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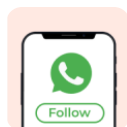
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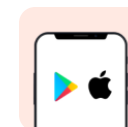
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# Why Advanced Metering Infrastructure is crucial for India to achieve energy transition goals

AMI not only improves the operational efficiency of Discoms by enabling remote access to meter data but also makes consumers responsive to system requirements.



R Rajiv Ranjan Mishra, • ETEnergyWorld

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India's goal of achieving 500 GW RE capacity addition by 2030 and becoming a net zero economy by 2070 poses some challenges for the power sector pertaining to efficient management of the grid. Firstly, increased RE penetration increases grid intermittency, which calls for large and flexible reserves for grid balancing. Secondly, during evening and night hours, when there is no solar power generation, the dependency on thermal power points to a need for adding new thermal generation capacity to meet the country's ever-increasing power demand. Moreover, as some of the thermal power stations are operated at technical minimum during the daytime to ensure availability during evening and night hours, it ends up being a suboptimal solution with higher coal consumption and emissions, and higher cost of generation. Meanwhile, the challenges related to the higher ramping-up and ramping-down requirements during morning and evening hours keeps the system operator on tenterhooks.

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Against this backdrop, the implementation of Advanced Metering Infrastructure (AMI) gains paramount importance. AMI not only improves the operational efficiency of Discoms by enabling remote access to meter data but also makes consumers responsive to system requirements. Through the mechanism of suitable incentives or disincentives, Discoms can influence power consumption and align it as per the requirements of the system and the grid. Demand-side measures such as Time-of-Day tariffs can be offered to the consumers for incentivizing them to shift their load to daytime. Such load-shifting will make the load curve flatter; defer the capital expenditure required for new generation and transmission capacity; avoid costly power procurement from the wholesale market; reduce overall emissions; and

reduce the ramping-up and ramping-down problem in morning and evening hours. It will lead to increased consumption of green power and, to an extent, reduce our dependence on fossil-based power as well as the need for costly storage capacity.

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Additionally, Discoms can leverage AMI to provide pricing signals and get 'demand response' from consumers on a real-time basis, which will enable them (Discoms) to meet the uncertainties associated with RE sources. It will provide the desired flexibility in the system and resilience in the grid. Large C&I consumers can leverage AMI to provide ancillary reserve services and demand response services through a market-based mechanism in a cost-effective manner.

Besides giving power over the monitoring and analyzing of consumption data, AMI can open many other possibilities. It will enable the implementation of prepaid metering, which, in turn, will improve energy

efficiency and cash flows for Discoms. It will enable Discoms to plan power procurement efficiently, along with other system-related developments. AMI will help in integrating distributed energy sources, such as rooftop solar, microgrids, and others, through gross or net metering. It will promote behind-the-meter solutions such as rooftop solar and battery storage, thus reducing the pressure on the grid.

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AMI will enable large-scale integration of electric vehicles (EVs) into the system by facilitating bidirectional flow of energy from Grid-to-Vehicle (G2V) and Vehicle-to-Grid (V2G), depending on the grid situation. It will also bring the intermediaries, or ‘aggregators’, into play. The aggregators

will be able to pool consumers and provide services such as demand response, grid balancing, etc., more effectively. Aggregators can also participate in the spot market on behalf of consumers, thus deepening the market while offering a market-linked competitive price to consumers.

AMI was initially and primarily intended to improve the billing efficiency of Discoms. However, with advancements in communication technologies and data analytics, the potential applications of AMI have grown manifold. Today, Discoms can use AMI to monitor consumption data in real time and accordingly take measures for effectively managing load, power procurement, asset utilization, and system development. In the years ahead, AMI will be the one of the key pillars atop which smart grids and smart cities will be built.

From the consumers' perspective, AMI will empower them to monitor their consumption and manage it efficiently – all through a mobile application. This will not only reduce energy bills but also improve energy efficiency overall. In the years ahead, we might even see consumers leveraging AMI, IoT devices, and intelligent technologies to develop innovative behind-the-meter solutions that support grid operations. The implementation of AMI is thus not only a win-win proposition for Discoms and consumers but also a crucial step towards

the adoption of new technologies and business models that will eventually support India's energy transition goals. Smart meter installation in developed economies such as the US and Europe is already around 80 percent, enabling their load-serving entities to provide new services to consumers while achieving demand-side flexibility and higher RE integration.

In view of the significance of AMI, the Ministry of Power of the Government of India has taken various measures for implementing it across the country. The Ministry of Power has been pushing for the installation of smart meters through various schemes such as Deendayal Upadhyay Gram Jyoti Yojana (DDUGY), Integrated Power Development Scheme (IPDS), Smart Meter National Program (SMNP), and the National Smart Grid Mission (NSGM). In 2021, the Ministry of Power announced the Revamped Distribution Sector Scheme (RDSS) for facilitating the installation of prepaid smart meter along with associated AMI and system metering at the feeder and the distribution transformer levels. The scheme has an outlay of INR 3.3 lakh crores, targeting the installation of 25 crore smart meters across the country by March 2025 through the public-private partnership (PPP) mode. The smart meter rollout proposed under this scheme envisages the appointment of an AMI Service Provider (AMISP) who will implement the AMI system and maintain it for 10

years against a monthly fee per meter. As per the NSGM dashboard, around 22.23 crore smart meters have been sanctioned till date, of which 8.71 crore have been awarded and 73.58 lakh have been deployed. Some states, including Bihar, UP, Haryana, Assam, and Rajasthan, have taken the lead in smart meter installation and have witnessed noticeable improvements in billing efficiency and revenue collection. It is estimated that the additional cost expected to be incurred for implementing AMI can be met from the improved revenue resulting from capturing accurate consumption data.

Due to the initial success and constant nudging by the Ministry of Power, the installation of smart meters has gained momentum during the past three years, with around 16 lakhs smart meters being installed annually. However, it is still low in comparison to the targets to be achieved. To achieve the target of installing 25 crore meters by March 2025, around 1.5 crore meters need to be installed on a monthly basis (or 5 lakh meters per day). This is a very tall order.

Rapid and widespread installation of AMI calls for effective project management and collaboration amongst various stakeholders. Measures such as adopting a standardized approach to bidding and contracting with AMISPs; bringing clarity on SLAs; constituting a Project Management Unit – comprising representatives from the AMISP, the

Discom, and local administration – after awarding the contract; ensuring monitoring by the highest authority at least at the level of State Power Secretary; building the capacity of Discoms and State Load Dispatch Centers; and creating consumer awareness, should be considered for smooth and rapid implementation AMI.

With regards to the data privacy and security concerns associated with AMI, the enactment of The Digital Personal Data Protection Act 2023 has come as a timely intervention that provides a legal framework for addressing all concerns. Meanwhile, issues related to cybersecurity can be handled effectively by strictly adhering to the latest cybersecurity guidelines issued by Indian Computer Emergency Team (CERT-In).

**[This piece was written exclusively for ETEnergyworld by Rajiv Ranjan Mishra, MD Apraava Energy]**

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