

**India Smart Grid Market Assessment, By Network Area [Home Area Network (HAN), Neighbourhood Area Network (NAN), Wide Area Network (WAN), and Long Range Wide Area Network (LoRaWAN)], By Components [Hardware and Software], By Applications [Distribution Automation, Conservation Voltage Reduction (CVR), Substation Automation, and Advanced Metering Infrastructure (AMI)], By End-user [Residential, Commercial, Industrial, and Transportation], By Region, Opportunities, and Forecast, FY2017-FY2031**

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**Report description:**

India has been experiencing significant advancements in its smart grid sector. The India Smart Grid market is projected to reach USD 10.53 billion by FY2031 from USD 4.87 billion in FY2023 with a CAGR of 10.12%. The implementation of a smart grid in India is driven by several crucial factors. Firstly, India faces significant challenges in meeting its growing energy demands due to rapid population growth and urbanization. Smart grids enable efficient energy distribution, load management, and demand response, ensuring reliable and stable power supply. Secondly, India aims to integrate a substantial amount of renewable energy into its grid to reduce dependence on fossil fuels and mitigate environmental impacts. Moreover, smart grids facilitate the integration and management of renewable energy sources, thereby enhancing grid stability and optimizing energy flows. Furthermore, the rise in installations of solar projects using smart grids by the Indian government is gaining traction nationwide. The rise in popularity of installing solar projects using smart grids in India is due to the need for efficient energy distribution, integration of renewable energy, and addressing power infrastructure challenges to optimize energy usage and enhance grid reliability. The Rewa ultra mega solar plant, situated in MP's Rewa district, is a ground-mounted photovoltaic solar facility that

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operates as a grid-connected power plant. Commencing its power generation in 2018, the plant successfully achieved its goal of producing 750 MW of electricity by January 2020. As solar energy continues to gain importance as a primary electricity source in India, this project aims to deliver clean energy to both residential and commercial structures, thereby contributing to a sustainable energy future. Hence, from the aforesaid pointers it can be concluded that the continuous rise in solar project installations using smart grids by the Indian government is expediting the overall market growth of smart grids in the country.

#### Improvisation of Rural Electrification using Smart Grids

Rural electrification using smart grids is gaining momentum in India to address the challenge of providing electricity access to remote and rural areas. By integrating renewable energy sources and implementing advanced metering systems, smart grids enable optimal utilization of resources, reduce energy losses, and empower rural communities with reliable and affordable electricity. Additionally, smart grids facilitate remote monitoring, fault detection, and demand management, improving operational efficiency and enabling remote maintenance. This approach to rural electrification supports India's goal of inclusive and sustainable development while reducing carbon emissions.

For example, Paschim Gujarat Vij Company Ltd's (PGVCL's) smart village pilot project, Gujarat - With the assistance of a government grant of Rs 50 million, the state of Gujarat has successfully established the country's inaugural rural smart grid pilot project in the villages of Shapur and Nana-Kajaliyara in the Junagadh district. This significant initiative consisted of two key components: green generation and smart distribution. The green generation component concluded involved the installation of a 480-kW capacity solar power photovoltaic (PV) plant and two solar water pumps. The smart distribution component, finalized by March 2016, included the implementation of smart meters, automated meter reading (AMR) technology, and network reinforcement. These investments have led to improved operational and billing efficiency, enhanced asset performance, reduced theft and distribution losses, and increased consumer satisfaction.

#### Frequent Installation of Smart Meters for Technological Development

India has been witnessing a rapid deployment of smart meters within its smart grid infrastructure. Smart meters, with their real-time monitoring and two-way communication capabilities, offer numerous benefits such as enhanced energy efficiency, reduced losses, and accurate billing. Hence, the Indian organizations are sheer focusing on enhancing the technological aspects of the smart grid technologies. For example, in 2021, Tata Power Delhi Distribution Limited (TPDDL) and Siemens Ltd. jointly announced the successful rollout of smart metering technology across entire North Delhi, involving the installation of more than 200,000 smart meters. By leveraging Siemens' advanced EnergyIP Meter Data Management System, the project ensures accurate and timely collection of electricity meter data for billing, thereby leading to enhanced visibility of the consumer network and reduced carbon emissions.

This initiative forms a crucial part of Tata Power-DDL's strategic plan for grid modernization. With real-time consumption monitoring, improved energy management, and timely alerts for outages and low power factor, consumers would benefit from this implementation. Additionally, the system enables quicker outage management and contributes to a more efficient and sustainable energy ecosystem. Thus, with the continued installation of smart meters, India's smart grid ecosystem is expected to evolve further, thereby revolutionizing the management and consumption of energy nationwide which in turn is augmenting the market growth of smart grids in the country.

#### Government Regulations

The Indian government is dedicated to advance the development of smart grids and has implemented a range of policies and schemes to support this goal. These initiatives include the establishment of regulatory targets, ensuring data security and privacy, introducing renewable energy credits, implementing interconnection tariffs, and providing utility subsidies. By implementing these regulations and finance models, the government aims to facilitate the adoption of smart grid technologies, promote renewable energy integration, and foster a secure and efficient energy infrastructure in the country.

The Government of India established the National Smart Grid Mission (NSGM) in 2015 with the purpose of strategizing and overseeing the implementation of policies and programs concerning smart grid initiatives in the country. The main objective of this mission is to enhance the reliability of electricity networks and enable the integration of renewable energy sources through distributed generation. Moreover, the utilization of smart grids and smart meters enables consumers to efficiently manage their electricity consumption, leading to reduced bills thereby fuelling the market growth.

#### Impact of COVID-19

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The COVID-19 pandemic had both immediate and long-term effects on the smart grid market in India. In the short term, the pandemic disrupted supply chains, construction activities, and project timelines, leading to delays and financial constraints. The lockdown measures and reduced economic activity resulted in a decline in energy demand, affecting revenue streams for smart grid projects. However, the pandemic also highlighted the importance of resilient and reliable energy infrastructure. As a result, there has been an increased emphasis on digitalization and automation to ensure efficient grid operations and remote monitoring.

Moreover, the adoption of smart grid technologies, such as advanced metering infrastructure and demand response systems, has gained prominence as they enable remote management and optimization of energy resources. On the other hand, the long-term impact of COVID-19 is expected to drive investments in smart grids as governments and utilities prioritize grid modernization and resilience to future disruptions, fostering a sustainable and technology-driven energy sector in India.

#### Key Players Landscape and Outlook

The Smart Grid market in India is witnessing substantial expansion as companies operating in this market acknowledge the importance of smart grid constructions for maintaining the grid stability. These companies are strategically positioning themselves to retain their market share and exploring local expansion opportunities. Additionally, they are investing more resources in smart meter installations, energy resilience, various technological upgradations, research and development, different forms of collaborations with international organizations, etc.

On March 3rd, 2023, Tata Power and the Enel Group of Italy jointly announced that they are set to undertake two pilot projects focused on India's distribution network. One project will involve smart metering, while the other will focus on digitalization and automation. The objective of these projects is to virtualize grid functionalities, enhance protection and control measures, enable automation, real-time fault detection, and expedite service restoration within the network. Additionally, the deployment of Gridspertise's metering technology will be piloted in the power distribution network of Delhi.

On October 20th, 2022, Adani Transmission secured a contract worth INR 13 billion to supply and maintain 1 million smart meters for the Brihanmumbai Electric Supply and Transport (BEST) Undertaking. BEST is a state-run utility that serves consumers exclusively in Mumbai. Adani Transmission's distribution platform would be responsible for installing the smart meters over a 30-month period and maintaining them for 90 months.

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