DISTRIBUTION UTILITY MEET DUM 2024

8th Annual Conference of Power Distribution Utilities for Collaborative Growth

DUM 2024 OUTCOME REPORT

14 - 15 November 2024

Hotel Centrum, Lucknow, Uttar Pradesh

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INTRODUCTION

Distribution Utility Meet (DUM) is the annual flagship event of the India Smart Grid Forum (ISGF), designed to bring together the electricity distribution community to foster knowledge sharing and collaboration. With the motto "Experience Sharing and Learning from each other", DUM serves as an effective platform for Discoms and stakeholders to exchange insights, address challenges in their operations, regulatory environment, energy transition, grid modernization, digitalization, and explore innovative solutions for the evolving power sector. The event is hosted in collaboration with local Discoms in different states every year, offering a unique opportunity to connect and learn from diverse experiences across India.

The journey of DUM began in November 2017 with its first edition in Bengaluru, organized in partnership with Bangalore Electricity Supply Company Limited (BESCOM). The second edition followed in Mumbai in 2018, held in collaboration with Tata Power and Reliance Infrastructure. In 2019, the third edition was hosted in New Delhi, co-organized with Tata Power Delhi Distribution Limited (TPDDL), BSES Rajdhani Power Limited (BRPL), and BSES Yamuna Power Limited (BYPL). The fourth and fifth editions were conducted virtually due to the COVID pandemic, ensuring the continuity of engagement despite the constraints. The sixth edition, held in November 2022, marked a return to the physical event format and was hosted in Bhubaneswar in collaboration with Tata Power Discoms in Odisha. In 2023, the seventh edition took place in Kochi on 02nd and 03rd November, co-hosted by Kerala State Electricity Board (KSEB) Limited and the Energy Department of Kerala.

The 8th Edition of DUM was successfully held on **14th and 15th November 2024** at Hotel Centrum, Lucknow, in collaboration with Uttar Pradesh Power Corporation Limited (UPPCL) and the Energy Department of Uttar Pradesh. This edition of DUM brought together **603 participants**, including senior officials from **39 Discoms, 362 Discom professionals, and 38 exhibitors and partners**. **73 eminent speakers** from India and overseas shared valuable insights and practical solutions on various themes of the conference.

The event was inaugurated by **Shri Manohar Lal, Hon'ble Minister of Power and Housing and Urban Affairs, Government of India, in the presence of Shri Arvind Kumar Sharma, Hon'ble Energy Minister of Uttar Pradesh, and Shri Rakesh Rathor 'Guru', Hon'ble Minister of State for Urban Development, Uttar Pradesh**. Among the notable highlights was the launch of the **All India DISCOMs Association (AIDA)** by Hon'ble Power Minister Shri Manohar Lal which aims to organize electricity distribution entities across India to drive cooperation, innovation, and sectoral growth. Additionally, the **National Registry of Solar Rooftop PV (SRTPV) Systems**, prepared by ISGF was also launched by the Hon'ble Minister Shri Manohar Lal. This registry is intended to improve the integration and management of distributed solar PV systems connected to the Discom grids, addressing a critical gap in generation forecasting and scheduling.

The event garnered widespread appreciation from policymakers, regulatory officials, utility leaders, and global experts. Discussions centered on shaping the future of India's power sector, challenges faced by Discoms relating to operational and financial sustainability, enhancing grid modernization, and leveraging digital technologies for improved operational efficiency and sustainability. The presence of international experts added depth to the dialogue, fostering global exchange of ideas.

As DUM continues to evolve, the 9th Edition is scheduled to take place on **06th and 07th November 2025** in **Mumbai**, in collaboration with the **All India DISCOMs Association (AIDA), MSEDCL and Tata Power Company Limited.**

CONFERENCE THEMES

1. Sustainability of Discoms
2. Digitalization of Discoms
3. Solarization of Agricultural Feeders - Success Stories
4. 250 million Smart Metering - Progress and Challenges
5. RE, EV and Grid Stability
6. Electric Vehicle (EV) Charging Infrastructure and Grid Integration
7. Artificial Intelligence Applications for Utilities
8. Challenges of 10 million Rooftop Solar PV Systems
9. Experiences from the Field

KEY TAKEAWAYS FOR IMMEDIATE ACTION

1. **Strengthen Collaboration** between policymakers, utilities, private players, and global experts to tackle challenges in energy transition, grid integration, and digitalization. This effort should focus on leveraging international best practices, fostering knowledge exchange, and creating unified strategies to support India's journey toward a sustainable and efficient power sector.

2. **Financial Challenges before DISCOMs Require Urgent Attention**: Discoms are burdened with a debt of ₹6.87 lakh crores (as of FY23), increasing by ₹70,000 crores annually. High Aggregate Technical and Commercial (AT&C) losses, which average around 15-17% nationally, but some states still experience losses over 25% and need focused attention to mitigate. Persistent financial challenges, including delayed subsidy payments, unsustainable tariff structures, and unfavorable long-term PPAs, continue to hamper Discoms' solvency. Tariffs are not cost reflective; and regulatory overreach with respect to disallowance of power purchase and O&M costs are hampering Discoms survival. Challenges due to open access, renewable purchase obligations (RPO) and RE integration pose additional burdens to Discoms. Resolving these issues will require a combination of timely regulatory support and forbearance, innovative debt recovery mechanisms, and reforms to streamline government subsidy disbursements. Power purchase costs account for 60-70% of Discoms' expenses, with rising cost of power adversely impacting financial stability; and delays in annual tariff orders, disallowance of genuine costs, and delay in implementing fuel surcharge mechanisms adding to these difficulties. This must be addressed on priority. Exploring alternative revenue models and unlocking new funding avenues are essential steps to stabilize Discoms finances. Promote decentralized renewable energy solutions like solar pumps to reduce agricultural subsidies. Ensure timely subsidy payments to Discoms by state governments.

3. **All India DISCOMs Association (AIDA) was launched at DUM 2024**. All Discoms are advised to join AIDA as members and leverage this as a common platform that can address challenging sectoral issues.
4. **Improved Collection Mechanisms and Debt Management**: Use innovative models like self-help groups (eg: Women-led billing and collection teams) to increase collection efficiency. Focus on reducing debt through improved revenue collection and efficient cost management. Establish Stabilization Funds to manage tariff fluctuations

5. **Dynamic and Evolving Ecosystem with Regional Heterogeneity and Demands Flexibility**: The power distribution sector operates in a highly dynamic environment, influenced by evolving technologies, changing regulatory landscapes, and shifting consumer expectations. Different Discoms face unique problems. For example, urban Discoms struggle with demand-side management and infrastructure stress while rural Discoms face high AT&C losses and inefficiency. **Regulators must approve cost-reflective tariffs to Discoms while balancing these competing forces to achieve sustainability**. India's electricity distribution landscape is diverse, with significant variations across states and utilities. Regulators are constrained by top-down directives, limiting flexibility for state-specific adaptations. Uniform mandates from the central government, such as RPOs and smart metering, often fail to consider local conditions in different states/Discoms. This needs to change, and a flexible regulatory framework is essential to address state-specific challenges and consumer profiles.

6. **Holistic Regulatory Approach for Trade-Offs**: Modernizing the power sector comes with inherent trade-offs, such as supporting green initiatives like net metering for solar power while addressing the financial burden on Discoms. Regulators must adopt a holistic approach that considers the long-term sustainability of Discoms alongside consumer benefits. These trade-offs should be tackled through balanced policies, such as cost-sharing mechanisms for renewable energy integration and incentives for technological adoption. Regulatory uncertainty regarding renewable purchase obligations (RPOs) and energy banking to be addressed on priority.

7. **Leverage New Revenue Opportunities**: Discoms must look beyond traditional revenue streams to ensure financial sustainability. Exploring innovative revenue models, such as monetizing digital assets, providing value-added services to consumers, and optimizing workforce utilization, can generate additional income. Similarly, leveraging existing physical infrastructure for alternative uses can open untapped revenue potential.

8. **Technological Advancements to Modernize Distribution Grid**: Replace aging infrastructure, including transformers and meters, with modern, reliable equipment (over 40% of transformers in UP have outlived their life expectancy); adopt smart metering to improve billing accuracy and other benefits. Mandate uniform equipment standards. Adopting technologies like smart meters, IoT devices, and advanced analytics is critical for transitioning to a modernized and efficient distribution system. These tools enable better grid management, predictive maintenance, and data-driven decision-making. Furthermore, developing IT compatibility and addressing cybersecurity concerns will be integral to successful technology integration. Develop common specifications for electrical equipment to ensure quality, reduce costs and inventory carrying cost.

9. **Promote Public-Private Partnerships (PPP) and Privatization**: Collaborating with private entities through PPP models can drive efficiency and innovation in the power distribution sector. Provide incentives for privatization of Discoms and governments may take over the loans. PPPs can provide the necessary capital, expertise, and operational frameworks to modernize infrastructure and expand service delivery capabilities. These partnerships must also focus on building capacity within Discoms to ensure long- term benefits. The examples of Delhi, Odisha and Noida are worth emulating in other states:

   - *Delhi Discoms Privatization Success: Losses reduced from 53% to 5.9% over two decades through technological adoption and operational efficiency. The public-private partnership (PPP) model allowed for better service quality and financial stability.*

- *Odisha Discoms Turnaround: Tata Power took over failing Discoms during the COVID-19 pandemic and made them profitable within three years. Achieved sustainability without government subsidies by focusing on technology, employee training, and operational efficiency.*
- *Noida Power Company: Brought down losses to 7.5% and consistently paid dividends to shareholders, showcasing how operational excellence translates to financial success.*

10. **Mandate Smart Inverters** conforming to **IS: 18968-2025** (IEEE 1547 – 2018) for all new DER connections (solar rooftops, BESS etc.) with the grid to improve grid voltage control and stability, addressing the growing integration of renewable energy sources and electric vehicles.

11. **Conduct Feeder-wise Capacity Studies** to better understand the impact of large number of solar rooftop PV systems on the feeder. Promote innovative business models for battery energy storage systems (BESS) and Vehicle-to-Grid (V2G) services, which can enhance grid flexibility and stability while supporting the integration of renewable energy and electrified transport.

12. **Mandate BESS for all New Large Buildings and Campuses for Backup Power** instead of DG sets being presently deployed. This could be a faster route to build distributed storage across the country. Replacement of existing DG sets with BESS may be mandated in a phased manner. MOP/MNRE to explore new schemes with subsidies for promoting the same.

13. **Scale up Successful Models of Solarizing Agricultural Feeders**, such as those implemented in Maharashtra and Gujarat. Address challenges related to land availability through solutions like agrivoltaics; and install meters on agricultural feeders to facilitate effective monitoring, measurement, and cost analysis. These efforts will ensure reliable daytime power for irrigation while reducing dependency on conventional grid electricity. **Maharashtra case study** is presented in this report which offers valuable lessons for other states.

14. **Accelerate the Rollout of Smart Meters under the Revamped Distribution Sector Scheme (RDSS)** initiative to enhance data collection, demand forecasting, and customer engagement. Leverage analytics from smart meter data to enable predictive maintenance, theft detection, and operational optimization. Develop and implement comprehensive digitalization roadmap in all Discoms to guide utilities in integrating advanced systems and technologies.

15. Encourage the adoption of emerging technologies like artificial intelligence (AI), IoT, Blockchain, and immersive tools such as augmented reality and virtual reality (AR/VR). These innovations can be used for predictive maintenance, grid optimization, theft detection, training and improved customer service. Investments in real-time monitoring and automation solutions will further enhance operational efficiency and system reliability.

16. Provide financial support in the form of capital subsidies, revenue-sharing models, and other incentives to encourage the adoption of EV charging infrastructure and renewable energy solutions. Expand initiatives like the PM E-Drive program and rooftop PV subsidies to accelerate the deployment of sustainable energy infrastructure across the country.

17. Integrate renewable energy resources with EV infrastructure to reduce carbon footprints and promote sustainability. Utilize AI-driven tools and smart technologies to optimize operational efficiency, improve reliability, and reduce costs across utilities while meeting the increasing demands of electrification.

18. **Equip utility workforces with new skills to manage digital systems** and leverage advanced analytics and emerging technologies. Training programs should address the challenges of transitioning to a modernized power sector, preparing the workforce for roles that require expertise in innovative tools and systems. Reskill and redeploy employees who became redundant owing to smart metering and automation. NPTI and other institutions may be requested to develop appropriate training programs, both face to face as well as online courses.

19. **Open Charge Point Protocol (OCPP)**, the most popular communication standard for EV charging globally has been adopted as an IEC standard (**IEC 63584 – 2024**) recently. All EV and EVSE OEMs in India are using OCPP, but there are no facilities for conformity testing. Bureau of Indian Standards (BIS) may be requested to adopt this as an Indian Standard on fast track so that testing can be undertaken in India.

20. Enhance consumer engagement through digital platforms that facilitate interaction, feedback, and dynamic pricing models. These platforms can empower consumers to save on energy cost, increase transparency, and improve overall satisfaction, creating a more inclusive and responsive energy ecosystem.

21. **Peer to Peer (P2P) Transactions of Rooftop Solar Energy**: Three states (UP, Delhi and Karnataka) have issued regulations for P2P transactions of rooftop solar energy. Successful pilot projects on P2P transactions of rooftop solar energy on blockchain platforms were executed in the recent past in UP, Delhi and Kolkata by ISGF. This may be promoted across the country which will create local clean energy communities and help scale up rooftop solar.

22. **Uttar Pradesh Renewable Energy and EV Infrastructure Ltd. (UPREV):** UP Government has setup a dedicated entity called UPREV as a wholly owned subsidiary of Uttar Pradesh Power Corporation Limited (UPPCL) for development of EV infrastructure and renewable energy in the state. This can be a role model for other states for creation of EV charging infrastructure on fast track and in Public-Private Partnership (PPP) models.

23. **National Solar Rooftop Registry**: A National Registry of Rooftop PV Systems has been prepared by ISGF, and the registry is now live – **www.indiaderregistry.in**. Discoms are requested to work with ISGF to upload the data of existing rooftop PV systems in the registry as well as make certain changes in the data captured for each rooftop PV connections by incorporating the feeder and distribution transformer (DT) details so that all future rooftop PV connections can be easily integrated with the registry through APIs. This registry will be a valuable tool for Discoms to manage rooftop solar systems.

24. Review and update outdated regulations, including the Electricity Supply Code, to incorporate EV-specific requirements. This may include provisions for LT connections up to 200 kW, as currently implemented in Delhi. Also, provision of multiple connections per premise and flexible tariff structures such as Time-of-Use (ToU) pricing.

25. Assess and redefine the role of regulators in view of the fact that the whole sector has become litigation heavy – are regulators the controller or regulator or activists?

INAUGURAL SESSION

DUM 2024 was inaugurated by Shri Manohar Lal, Hon'ble Minister of Power, Housing and Urban Development, Government of India on 14th November 2024 in Lucknow, Uttar Pradesh in the august presence of Shri Arvind Kumar Sharma, Hon'ble Minister of Energy, Government of Uttar Pradesh. The event emphasized the importance of key challenges related to sustainability and financial viability of Discoms, scaling up renewable energy, grid modernization, and adoption of advanced digital technologies such as AI, ML, robotics, and Blockchain. It also highlighted the integration of diverse technologies relevant to the power sector to enhance customer services and drive a sustainable and resilient energy future for India.

Shri Reji Kumar Pillai, President, India Smart Grid Forum (ISGF), extended a warm welcome to the dignitaries and participants at DUM 2024. He expressed ISGF's gratitude and appreciation for the collaboration with UPPCL and UP Energy Department in organizing the 8th edition of Distribution Utility Meet in Lucknow. Mr. Pillai mentioned that electrification across sectors like transportation, agriculture, and industry being adopted as the main strategy for India's decarbonization, and hence the demand for electricity is projected to triple within the next 10–15 years. The current generation capacity of 452 GW is estimated to grow to 2,100 GW by 2047. He also highlighted the significant reduction in Aggregate Technical & Commercial (AT&C) losses from 36% in 2002 to 15% by December 2023. This reduction translates to savings of approximately 300 billion units of electricity annually, equivalent to INR 90,000 crores every year! Discoms in India are already adopting new technologies, including AI, ML and other digital tools to improve reliability, efficiency, and customer service which is a very impressive progress; and there are many things Discoms can learn from each other which is the very motto of DUM platform by bringing all stakeholders together. Mr. Pillai also expressed deep appreciation for the Hon'ble Chief Minister of Uttar Pradesh, Shri Yogi Adityanath, for extending full support for organizing DUM 2024 in Uttar Pradesh.

Dr Ashish Goel, Chairman, UP Power Corporation Limited (UPPCL) in his welcome address mentioned some of the key achievements of the UP Power Sector in the recent years such as: solarization of agricultural feeders, implementation of smart metering and digitalization, adoption of advanced technologies like AI, ML, and data analytics for efficient electricity distribution, transitioning towards green energy and renewable sources**.** Dr Goel highlighted major improvements in the state, including uninterrupted 24-hour electricity supply in rural areas during peak summer months; and successfully meeting the summer peak electricity demand of 30,618 MW in 2024. Presently the daily demand and supply of electricity in UP has surpassed states like Maharashtra and Gujarat. He complimented the great efforts of UPPCL, UP TRANSCO, and Discom employees for driving the state's energy sector forward. Dr Goel presented the UP Power Sector's Vision for 2034, which includes addition of 1,600 MW of thermal power, 4,000 MW of solar power, 2,000 MW of hydro power and pumped storage; and battery energy storage systems which will make Uttar Pradesh a leader in energy self-reliance through proactive implementation of these projects. Dr Goel also informed the audience that UP is the first state that has formed a dedicated government agency for promotion of electric mobility on fast track with the launch of Uttar Pradesh Renewables and EV Infrastructure Limited (UPREV) as a fully owned subsidiary of UPPCL on 29th May 2024. He reaffirmed UPPCL's commitment to achieving 24x7 reliable power supply in the state and creating solutions for long-term self-reliance and customer satisfaction. He emphasized that sufficient policy and regulatory support is required for meeting the challenges before the Discoms which are facing financial viability issues.

Shri Narendra Bhooshan, Additional Chief Secretary, Energy, Government of Uttar Pradesh lauded Uttar Pradesh's leadership in renewable energy, citing achievements in the PM Surya Ghar Yojana and advancements in grid digitalization. He highlighted the importance of AI and IoT as transformative forces in electricity supply and customer engagement; and advised to focus on the importance of cyber-security for interconnected grids. He suggested to bridge the gap between public and private utilities by adopting best practices from both; and the need to promote cross-sector collaboration to address consumer behavior and improve efficiency in the power distribution sector.

Shri Arvind Kumar, Chairman, Uttar Pradesh Electricity Regulatory Commission (UPERC) expressed appreciation to ISGF's DUM Platform for making available live interactions amongst Government, Public and Private stakeholders. He emphasized the need to achieve 29% renewable purchase obligation (RPO) by Discoms to meet 500 GW RE target by 2030. Mr Kumar advised Discoms to focus on PM KUSUM and PM Surya Ghar Yojana to meet the above targets. He also highlighted the need for robust feeder metering, transformer tagging, and data-driven decision-making; and advocated for leveraging funds from programs like RDSS for digital transformation in utilities. Also, touched up on the importance of Resource Efficiency,

Demand Side Management, Data Analytics (15 min slab) for Resource Adequacy Planning and Demand Forecasting. On the manpower front Mr Kumar expressed concern on the lack of trained manpower for data handling to operate multiple digital platforms. He proposed creating a dedicated cadre for IT and data management within utilities to handle future challenges.

Shri Arvind Kumar Sharma, Hon'ble Energy Minister of UP, mentioned building UP's first Solar City in Ayodhya where a 40 MW Solar Plant was commissioned in 2024; and installed solar powered streetlights on 11 km of roads, introduced solar powered Water ATMs and Solar Water Boats. The minister mentioned that 16 more Solar Cities will be developed in UP on fast track. The minister informed the audience that Uttar Pradesh achieved record peak electricity demand of 30,618 MW in 2024; and Discoms were able to provide 24 hours supply even in rural areas especially during summer. However, the Minister highlighted the need to make the distribution grid robust to meet the fast-growing electricity demand. Minister also highlighted that UPPCL and the Discoms are now making quarterly balance sheets which is a remarkable achievement as the first state in India to implement such financial discipline. Minister Sharma called upon the power sector officials to focus on addressing consumer dissatisfaction with billing errors, delayed service, and misconceptions about smart meters and accidents caused during maintenance.

Shri Manohar Lal, Hon'ble Minister for Power, Housing, and Urban Development, Government of India in his inaugural address emphasized the pivotal role of electricity in economic growth and global competitiveness, particularly as India aims to become a developed nation by 2047 and urged to treat electricity as the cornerstone of development. The Minister advocated for innovations in energy storage systems and the transition from fossil-fuel to cleaner energy sources-based power system. He highlighted the importance of achieving round-the-clock reliable power supply and preparing for emerging global challenges like green hydrogen requirements. He also advised the utilities to study Consumer Behavior and Psychology in perspective of Energy Consumption; and recommended concessions and rebates in electricity bills to motivate consumers for adoption of smart meters and early bill payments. The minister also mentioned amendments in the ranking systems of power utilities. The Minister advised power utilities to focus on the technological advancements in Solar, Hydro, Wind, and Nuclear Energy, and other emerging technologies for grid modernization. He exhorted utilities and consumers to treat electricity as a commodity, and not free service. To provide reliable electricity supply 24x7, Discoms have to be financially viable and sustainable entities.

Hon'ble Minister Shri Manohar Lal launched the All India DISCOMs Association (AIDA) and also a National Registry for Solar Rooftop PV systems prepared by ISGF. More about AIDA and Solar Registry are given at the respective websites:

www.aida-india.org
www.indiaderregistry.in

Vote of Thanks were delivered by **Shri Pankaj Kumar**, Managing Director of UPPCL; following which Hon'ble Minister of Power **Shri Manohar Lal** inaugurated the Exhibition at DUM 2024. The inaugural session was anchored by **Smt Reena Suri**, Executive Director of ISGF.

Video Link of the Session: https://youtu.be/k8X0oysPHhM?si=UyVTtGHLn5P5ND2w

SESSION 1 & 5 - SPECIAL PLENARIES

SUSTAINABILITY OF DISCOMS (PART 1)

INTRODUCTION

India operates the **third-largest power system in the world** and is recognized as a global leader in energy transition. While significant strides have been made in power generation and transmission, the **distribution sector still lags behind** in efficiency and sustainability. India's electricity distribution network is managed by 73 licensees, including 47 state-owned Discoms, 11 government departments, and 15 private companies and municipal entities. Despite achieving **99.9% household electrification** and reducing AT&C losses from **36% in 2002 to 15% in 2023**, the sector continues to face critical challenges, including financial instability, technological gaps, and regulatory hurdles.

The session highlighted the pressing need to **strengthen Discoms' operational and financial sustainability** to meet the projected tripling of electricity demand in the next 25 years due to rapid electrification in transport, industry, and agriculture sectors. This session emphasized enhancing Discoms efficiency, ensuring customer satisfaction, and leveraging regulatory and technological innovations for long-term sustainability.

PARTICIPANTS

Dr Ashish Goel, Chairman, UPPCL, **Dr Praveer Sinha**, MD & CEO, The Tata Power Company Ltd, **Shri Arun Goyal** - Former Member, CERC, **Shri PR Kumar**, MD - NPCL, **Shri Amarjeet Singh**, CEO - BSES Yamuna Power Limited, **Shri Alok Mishra**, Business Lead - Power Grid, DNV MES India Private Limited

KEY TAKEAWAYS

1. **Financial Challenges before DISCOMs Require Urgent Attention**

   Discoms are burdened with a debt of ₹6.87 lakh crores (as of FY23), increasing by ₹70,000 crores annually. High Aggregate Technical and Commercial (AT&C) losses, which average around 15-17% nationally, but some states still experience losses over 25% and need focused attention to mitigate. Persistent financial challenges, including delayed subsidy payments, unsustainable tariff structures, and unfavorable long-term PPAs, continue to hamper Discoms' solvency. Tariffs are not cost reflective; and regulatory overreach with respect to disallowance of power purchase and O&M costs are hampering Discoms survival. Challenges due to open access, renewable purchase obligations (RPO) and RE integration pose additional burdens to Discoms. Resolving these issues will require a combination of timely regulatory support and forbearance, innovative debt recovery mechanisms, and reforms to streamline government subsidy disbursements. Power purchase costs account for 60-70% of Discoms' expenses, with rising cost of power adversely impacting financial stability; and delays in annual tariff orders, disallowance of genuine costs, and delay in implementing fuel surcharge mechanisms adding to these difficulties. This must be addressed on priority. Exploring alternative revenue models and unlocking new funding avenues are essential steps to stabilize Discoms finances. Promote decentralized renewable energy solutions like solar pumps to reduce agricultural subsidies. Ensure timely subsidy payments to Discoms by state governments.

2. Assess and **redefine the role of regulators** in view of the fact that the whole sector has become litigation heavy – are regulators the controller or regulator or activists?

3. **Formation of DISCOMs Association**

During DUM 2023 in Kochi, the idea of an Association of Discoms was mooted; and the **All India DISCOMs Association (AIDA)** was launched at DUM 2024 with the key objectives of:

- A new platform aimed at uniting all Discos for experience sharing, capacity building, and finding collaborative solutions to sectoral challenges
- Promotion of Public-Private Partnerships (PPP) and sharing of best practices in AT&C loss reduction, training, and IT system compatibility
- Key mandates include the development of a strategic vision for the power sector, standardization of equipment specifications, collaboration for unified procurement system; and sharing of cost data
- Sharing of equipment, spares, specialized tools and crew during emergency situations for network restoration

Shri Lokesh Chandra, CMD of MSEDCL, Dr Ashish Goel, Chairman of UPPCL and Shri Amarjeet Singh, CEO of BSES Yamuna Power Ltd have been chosen unanimously as the founding President, General Secretary and Treasurer of AIDA for a term of 3 years. More details at: www.aida-india.org

4. **Interventions to Enhance Operational Efficiency**

Operational inefficiencies, such as outdated asset management practices and prolonged outage restoration times, must be addressed with focus on automation, digitalization, and process optimization. Advanced technologies, such as AI-driven analytics, network automation, predictive maintenance and real-time monitoring, can significantly improve outage detection, asset performance, and service reliability. Moreover, reducing inventory carrying costs through better procurement and spares management is critical to operational sustainability. The following are the key interventions that Discoms should focus:

- Adoption of network automation and monitoring and predictive maintenance to improve reliability and reduce downtime
- Improved asset management, faster outage restoration, and optimized procurement processes
- Exploration of new revenue streams using existing physical and digital assets and workforce
- Reduction of inventory carrying costs and optimization of spare parts inventory
- Work with state regulators for cost reflective tariffs

5. **Improved Collection Mechanisms and Debt Management**

Use innovative models like self-help groups (eg: women-led billing and collection teams) to increase collection efficiency. Focus on reducing debt through improved revenue collection and efficient cost management. Establish Stabilization Funds to manage tariff fluctuations.

6. **Smart Metering: Beyond AT&C Loss Reduction**

Presently there are very high rates of provisional billing, often due to non-operational meters or lack of metering, leading to manipulation and revenue loss. Accelerate rollout of smart metering to improve billing accuracy and reduce AT&C losses. While smart metering is often seen as a tool for reducing AT&C losses, its potential extends far beyond that. Smart meters enable better demand forecasting, time-of-day tariffs, and dynamic load management, which are critical as the electricity distribution sector evolves. Regulators and policymakers must recognize these broader objectives and design frameworks that prioritize Discoms sustainability while balancing consumer welfare.

7. **Holistic Regulatory Approach for Trade-Offs**

Modernizing the power sector comes with inherent trade-offs, such as supporting green initiatives like net metering for solar power while addressing the financial burden on Discoms. Regulators must adopt a holistic approach that considers the long-term sustainability of Discoms alongside consumer benefits. These trade-offs should be tackled through balanced policies, such as cost-sharing mechanisms for renewable energy

integration and incentives for technology adoption. **Regulatory uncertainty** regarding renewable purchase obligations (RPOs) and energy banking to be addressed on priority as banking involves storage which is very costly for Discoms. RPOs also put small industry at a disadvantage.

8. **Leverage New Revenue Opportunities**

   Discoms must look beyond traditional revenue streams to ensure financial sustainability. Exploring innovative revenue models, such as monetizing digital assets, providing value-added services to consumers, and optimizing workforce utilization, can generate additional income. Similarly, leveraging existing physical infrastructure for alternative uses can open untapped revenue potential.

9. **Technological Advancements to Modernize Distribution Grid**

   Replace aging infrastructure, including transformers and meters, with modern, reliable equipment (over 40% of transformers in UP have outlived their life expectancy); adopt smart metering to improve billing accuracy and other benefits. Mandate uniform equipment standards. Adopting technologies like smart meters, IoT devices, and advanced analytics is critical for transitioning to a modernized and efficient distribution system. These tools enable better grid management, predictive maintenance, and data-driven decision-making. Furthermore, developing IT compatibility and addressing cybersecurity concerns will be integral to successful technology integration. Develop common specifications for electrical equipment to ensure quality, reduce costs and inventory carrying cost.

10. **Consumer-Centric Approaches and Encourage Responsible Consumption**

    Consumer satisfaction must remain a key focus area for Discoms. Enhancing transparency in billing, offering flexible payment options, and using smart metering data to empower consumers with usage insights will significantly improve customer engagement. A consumer-centric approach also involves streamlining service delivery and reducing downtime, fostering greater trust and loyalty. Encourage responsible consumption by educating consumers on the importance of energy payment and theft prevention; Promote the adoption of energy-efficient appliances and demand-side management. Implement time-of-use tariffs to encourage off- peak consumption. Streamline grievance redressal processes to make them efficient and less prone to litigation.

11. **Promote Public-Private Partnerships (PPP)**

    Collaborating with private entities through PPP models can drive efficiency and innovation in the power distribution sector. PPPs can provide the necessary capital, expertise, and operational frameworks to modernize infrastructure and expand service delivery capabilities. These partnerships must also focus on building capacity within Discoms to ensure long-term benefits. The examples of Delhi, Odisha and Noida are worth emulating in other states:
    - **Delhi DISCOMs Privatization Success**: Losses reduced from 53% to 5.9% over two decades through technology adoption and operational efficiency. The public-private partnership (PPP) model allowed for better service quality and financial stability.
    - **Odisha DISCOMs Turnaround**: Tata Power took over failing Discoms during the COVID-19 pandemic and made them profitable within three years. Achieved sustainability without government subsidies by focusing on technology, employee training, and operational efficiency.
    - **Noida Power Company**: Brought down losses to 7.5% and consistently paid dividends to shareholders, showcasing how operational excellence translates to financial success.

12. **Incentivize Green Energy**

Tailor renewable purchase obligations (RPOs) to state-specific conditions; Encourage the use of rooftop solar with appropriate limits (say 10 kW) on net metering for institutional and industrial consumers.

13. **Sustainability as a Long-Term Goal**

The session highlighted the importance of positioning sustainability at the core of Discom's operations. This includes not only financial and operational sustainability but also environmental considerations, such as integrating renewable energy sources and reducing carbon footprints. The session underscored the criticality of ensuring the financial, operational, and technological sustainability of Discoms to support India's socio- economic growth. With electricity demand set to rise exponentially, a multifaceted approach combining regulatory reforms, technological innovation, and collaborative efforts is imperative. The formation of AIDA will provide a unified platform to address the sectoral challenges and foster collective progress. This transformation will not only secure Discom viability but also enhance consumer welfare, making it a cornerstone of India's energy future.

14. **Recommendations to Regulators, Governments and Customers**

- **Regulators** must ensure timely and cost-reflective tariff approvals. Simplify regulatory processes to encourage investments in the sector.
- **Governments** must pay subsidies on time and explore alternative models like decentralized renewables to reduce long-term subsidy costs. Support Discoms with capital for infrastructure upgrades.
- **Consumers** must pay electricity bills regularly to ensure better service quality. Avoid electricity theft and adopt energy-efficient practices.
-

Video Link of the Session: https://youtu.be/2uUwGWodvtE?si=zhcnyNL_UahJgJKu

SUSTAINABILITY OF DISCOMS (PART 2)

INTRODUCTION

This session focused on the critical challenges and opportunities facing India's electricity distribution sector. While the country has made remarkable strides in power generation and transmission, the sustainability of Discoms remains a pressing concern as they grapple with growing electricity demand, technological advancements, and operational inefficiencies. The session examined various dimensions of Discom sustainability, including workforce optimization, customer engagement, financial health, and regulatory support.

PARTICIPANTS

Shri PK Pujari, Former Power Secretary and Former Chairperson, CERC; **Shri Rahul Tongia**, Advisor, ISGF; **Shri Sanjoy Mukherjee**, Executive Director-Technical, Distribution, CESC Limited, Kolkata; **Shri Shailendra Dubey**, Director, Inventive Software Solutions; **Shri Hemant Verma**, Chairman, Chhattisgarh State Electricity Regulatory Commission; **Shri Sushant Kumar Ray Mohapatra**, Member-Technical, OERC; **Shri Ashutosh Goel**, MD, Allied Engineering; and **Shri Rajneesh Bahadur**, Regional Head, Havells India Ltd.

KEY TAKEAWAYS

1. **Dynamic and Evolving Ecosystem**

The power distribution sector operates in a highly dynamic environment, influenced by evolving technologies, changing regulatory landscapes, and shifting consumer expectations. Different Discoms face unique problems. For example, urban Discoms struggle with demand-side management and infrastructure stress while rural Discoms face high AT&C losses and inefficiency. Regulators must approve cost-reflective tariffs to Discoms while balancing these competing forces to achieve sustainability.

2. **Regional Heterogeneity and Demands Flexibility**

India’s electricity distribution landscape is diverse, with significant variations across states and utilities. Regulators are constrained by top-down directives, limiting flexibility for state-specific adaptations. Uniform mandates from the central government, such as RPOs and Smart Metering, often fail to consider local conditions. This needs to change, and a flexible regulatory framework is essential to address state-specific challenges and consumer profiles.

3. **Leveraging Technological Advancements**

The availability of advanced technologies offers numerous opportunities for Discoms to enhance their operations. While some technologies can be mandated as minimum standards, others can be introduced as optional nudges to encourage gradual adoption. Invest in training programs to upskill employees in advanced technologies like AI, IoT, and analytics. Provide tools like workforce management apps to streamline operations and boost productivity. Reskill redundant staff, especially those displaced by smart metering and automation; and redeploying them.

4. **RE Challenges**

Green Open Access imposes additional financial and operational stress on Discoms. Incentives for renewable developers can increase costs for Discoms. Banking policies for renewable energy and green hydrogen are

often not cost-reflective.

5. Enhanced Consumer Participation

Consumer engagement is pivotal for the success of Discoms. Tools such as Customer Apps can deepen consumer involvement, enabling better communication, demand-side management, and transparency in billing and service delivery. Develop easy-to-use apps for bill payments, outage notifications, and real-time consumption monitoring. Engage consumers with personalized alerts, such as subsidy tracking, solar generation issues, and energy-saving tips.

6. Infrastructure Upgrades

Non-uniform infrastructure across states complicates scaling smart grids and related technologies. Transitioning to smart grids demands significant investments in advanced infrastructure, workforce retraining, and operational changes. Many existing distribution systems are not cyclone or disaster-resilient, particularly in vulnerable coastal states. Odisha has started leveraging cyclone-resilient infrastructure to prevent power disruptions and reduce economic losses.

7. Other Issues

Delayed or incorrect tariff filings and insufficient true ups result in revenue gaps. Inconsistent tariff structures burden Discoms, especially in states with large industrial consumers or high rural loads.

8. DISCOMs Turnaround in Odisha

Odisha handed over the management of 4 Discoms in the stare to Tata Power Company in 2020/2021. Despite the Covid pandemic, Discoms have reduced AT&C losses from over 40% to below 19% in 2-3 years through targeted investments. Improved the revenue collection and enabled timely payments to power generators, reducing debt burdens. They adopted cyclone-resilient infrastructure that minimized power disruptions and economic losses; and engaging consumers through digital platforms and personalized services is driving energy conservation and improved revenue collections.

Video Link of the Session: https://youtu.be/PA4pjF1_cNg?si=ki6-skVcL3f4ueUH

SESSION 2

STORIES FROM SOLARIZATION OF AGRICULTURAL FEEDERS AND OTHER NOTABLE EXPERIENCES FROM THE FIELD

INTRODUCTION

The solarization of agricultural feeders presents a pivotal initiative in India's journey toward sustainable energy practices. Spearheaded under the PM-KUSUM program, which provides 40% subsidy, this initiative ensures farmers receive day-time reliable power for irrigation, either free or at concessional tariffs determined by the respective state governments. By reducing reliance on conventional power sources, it plays a crucial role in decarbonizing the agricultural sector and enhancing power supply efficiency in rural areas.

This session highlighted the successful implementation of agricultural feeder solarization across states, addressing challenges such as land availability for solar panel installation and improvements in the reliability of agricultural power supply. Additionally, it showcased innovative projects and practices adopted by Discoms, setting a benchmark for operational efficiency and customer engagement. The discussions underscored the role of advanced technologies, process optimization, and new business models in transforming the distribution sector.

PARTICIPANTS

Smt Abha Shukla, ACS – Energy, Maharashtra, **Shri Ravi Seethapathy**, Advisor, ISGF, **Shri Vipul K. Joisher**, Director, Aditya Green Energy Pvt. Ltd., **Shri Deepak Raizada**, Chief Engineer - PPA, UPPCL, **Shri Ranvir Prasad**, MD, UPPTCL, **Shri Dhruv Suri** and **Shri Mohak Mangal**, Stanford University, USA, Shri Arvind Singh, CEO, TPCODCL, **Shri SR Pandey**, Member, GERC, **Shri JK Jethani**, Scientist-F, MNRE, **Shri Nitish Kumar**, MD, DVVNL, UP, **Shri Anant Venkateswaran**, Advisor, ISGF

KEY TAKEAWAYS

1. Progress Variability Across States

The success of solarizing agricultural feeders has not been uniform across the country. States like Maharashtra and Gujarat have demonstrated significant progress, particularly in feeder segregation and solarization. These states have implemented effective management practices that can serve as a model for replication in other regions. However, several states face delays due to challenges in planning, execution, and stakeholder alignment, highlighting the need for a more coordinated approach.

2. Metering Challenges

Most agricultural feeders remain unmetered, which presents a significant challenge in measuring energy consumption, and ensuring accountability. Metering agricultural feeders is essential to monitor performance, identify inefficiencies, and implement corrective measures. Without proper data, it is difficult for Discoms to quantify the benefits of solarization or optimize resource allocation effectively.

3. Long Rural Feeders

Long rural feeders are prone to technical losses and voltage drops, which can undermine the benefits of solarization. Addressing these challenges requires targeted investments in grid infrastructure and voltage regulation mechanisms, ensuring that both urban and rural areas benefit from reliable energy supply.

4. Agrivoltaic Potential

The integration of agrivoltaics—combining agriculture and solar energy production—offers a promising solution to address the challenge of land availability for solar installations. By enabling dual use of agricultural land, agrivoltaics maximize resource utilization, providing farmers with a steady income from both crops and solar energy. Scaling up agrivoltaics can help overcome land-related bottlenecks and align with sustainable development goals.

5. Adoption of Advanced Technologies

The deployment of IoT devices, AI-driven analytics, and other advanced technologies in Discom operations has been instrumental in improving operational efficiency. These tools help optimize asset management, predict faults, and streamline service delivery. By leveraging data-driven decision-making, Discoms can significantly enhance their performance, reduce operational losses, and deliver better service to consumers.

6. Economic Viability and Cost Savings

Solarized agricultural feeders have proven to be cost-effective for Discoms, reducing dependency on conventional power sources and lowering operational costs. Farmers benefit from reliable, daytime electricity at concessional rates, which enhances agricultural productivity and reduces reliance on diesel-powered pumps. These benefits to both farmers and the utility underscore the economic viability of scaling up feeder solarization projects nationwide.

7. Consumer-Centric Initiatives

Discoms have undertaken efforts to improve consumer satisfaction by implementing digital platforms (customer portals) for interaction and feedback. These initiatives have increased transparency, enabled better grievance redressal, and empowered farmers with real-time energy usage insights. Building trust and engagement with consumers is critical to the long-term success of solarization programs.

8. Replication and Scalability

Successful models, such as those implemented in Maharashtra, showcase the potential for scaling solar feeder projects across India. However, scaling up requires addressing critical issues like land acquisition, financing, and stakeholder alignment. A collaborative approach involving government agencies, private players, and local communities is essential to replicate these successes on a national scale.

9. Impact on Grid Operations

Solarizing agricultural feeders has implications for grid stability and performance. Proper planning is required to manage the intermittent nature of solar power and ensure smooth integration into the existing grid infrastructure. Innovative solutions like energy storage and real-time grid monitoring can

mitigate potential disruptions and optimize solar energy utilization.

10. Capacity Building and Knowledge Sharing

Capacity building among Discoms and sharing best practices are critical to accelerating solarization efforts. By learning from successful implementations and adopting innovative business models, Discoms can enhance their operational capabilities. Platforms for experience sharing can drive collective progress and ensure more effective deployment of solar feeder projects across the country.

11. Maharashtra Case Study

Maharashtra has the highest agricultural electricity demand in India (~39,000 MUs annually). Agriculture accounts for 30% of the state's electricity consumption, but recovery from the sector is only 2–3%, with arrears more than INR 66,800 crores. The Government of Maharashtra launched MSKVY 1.0 in 2017 with the prime objective to provide reliable daytime supply to agricultural consumers at a reasonable tariff. It was scoped to implement solar projects for feeding agricultural feeders through a PPP model. The scheme could not yield desired outcomes, and thus its revamped version (MSKVY 2.0) was launched.

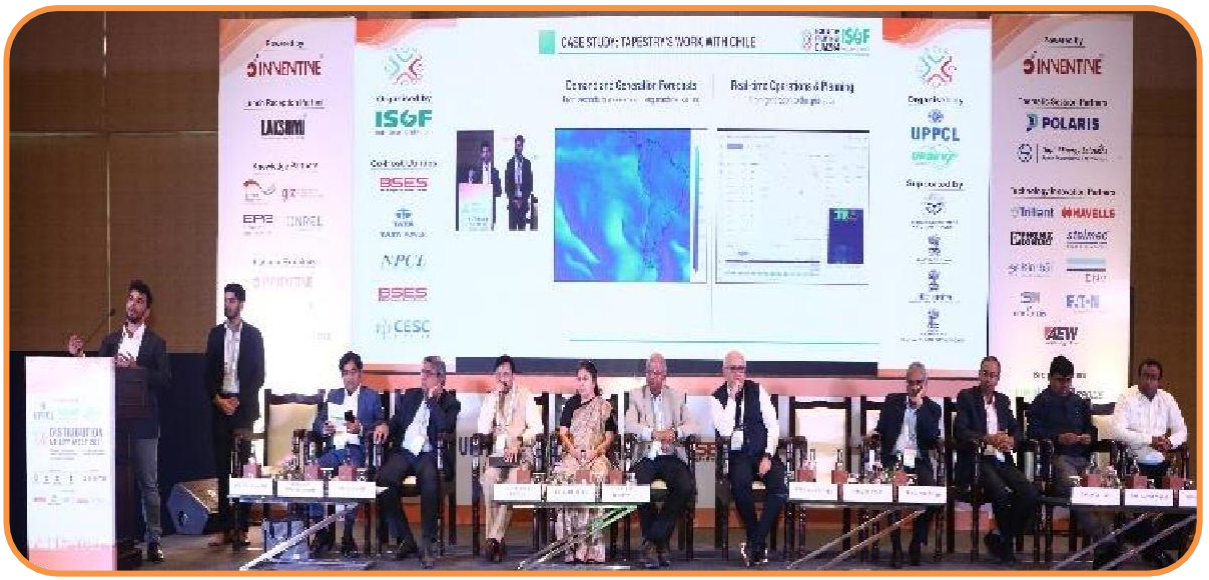
In the new scheme, chronic challenges were identified – difficulty in land acquisition, delay in grid connectivity, lack of scalability due to smaller project size, challenges in gathering critical data points related to grid substations, and delayed payments to developers. With a combination of design reengineering and process reengineering, tailored solutions were implemented for these challenges.

To address land acquisition challenges, 40,000 acres of government land was geo-tagged, and a data room was created, having critical information converged from three earlier isolated sources – the Revenue Department, Distribution Utility, and Gati Shakti Portal. This helped Solar Power Developers (SPDs) to identify suitable land parcels efficiently and in a well-informed manner. Lack of scalability was addressed by adopting a cluster-based approach for project sizing, which helped increase the project size to 200–250 MW each, thus inviting big SPDs to implement those projects. On the permissions/NoC front, the projects were expedited even further by arranging advance clearances and grid connectivity. For payment security, the SPDs were de-risked by deputing a nodal agency for extending a payment credit guarantee of ₹100 crore per GW in case the payment to the developer was delayed by more than three months.

Alongside, to streamline processes, several major steps were taken. A new transactional structure was formed by incorporating a new entity – Maha Agro Solar Company – dedicated to the solarization of the agricultural sector in the state, and further, 22 SPVs were formed district-wise. For ensuring ease of doing business, an exclusive single-window portal was created, and access to the data room was given to SPDs. The single-window portal has the capabilities to monitor the entire project end-to-end, starting from the award of work to real-time monitoring of generation. The projects were tagged with PM-KUSUM C, which helped avail 30% Central Financial Assistance. State-level support was also rolled out, wherein the land lease rate was fixed for private land with provisions for yearly increments, several other grants were given to Gram Panchayats, Distribution Utilities, and SPDs to incentivize speeding up the projects.

With all these measures, 15.2 GW of solar capacity has been awarded in a 10-month period at an average tariff of ₹3.08/kWh. This capacity equates to 88% of the agricultural demand across 27 districts in the state. In the longer term, these projects are expected to be a game-changer for all stakeholders by providing 100% daytime supply of electricity to farmers, additional income from leasing of non-fertile land, increased participation of the women workforce due to daytime availability of power, significant reduction of AT&C losses, estimated savings of ₹10,000 crores in power purchase costs, reduction of ₹4,000–5,000 crores in annual government subsidy, and several other benefits.

Video Link of the Session: https://youtu.be/DHaoCJhZg6g?si=i0rYqiy6ai6XoqgA



SESSION 3

LEVERAGING 250 MILLION SMART METERS TO DRIVE DIGITALIZATION OF DISCOMS

INTRODUCTION

This session focused on the transformative potential of digitalization in the electric utility sector. With the deployment of 250 million smart meters under the Revamped Distribution Sector Scheme (RDSS), the power utilities in India are at the forefront of this digital revolution. The session explored the integration of cutting-edge technologies, such as smart metering, digital twins, and automation systems, to enhance the operational efficiency, reliability, and customer service of Discoms. It also highlighted the strategic roadmaps required to ensure seamless adoption and implementation of these advancements, drawing on valuable lessons from global leaders in utility modernization.

PARTICIPANTS

Shri Shashank Mishra, JS - Distribution, Ministry of Power; **Shri Atul Bali**, Director, NSGM & ED Power Grid; **Shri Sanjay Banga**, President-T&D, Tata Power Company Ltd; **Shri Dwarka Srinath**, CDIO, Tata Power; **Shri Rajesh Bansal**, CIO, Inventive Software Solutions; **Shri Saahas**, COO, Polaris; **Shri Swapandeep Banerjee**, Trilliant, Inc; **Shri Saurav Shah**, Executive Director, PFC; **Shri Shambhu Kumar**, MD, PuVVNL; **Shri Yogesh Kumar**, Director-Commercial, MVVNL; **Shri Deepak Pandey**, COO, Kimbal; and **Shri Anand Budholia**, Group CIO, BSES.

KEY TAKEAWAYS

1. **Data Utilization for Digitalization**

The effective digitalization of Discoms relies heavily on robust data analytics, with smart meters serving as a primary data source. By analyzing consumption patterns, utilities can make informed decisions about demand management, optimize energy distribution, and predict potential disruptions. This data-driven approach is essential for enhancing operational efficiency and delivering customer-centric solutions.

2. **Smart Meters as Grid Essentials**

With the increasing penetration of Distributed Energy Resources (DERs) such as rooftop solar panels and Electric Vehicles (EVs), the complexity of grid management is growing. Smart meters are becoming indispensable for real-time monitoring and balancing of supply and demand. Without them, managing the grid's dynamic needs in the future will become increasingly challenging.

3. **Diverse Use Cases of Smart Meters**

Smart meters are not just tools for reducing technical and commercial losses. They enable several critical applications, such as:

- **Time of Day (ToD) and Time of Use (ToU) Tariff Schemes:** These tariff schemes promote energy usage during off-peak hours, reducing strain on the grid and offering cost savings to consumers.
- **Demand Response (DR) Programs:** Empower Discoms to incentivize consumers to reduce consumption during peak demand periods to enhance grid stability and reduce peak power purchase

cost.

- **Integration of EVs and DERs:** Facilitating seamless integration and management of new energy sources and consumption patterns.
- **Accurate Demand Forecasting:** with time-stamped meter reads of 15-minute intervals, Discoms can calculate exact demand for the following days, and this will help optimize power purchase cost considerably.

4. Smart Meters as Pillars of the Digital Grid

As the backbone of smart grids, smart meters are pivotal to the ongoing digital transformation. They provide critical data that supports predictive maintenance, real-time monitoring, and advanced analytics, making the grid more resilient and efficient. Their integration in Discoms marks a significant step toward modernizing India's power distribution network and aligning it with global best practices.

Video Link of the Session: https://youtu.be/kqYEpl-IFZA?si=5n5hS9bVHK0-QtH4

SESSION 4

EMERGING TECHNOLOGIES FOR NET ZERO POWER SECTOR

INTRODUCTION

The session explored the pivotal role of advanced technologies in achieving the Government of India's ambitious Net Zero emission target by 2070; and delved into the integration of transformative tools like AI, ML, Blockchain, Robotics, and Metaverse in optimizing power grids, improving renewable energy forecasting, and modernizing utility operations. These technologies are not only addressing current challenges in the power sector but are also laying the foundation for a more sustainable, efficient, and secure energy future.

PARTICIPANTS

Shri Pankaj Kumar, MD, UPPCL; **Smt Reena Suri**, Executive Director, ISGF; **Shri Murali Baggu**, Laboratory Program Director - Grid Integration, NREL, USA; **Shri Sumit Gupta**, CEO, AssetPlus; **Shri SK Senapati**, Head - Sales & Commercial Services, L&T PT&D Digital Energy Solutions; **Shri Lalit Jain**, Product Marketing Head – Industrial Automation, Phoenix Contact India Pvt. Ltd; **Shri Mukesh Dadhich**, Head - Business Development, Sustainability and Clean Technology, BSES Yamuna Power Limited; **Smt Tripta Thakur**, DG, NPTI; **Shri RS Selvam**, VP-Technology, Stelmec; **Shri Ayush Kumar**, CEO, Sai Computers; **Shri Sandip Sinha**, Vice President - Sales, Trilliant, Inc**;** and **Shri Anish Mandal**, Partner, Deloitte.

KEY TAKEAWAYS

1. **Transition to Digital Medium-Voltage Switchgear**

This technology is redefining power distribution by significantly improving reliability, operational efficiency, and safety in the distribution grid.

2. **IoT-Based Substation Operations**

IoT integration in substations enables real-time monitoring and control of power flows, resulting in better automation and operational optimization.

3. **Predictive Maintenance and Grid Transformation**

AI-powered predictive maintenance enhances grid reliability by minimizing outages and ensuring efficient energy usage. Real-time data from connected devices allows for proactive decision-making and improved grid stability.

4. **Innovative Technologies Driving Utility Modernization**

Blockchain based peer-to-peer (P2P) trading of solar rooftop energy opens new avenues for monetization of investments on rooftop solar systems and help build green energy communities locally. It also enhances transparency and security in energy trading. Immersive tools like VR and AR improve visualization, allowing better infrastructure management and operator training.

5. AI-Driven Solutions for Monitoring and Maintenance

Advanced tools that could leverage drone imagery and AI algorithms can detect defects and predict equipment faults. These innovations reduce downtime, improve efficiency, and lower operational costs.

6. Transforming Workforce and Skills

The adoption of emerging technologies necessitates significant upskilling of the workforce. Roles in utility operations are transforming, creating opportunities for innovation and efficiency.

Video Link of the Session: https://youtu.be/RnGlLVfYi3A?si=fL_hu0w44YP6fuAm

SESSION 6

ELECTRIC VEHICLE (EV) CHARGING INFRASTRUCTURE AND GRID INTEGRATION

INTRODUCTION

The session explored the critical role of robust and smart charging infrastructure in accelerating the adoption of electric vehicles (EVs) and contributing to India's net zero goals. With the global EV fleet projected to reach 132 million by 2027 and over 340 million by 2050, India is also advancing its EV agenda through initiatives like "Vision 2030: PM Public Transport Sewa." This ambitious program envisions the development of 600 km of electric highways and the replacement of 800,000 diesel buses with electric buses including 50,000 school buses, alongside an expansion of EV charging stations. This session delved into the planning, technological advancements in electric mobility, grid integration, and policy interventions required to drive the growth of EVs in India.

PARTICIPANTS

Shri KR Jyothilal, ACS – Energy, Kerala; **Shri Pankaj Kumar**, MD, UPPCL; **Shri Nidhi Narang**, Director - Finance, UPPCL; **Shri Hanif Qureshi**, Additional Secretary, DHI; **Shri Awadhesh Jha**, Executive Director, GLIDA INDIA and Chairperson of CPO Association of India; **Smt Isha Duhan**, MD, PVVNL; **Shri RK Singh**, Head of Business Operations - EV Charging, Tata Power Company Ltd; **Shri Praveen Rathore**, Regional Manager-Power Distribution, Eaton India; and **Shri Arjun Sinha Roy**, Co-Founder and CEO, Iraseus.

KEY TAKEAWAYS

1. **Strategic Planning for EV Charging Infrastructure**

The rapid growth of EVs necessitates meticulous planning to establish a widespread and efficient charging network. Collaboration among stakeholders—Discoms, STUs, Municipalities/Corporations, private players, and policymakers—is vital for achieving strategic land allocation, funding, and grid integration.

2. **Technological Innovations to Drive Scalability**

Cutting-edge technologies like MW-scale chargers, wireless charging systems, and ultra-fast charging will play a pivotal role in meeting the demand of both private and public EVs. Battery swapping and drone charging solutions are expected to grow faster soon.

3. **Grid Preparedness for EV Integration**

The growing EV fleet places immense pressure on the grid, making its readiness critical. Strategies like grid upgrades, demand-side management, and advanced vehicle-grid integration models (V1G, V2G, VPPs) are essential to ensure stability and reliability.

4. Enabling Policy and Regulatory Support

Uniform power connection rules and state-specific EV targets are crucial for streamlining EV adoption across India. While LT connections up to 200 kW are given in Delhi, most states have limited the capacity of LT connections below 100 kW. This needs to be reviewed and standardized across the country. Special EV tariffs and regulatory frameworks tailored to urban infrastructure challenges will further accelerate growth in this sector.

5. Public-Private Collaboration

A robust charging infrastructure requires synergized efforts between public and private stakeholders to ensure financial viability, operational efficiency, and consumer satisfaction. Sustainable business models must incorporate private investment, innovative revenue streams, and government incentives.

6. UPREV Model

UP Government has launched a dedicated agency UP Renewable Energy and EV Infrastructure Ltd (UPREV) as a wholly owned subsidiary of UP Power Corporation Ltd. UPREV mandate is to create appropriate EV charging infrastructure in the state on fast track. This could be a model worth emulating in other states.

Video Link of the Session: https://www.youtube.com/watch?v=8CoESHC8Ndc

SESSION 7

RE, EV AND GRID STABILITY AND CHALLENGES OF 10 MILLION ROOFTOP SOLAR PV SYSTEMS

INTRODUCTION

Session highlighted the transformative developments in India's energy landscape as it progresses toward its Net Zero by 2070 goal. Central to this transformation is the rapid adoption of renewable energy (RE) resources and electric vehicles (EVs). This session addressed the challenges and opportunities presented by integrating these technologies into the grid, focusing on their impact on demand and stability. Discussions also explored advancements in grid management, the role of battery energy storage systems (BESS), peer-to- peer (P2P) energy trading, and strategies to manage the growing share of rooftop PV systems under the ambitious PM Surya Ghar Muft Bijli Yojana.

PARTICIPANTS

Shri Ravi Seethapathy, Advisor, ISGF; **Shri Kuldeep Sharma**, Head - RE and Discoms, GIZ; **Shri Anupam Shukla**, MD, UPNEDA; **Shri Murali Baggu**, Laboratory Program Director - Grid Integration, NREL, USA; **Smt Reena Suri**, Executive Director, ISGF; **Shri Eckehard Troster**, CEO, Energynautics, Germany; **Shri Samuel Paul N**, MD, KESCO, UP; **Shri RJ Vala**, CE - Distribution, PGVCL, Gujarat; **Shri Shivram Bikkina**, Tata Power Company Ltd; **Shri BB Mehta**, Director, SLDC, Odisha; **Shri Dhananjay R Aundekar**, ED, MSEDCL, Maharashtra; **Shri SK Senapati**, Head - Sales & Commercial Services, L&T PT&D Digital Energy Solutions; and **Shri Zakir Rather**, IIT Mumbai.

KEY TAKEAWAYS

1. **Rooftop PV Systems and Grid Challenges**

- The unique characteristics of individual feeders (load, phase imbalance, PV generation capacity) make it difficult to generalize grid impacts.
- Single-phase rooftop PV systems exacerbate phase imbalances, making three-phase systems with limited reverse power injection a safer option.
- Discoms need to conduct comprehensive feeder hosting capacity studies before scaling up rooftop PV adoption.

2. **The Role of Smart Inverters**

- Smart inverters with VAR compensation are essential for managing voltage at the Point of Common Coupling (PCC).
- Inverters operating at unity power factor are inadequate for effective voltage control, underscoring the need to adopt IEEE-1547: 2018 standards across utilities. Bureau of Indian Standards (BIS) has recently adopted IEEE 1547 – 2018 standards and issued as IS: 18968 -2025. Regulators and Discoms should make smart inverters mandatory for all new rooftop PV systems.

3. **BESS Integration and Business Models**

- Battery storage systems enhance grid resilience by providing flexibility and backup power.
- Innovative business models, such as leasing or co-ownership arrangements, can incentivize customer adoption of BESS.
- For large buildings and campuses, BESS may be made mandatory for stand-by power instead of DG sets.

4. **Digital Tools for DER Management**

- AI/ML-powered tools, IoT devices, and analytics platforms are critical for optimizing the integration of distributed energy resources (DERs).
- A national registry of rooftop PV systems has been prepared by ISGF, and the registry is now live – www.indiaderregistry.in
- Discoms should work with ISGF to upload the data of existing rooftop PV systems in the registry as well as make certain changes in the data captured for each rooftop PV connections by incorporating the feeder and distribution transformer (DT) details so that all future rooftop PV connections can be easily integrated with the registry through APIs.

5. **Vehicle-to-Grid (V2G) and Virtual Power Plants (VPPs)**

- V2G technologies enable bidirectional power flow, facilitating grid balancing and maximizing rooftop PV utilization.
- Pilot projects have demonstrated the feasibility of V2G systems; however, regulatory and infrastructural challenges must be addressed for large-scale adoption.

6. **Standardization and Policy Recommendations**

- Mandating smart inverters conforming to IS: 18968-2025 (IEEE 1547:2018) standards through regulatory guidelines can significantly enhance DER integration.
- One of the popular communication standards for EV charging is Open Charge Point Protocol (OCPP) which is adopted by all OEMs in India. OCPP 2.0.1 has been adopted as an IEC standard (IEC 63584 – 2024); and BIS should adopt this as an Indian Standard on fast track.
- Policymakers should focus on flexible and scalable frameworks to accommodate diverse local grid conditions and promote innovation.

7. **Peer to Peer (P2P) Transactions of Rooftop Solar Energy**

Three states (UP, Delhi and Karnataka) have issued regulations for P2P transactions of rooftop solar energy. Successful pilot projects on P2P transactions of rooftop solar on blockchain platforms were executed in the recent past in UP, Delhi and Kolkata by ISGF. This may be promoted across the country which will create local clean energy communities and help scale up rooftop solar.

Video Link of the Session: https://youtu.be/q84kShIZZ4A?si=-IcYyzMzsSeZmans


DISTRIBUTION UTILITY MEET
DUM 2024
8th Annual Conference of Power Distribution Utilities for Collaborative Growth
14 - 15 November 2024
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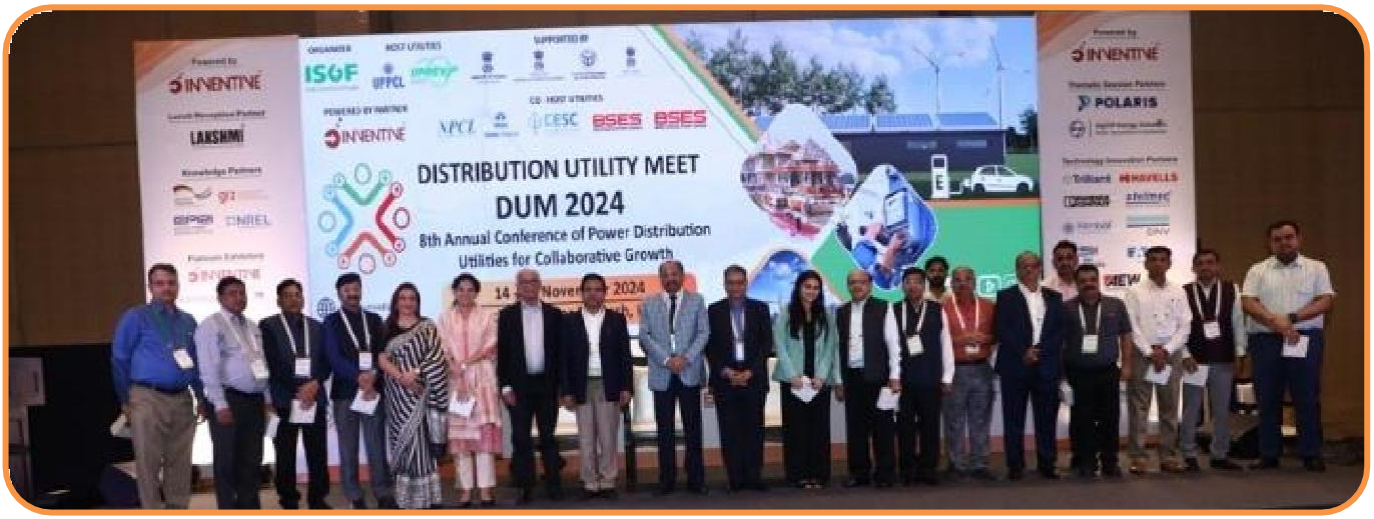
VALEDICTORY SESSION

1. During the Valedictory Session all key stakeholders were felicitated and recognized their valuable support for making DUM 2024 a very successful event
2. The key takeaways listed above were summarized in the valedictory session
3. Date and venue of DUM 2025 was announced. **DUM 2025 will be held on 06-07 November 2025 in Mumbai co- hosted by MSEDCL and Tata Power Company Ltd**



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Pashchimanchal Vidyut Vitran Nigam Limited

UP Power Transmission Corporation Limited

Purvanchal Vidyut Vitaran Nigam Limited

Kanpur Electricity Supply Company Limited

Dakshinanchal Vidyut Vitran Nigam Ltd

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TATA POWER-DDL

TPSODL
TP SOUTHERN ODISHA DISTRIBUTION LIMITED

TPWODL
TP WESTERN ODISHA DISTRIBUTION LIMITED

TPNODL
TP NORTHERN ODISHA DISTRIBUTION LIMITED

TPCODL
TP CENTRAL ODISHA DISTRIBUTION LIMITED

torrent POWER

MAHAVITARAN

BSES
BSES Rajdhani Power Limited

BSES
BSES Yamuna Power Limited

KSEB

adani
Electricity

NPCL
NOIDA POWER COMPANY LIMITED

Assam Power Distribution Company Limited

PGVCL

UGVCL

MGVCL

GUVNL

CESC LIMITED

CESC
RAJASTHAN

उत्तराखण्ड पावर कारपोरेशन लि०

WBSEDCL

PDD
Power Development Department, Government of Jammu and Kashmir

Jaipur Vidyut Vitran Nigam Limited

CIN No. U40109MP2002SGC015121
Madhya Pradesh Paschim Kshetra Vidyut Vitran Company Limited

Jharkhand Bijli Vitran Nigam Limited

Electricity Department, Government of Goa

Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company Limited

SB
South Bihar Power Distribution Company Limited

ISGF
India Smart Grid Forum

DISTRIBUTION UTILITY MEET
DUM 2024

India Smart Grid Forum
CBIP Building, Malcha Marg, Chanakyapuri, New Delhi
Team@indiasmartgrid.org | +91-11-41030398

@Distribution Utility Meet

@India Smart Grid Forum