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SMART GRIDS IN INDIA: A REALITY CHECK

"Overall impact of COVID-19 on electric utilities would be faster digitalisation"

We believe that the post COVID-19 recovery plans in most countries will have clean energy and clean transportation as central themes.

Reji Kumar Pillai, President - India Smart Grid Forum and Chairman – Global Smart Grid Federation

India Smart Grid Forum (ISGF) is a public private partnership initiative of Ministry of Power (MoP), Government of India for accelerated development of smart grid technologies in the Indian power sector. In an interview with Subhajit Roy, ISGF's President Reji Kumar Pillai explains the plethora of reasons as to why distribution utilities in India continue to incur high aggregate technical and commercial (AT&C) losses. He also examined the progress made so far in the smart grids space under National Smart Grid Mission (NSGM).

Though India has made significant investment in implementation of smart grid infrastructure, it continues to make huge AT&C losses. What may be the reason?

During the last 15 years we have brought down the AT&C losses by over 50 percent. In 2005, AT&C losses were above 36 percent and presently it is around 17.5 percent nationally. However, there are several states with AT&C losses above 25 percent. The main reasons are very long 11kV and 33kV lines, overloaded low voltage lines and distribution transformers (DT). In most cases the DTs are overloaded due to phase-imbalance and the DISCOM gets to know it only when it catches fire. We have been advising them to conduct thermo-scanning survey on all DTs before summer every year and the DISCOMs who have done that have significantly reduced their DT failures. Smart metering if implemented properly could give accurate data on over-loading and phase imbalances on the distribution network that could then be corrected. So in our view, more than half of the AT&C losses are technical losses which can be addressed with proper studies and minimum investments. Smart grid investment we have made is primarily in the transmission sector and in the urban areas in distribution sector. Semi-urban and rural distribution networks require attention and investments.

How do you assess the progress made so far in the smart grids space under NSGM?

The 14 smart grid pilot projects allotted by Ministry of Power in 2013 offered 50 percent grant whereas the NSGM projects offered only 30 percent grant. As a result, DISCOMs were not very enthusiastic in taking up large projects under NSGM. Another reason for poor response from DISCOMs was their own capacity issues as most DISCOMs were struggling with several other programs such as DDUGVY, IPDS and SAUBHAGYA. All these programs involved commitment of huge manpower from the DISCOMs. Frequent changes in management (read CMD/MD/Principal Secretary) in DISCOMs and states delays decision making process. Some NSGM projects like the smart metering in Chandigarh are progressing well. In the meantime NSGM has developed a smart grid technology demonstration centre in Manesar, Haryana. Also NSGM is expected to play an important role in the rollout of 250 million smart meters.

What needs to be done to get the best out of smart grid infrastructure?

The grid in the next decade will be very different than the present-day grids in most parts of the world. Clean energy from solar and wind which could be stored cheaply and transported as well will very much be a possibility. Digitalisation is expected to play a pivotal role in grid balancing with higher share of renewable energy. Post COVID-19, the digitalisation drive in the utilities is going to be faster and would cover full utility operations. First and foremost, the utilities must have a smart grid or transformation roadmap of 10-15 years. The roadmap must be approved by the utility's board and the respective regulator. Despite changes in state governments and utility's management, the roadmap must be implemented. The roadmap should be reviewed every 3-5 years

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and changes may be incorporated as the utility moves ahead.

In any new technology, the key is proper training of the employees and also engagement with the customers. This is an often neglected area and ISGF has been advocating that minimum 5 percent of the cost of technology related projects must be provisioned for training and capacity building. Also the trained personnel must be retained in the same department for 5-7 years despite promotions till next line officers are trained. Another approach could be engaging technology partners and procure new technologies and solutions as a service. In this case the responsibility for maintaining the complex technologies will be with the technology partner. Such agencies should be treated as a long-term business partners, not as a typical "contractors" – this require a huge cultural shift in the utilities in dealing with matured technology companies rather than small time vendors. Engagement with customers is equally important and should make them understand about the advantages of the new systems and how best they should use the new technologies to save time and money.

Could you name some of the noteworthy ongoing smart grid projects in India that will transform the energy ecosystem?

Several projects executed at transmission level by Power Grid Corporation (PGCIL), POSOCO and many state transmission companies are state of the art technology projects that have made our high voltage grid better than most developed countries. We have seen how brilliantly the grid was managed on 05 April 2020 at 9pm when the whole country turned-off their lights for 9 minutes – there was a fluctuation of about 32 GW during that 15-20 minutes that the grid could handle without any issues, which proved that the Indian grid is very flexible to the tune of 25-30 percent! No other country could practically demonstrate this level of flexibility so far – kudos to POSOCO and all the State Load Dispatch Centres! In June 2020, Central Electricity Regulatory Commission (CERC) launched the Real-Time Markets (RTM) in India which allows generators, buyers and traders to engage in real-time trade of electricity and this market segment has taken-off very well. Presently, Ministry of Power is planning to launch a mega program of 250 million smart meters in the country. This will be a great initiative that will catapult our DISCOMs to the digital era. National merit order dispatch system being introduced and bringing the shutter closing time to 5 minutes from 15 minutes are very bold steps to develop a power

market in line with international best practices. The latest guidelines issued by CERC on procurement of Round the Clock (RTC) power from Grid Connected Renewable Energy Projects is first-of-a kind in the world.

How far India has achieved in the area of smart grids and renewable energy integration?

On the renewable front India has done outstanding work. We have already installed about 87 GW of renewable energy and these assets are being utilised efficiently. The share of renewables is already 24 percent in terms of capacity and 8 percent in terms of energy. The Renewable Energy Management Centres (REMC) commissioned in India last year are equipped with best in class systems to forecast solar and wind energy generation. The REMCs will help in forecasting, scheduling and dispatching of renewable energy efficiently. While the integration of large solar and wind farms with high voltage grid is being handled well, there are issues with respect to rooftop PV and other small size renewable resources connected to the distribution grid. This area requires attention. Last year ISGF prepared the "Energy Storage Roadmap for India: 2019-2032" in which we estimated the requirement of about 10 GWh of battery energy storage to integrate the 40 GW rooftop PV that is planned in the 175 GW RE target by 2022. This area requires detailed studies and preparations so that the distribution grid (medium voltage and low voltage) where rooftop PV and also electric vehicles would be connected is maintained with stable voltage and frequency.

Do you see any impact of COVID-19 on EV adoption in India?

Overall impact of COVID-19 on electric utilities would be faster digitalisation. ISGF has been advocating for smart metering and other digitalisation initiatives since 2012. Presently less than 1 percent of the electricity customers have smart meters in India. Rest all of them are issued bills with estimated consumption in the last 3-4 months. There are complaints from all around the country on inflated bills. So this crisis will ultimately push smart metering in India. The air quality in our cities, particularly in Delhi is the poorest in the world and we used to think that it would take years to improve the air quality. However, during the lockdown we have seen that within 2 weeks the air quality had improved – in Delhi the PM 2.5 levels came down from above 400 to well below 100! So now everybody is convinced that if vehicles are out of the road, the air quality in our cities can be improved. This is going to drive adoption of EVs in a big way – the simple belief that EVs could reduce pollution. We believe that the post COVID-19 recovery plans in most countries will have clean energy and clean transportation as central themes.

ISGF's current focus areas

(i) **Time of Use Tariff (ToU) Framework in Gujarat:** ISGF is preparing a Time of Use (ToU) or real time pricing framework for electricity in Gujarat which is supported through a grant from Shakti Sustainable Energy Foundation (SSEF) and executing this project in partnership with Florence School of Regulation (FSR).

(ii) **EV Charging Station Planning Studies in Bangalore City:** ISGF is conducting detailed planning studies for BESCOM for rollout of 162 EV charging stations in Bangalore City. In many cases there is a need for upgrading the distribution network to accommodate EV charging stations, particularly on feeders with rooftop PV.

(iii) **Peer to Peer Trading of Electricity from Rooftop PV:** ISGF is setting up a Peer-to-Peer (P2P) Energy Trading Platform on Blockchain for buying and selling of rooftop solar power amongst customers in Uttar Pradesh. All these are first of its kind projects in India. ISGF also assisted West Bengal Transport Corporation (WBTC) for successful rollout of 80 electric buses under FAME-I program which is the most successful electric bus rollout in the country. WBTC received C40 award last year and was also cited in the latest IEA report on EV outlook.

In 2019, ISGF published the Energy Storage System Roadmap for India which was prepared in coordination with NITI Aayog, Ministry of Power, Ministry of New and Renewable Energy and Central Electricity Authority. This project was supported through a grant from Mac Arthur Foundation and we undertook this in collaboration with India Energy Storage Alliance (IESA). ISGF also prepared the smart grid roadmap for PT.PLN, the state-owned electric utility in Indonesia which is world's second largest electric utility (after State Grid Corporation of China) with installed generation capacity of 61 GW and 72 million customers. ISGF has completed that assignment in collaboration with the Universitas Indonesia and PJCI, the smart grid association in Indonesia. The roadmap has been approved by PT.PLN.