
- Distribution was successfully privatised in Delhi in 2002
- AT&C losses have been reduced from more than 50% in 2002-03 to about 8% in 2019-20
- Load shedding reduced from more than 5% in 2000-01 to less than 0.03% in 2019-20

Privatization of distribution involving large-scale rural areas will continue to remain a challenge in the Indian context.

Way Forward:

1. In Distribution

- Need to have cost-reflective tariffs determined in a fair and transparent manner without considering any subsidy. Thereafter, the state governments at their discretion can give subsidies to a set of consumers.
- Subsidy to be disbursed in full and in a timely manner
- Creation of regulatory assets to be avoided

2. Need to Reduce AT&C Losses

- Separation of agriculture and domestic feeders in rural areas
- Load shedding based on AT&C loss at feeder level
- Investing in the latest technologies
- Making detection and control of electricity theft one of the key result areas of the distribution staff and local police

3. Focus on demand-side management through differential tariffs based on intra-day demand and energy efficiency practices

4. Fast-tracking resolution of contractual and tariff-related disputes

5. Capacity building of the power sector (including regulatory commissions) Achieve political consensus to treat electricity as a 'commercial' good.

Question/Answer Round

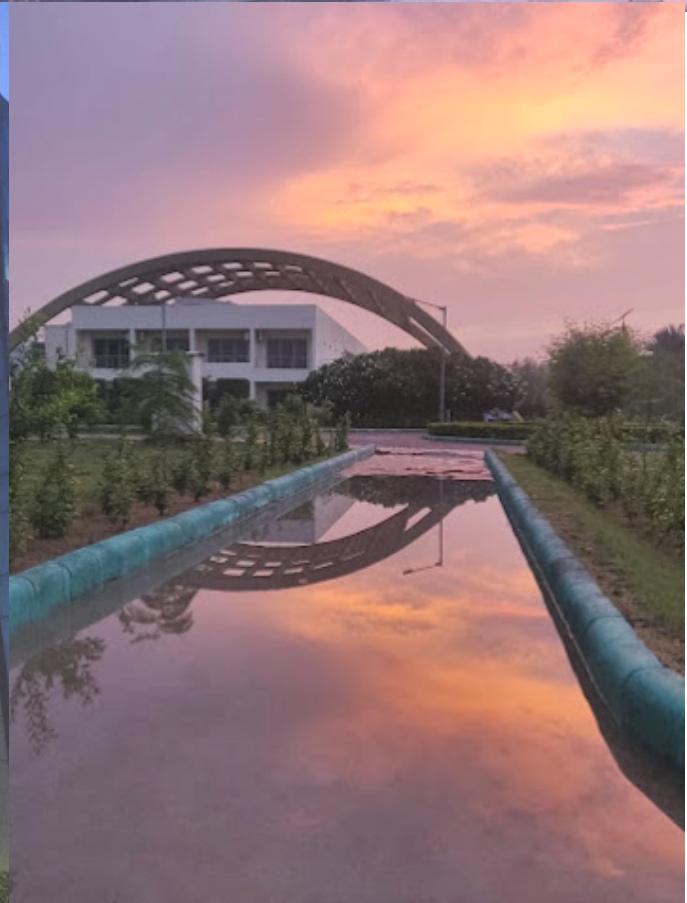
Post the presentation, Dr Abha Yadav thanked the speaker and the house was left open for the participants for questions and answers.

Vote of Thanks

The webinar ended with a vote of thanks by Dr Abha Yadav thanking the esteemed speaker and participants for sharing their knowledge and their experiences. The efforts of FOIR and IICA for the webinar were also much appreciated by the speaker and the participants.

For Queries and Feedback:

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