

INTERVIEW

• What have been POSOCO's biggest achievements in the last few years?

Indian energy system is undergoing a transition towards clean energy. The challenges presented by growth of utility-scale solar and wind power, distributed rooftop solar, electric vehicles and battery storage system in the grid call for innovative solutions. It is necessary that the rules and governing institutions of the system adapt and evolve to support and enable this energy transition. POSOCO has been working in several areas to ensure that our electricity grid remains reliable even as we embrace solutions supporting the clean energy transition as well as economic operation.

One of the key achievements has been the introduction of frequency control through reserves and ancillary services to enhance operational security & reliability. Commissioning of Automatic Generation Control (AGC) facilities in the Indian electricity grid for the first time involved lot of technical preparations and coordination with the power plants and the Central Transmission Utility (CTU). There has been emphasis on flexibility in operations in terms of generation,

transmission, distribution and markets side.

Earlier, the introduction of Security Constrained Economic Despatch (SCED) with effect from 1st April 2019 has enabled optimization-based paradigm for system operations. More than ₹ 2000 crores has been saved over a period of



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three (3) years due to SCED. The refinements in imbalance pricing with market linkages has been key to imbalance management. The Real Time Market (RTM) introduced with effect from 1st June 2020 in the midst of the COVID pandemic has been a significant achievement. Integrated web-based energy scheduling pan-India & gate closure has enabled fast data transfer and visibility for operations in 15-minute time-block basis.

There is state-of-the-art SCADA/EMS in the control rooms and situational awareness on the renewables through Renewable Energy Management Centres pan-India. Synchrophasor technology deployment and application has given deep insights in the post-despatch analysis and ensuring grid resilience. National Open Access Registry as digital platform for pan-India electricity market has been operationalized with effect from 1st May 2020. Data, controls and automation has enabled big data analytics and visualizations for better system operations. Sustainability through renewable energy certificates & energy efficiency certificates is being promoted towards decarbonisation of the Indian economy.

• Government of India is giving a lot of emphasis to clean energy transition. What are the steps required to prepare the electricity grid for 500 GW of renewables by 2030?

The ground for electricity grid operations in 2030 needs to be prepared through several initiatives taken by different stakeholders. The Technical Standards for Grid Connectivity for the new Inverter Based Resources (IBRs) getting

connected to the grid need to be reviewed and updated quickly. These need to be extended to several new devices such as Energy Storage Systems and electrolyzers for green hydrogen. Transmission planning is another important area which needs to factor the diurnal and seasonal power flow pattern as we add more wind and solar into the system. Energy Storage also needs to be integrated into the transmission plans besides adoption of flexible and newer technologies like High Voltage Direct Current (HVDC), Flexible Alternating Current Transmission System or FACTS devices, synchronous condensers etc. The transmission planning process should also factor the reduction in inertia as conventional generating units are replaced by wind, solar and energy storage and suggest the solutions to mitigate the same.

Resource Adequacy (RA) exercises at DISCOM, state, regional and national level would become important considering the wind and solar generation, fuel supply related uncertainties and extreme weather conditions. RA is no longer a problem of meeting the peak demand; it would require adequate quantum of flexible generating resources to meet the load safely for each of the 8760 hours in a year and ensuring adequate reserves in the system.

On the operational front, ensuring adequate operational reserves for frequency control and voltage control is essential. Ancillary

Services Market covering frequency control and introduction of Voltage Control Ancillary Services (VCAS) would be essential. Wind, solar and energy storage devices as well as electrolyzers for green hydrogen should all be capable of providing these ancillary services too. Going forward, demand response and Distributed Energy Resources (DERs) would also play a key role in ancillary services. Operational planning would also need to encompass ElectroMagnetic Transient (EMT) models in addition to the Root Mean Square or RMS model used for simulations.

In real time operation, Visualization and Situational Awareness in control rooms at Load Despatch Centres would become important for which the necessary hardware and software need to be in place. Ensuring cyber security of such Critical Information Infrastructure would also be a key challenge for which the necessary infrastructure and trained personnel need to be in place.

While emphasis has been placed on building reliable systems through incorporating several redundancies, even a well built system could fail. There are a number of extreme weather events taking place as well as other Low Probability High Impact incidents. In all such cases resilience or how quickly the systems come back to normalcy becomes important and therefore building resilient systems is important for handling the grid of 2030.

- **With the advent of renewables, climate change induced events, integration of new market players and fast pace growth, what are the biggest issues and challenges in Indian grid operations?**

The areas meriting attention have been covered above. We are moving away from despatchable resources to a much more variable fleet, a much greater dependence on Mother Nature and inverter-based resources. It is not easy, but we are moving quickly and learning a lot. The next few years will be a period of profound innovation.

The next big transformation we are going to see is what a significantly scaled up storage battery fleet can do for us. We are going to have 500 MW/1000 MWh Standalone Battery Energy Storage Systems (BESS) in India. A first-of-its-kind tender in the country, it will provide Discoms with storage facilities to be used on an "on-demand" basis. Out of the 60% capacity off taken by SECI, 30% will be earmarked to be used by NLDC, POSOCO for Grid Ancillary Services. The tender marks the first tranche of the Government of India's immediate target of setting up 4000 MWh of Battery Storage Capacity pilots as part of achieving increased penetration of RE in the national grid.

The original definition of 'peak' has changed, especially during summers: that typical peak, which would historically be around 6 PM, has migrated earlier into the afternoon, around 3 PM. Agriculture load is increasingly getting shifted to the solar hours. Space cooling or air-conditioning load increase has led to a situation where during summers, the night load from 10 pm to 3 am becomes a challenge to meet (as solar generation is nil). So anticipating the future load shape would be a key challenge and ensuring adequate flexible resources to handle this load shape.

- **What are the key focus areas and top priorities of POSOCO for the coming years?**

As India gears up to enhance its non-fossil fuel capacity to 500 GW by 2030, key focus areas and top priorities of POSOCO is to have sufficient resource adequacy and have enough flexibility to manage this high RE penetration scenario efficiently. The framework for assessment, quantification and dispatch of reserves along with Security Constrained Unit Commitment is under progress.

India, due to its geographic location and diverse topography, is encountering the increasing magnitude and frequency of 'High Impact Low Probability' events such as storms, floods, cyclones, heat

waves, cold snaps, earthquakes, landslides, silt in rivers etc. which challenge the grid resiliency and power system operations.

In the coming years, POSOCO system operators also need to enhance and upgrade their skills focused on system security, reliability, resilience through resource adequacy, network modelling and simulation studies, forecasting, assessment and deployment of reserves and optimization. Their mind-set and skill set has to take into account the integration of new players such as electric vehicles, storage, green hydrogen, Distribution System Operators (DSOs). The skills in the digital infrastructure, cyber security and way of work scalable with interoperable information and communication systems, Artificial Intelligence has to be emphasized in the coming years.

- **What is your medium to long term outlook for the power sector?**

Strong economic growth, combined with climate events, boosted global electricity demand which placed exceptional demands on electricity markets around the world. The fast rebound in overall energy demand strained supply chains for coal and natural gas, which is pushing up wholesale electricity prices. Energy & capacity procurement with physical and financial market structures in various time horizons has to be evolved.

There had been a lukewarm response by many of the DISCOMs in terms of signing Power Purchase Agreements (PPAs) for new wind and solar projects. This would change as Resource Adequacy (RA) assumes centre stage. An equally interesting development would be the adoption of Renewable Energy (RE) by the Commercial and Industrial (C&I) consumers. State Electricity Regulatory Commissions (SERCs) like Maharashtra have already announced a green tariff whereby consumers could migrate to this tariff by paying a small premium to the DISCOMs. This space holds lot of potential. In addition the Green Open Access Rules recently notified by the Government of India should also give a push to Renewable Energy (RE).

On the Distributed Energy resources (DERs) we have been a little slow as compared to other parts of the world. This would change as we have more roof top solar and Energy Storage devices at the consumer level (Behind The Meter). These should be accessible to Load Despatch Centres for Demand Response through aggregators, a new set of players that the electricity market would see.

We are going to see profound innovation in generation, transmission and distribution technologies over the next 10-20 years – stuff we can't even imagine today. Expansion of regional footprint with cross border trade

through initiatives such as OSOWOG, BIMSTEC, BBIN etc. would gain prominence. Digital infrastructure, cyber security & way of work scalable with interoperable information & communication systems would need to be developed. Modernization of control centres with artificial intelligence tools and maximization of system performance is also important. Risk-based probabilistic transmission planning processes and criteria along with non-wires alternatives has to be evolved. Offshore wind and hybrid renewables (wind-solar, wind-solar-storage etc.) would have to be seamlessly integrated in to the grid operations.

Last but not the least, Energy Efficiency and Energy Conservation (EC) would become centre stage. Hitherto, a less glamorous cousin in the decarbonization objective, this sector would grow in importance as the world realises that we just can't keep satisfying the world energy demand.

- **What skills in the work force are required to meet the previous mentioned challenges?**

In the coming years POSOCO system operators would need to enhance and upgrade their skills focussed on system security, reliability, resilience through resource adequacy, network modeling and simulation studies, forecasting, assessment and deployment of reserves and optimization. POSOCO would work towards enhancing transparency,

stakeholder coordination and collaboration with the academia. POSOCO's internal policies would focus on talent management, empowering our system operators and keeping them motivated to meet the growing stakeholder expectations.

The mindset and skill-set has to take into account the integration of new actors such as electric vehicles, storage, green hydrogen, Distribution System Operators (DSOs). The skills in the digital infrastructure, cyber security & way of work scalable with interoperable information & communication systems has to be emphasized in the "new normal". Modernization of control centres with artificial intelligence tools and maximization of system performance is one of the key areas to ensure efficient system operations.

It is and will become even more important to be able to self-study, perform in-depth analysis, learn and adapt fast and be able to work in multi-domain projects. Sound knowledge of Machine learning, AI will play a key role in enabling our employees against future challenges because as RE penetration increases, maintain supply-demand balance will pose a major challenge and I think then the knowledge of Artificial Intelligence will enable us in taking Grid Operations to the next level.

Further, the millennials and Gen Z represent the largest section of the workforce at POSOCO as the average

age of the workforce in POSOCO is around 36 years. Millennials and Gen Z bring higher energy, fresh perspective, spectrum of novel opportunities for organization. They are very agile, competitive and thrive to push themselves beyond limits.

The numerous benefits that Millennials brings comes with its own share of challenges of constantly providing them with challenging jobs that align their professional capabilities, career growth perspective and ethical values. They aggressively seek for progressive work culture, competitive compensation, opportunities to upskill, meaningful engagement and greater exposure.

Having grown up with technology surrounding their lives, they look forward to continuous technological and infrastructural upgradations and also prefer flexible work schedules to have all-inclusive life which is a challenge to suffice and balance with the task as crucial as of managing grid operations that require 24*7 of alert monitoring. The concept of life time employment is old school for them as they keep on seeking the career advancement opportunities and retaining them and keeping them interested in the job is also a challenge. We are fortunate that due to our unique business model, POSOCO is amongst the preferred and sought-after employers in the sector.