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India Microgrid Market - Segmented By Connectivity (Grid Connectivity, Off-Grid Connectivity), By Type (AC Microgrids, DC Microgrids, Hybrid), By Pattern (Urban, Semiurban, Rural), By Offering (Hardware (Power Generator, Energy Storage Systems, Controllers), Software & Service), By End User (Government, Utilities, Military, Healthcare, Commercial & Industrial, Others), By Region, Competition, Forecast and Opportunities, 2019-2029F

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Abstracts

The India microgrid market is growing owing to the rising demand for renewable energy that has spurred the need to microgrid construction and grid modernization along with rising government investment on microgrid for flexible and efficient electric grid. The increasing requirement to strengthen the grid resilience, managing the grid disturbance mitigation and development cost advantage by managing power supply and demand have led to an increased focus on microgrid to overcome the need for faster system response and optimize the performance. Moreover, technological advancements in control systems and advancements in energy storage technologies have further boosted the demand for microgrids. Government measures such as Make in India initiative, emphasis on self-reliance, national smart grid missions, and national policies for mini and micro grids are further increasing the demand for microgrids in the country. Moreover, the market is expected to be driven by computerized change of force circulation through shrewd meters, which empowers organizations to advance toward computerized change and requires more energy utilization, flood in charge projects, expanding need for continuous power supply, and consequently depending on microgrid foundation. Additionally, the growing movement toward smart microgrids, especially due

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to increasing emphases of digital India programs and smart techniques are promoting the development of the microgrid market in India during the forecast period.

Microgrids are small-scale electrical networks that can operate independently or in conjunction with the main power grid. In addition, the collection of interconnected loads and dispersed energy sources act as a single, controlled entity with regard to the grid and are contained within well-defined electrical limits. The basic purpose of microgrids is to use renewable energy sources, such as energy generating and storage systems, to their fullest potential. They typically consist of a combination of distributed energy resources such as solar panels, wind turbines, battery energy storage systems, and generators. In emergency situations, it also serves as a grid backup. In most cases, they are situated at or close to the consumption locations and are managed by a microgrid controller. Microgrids are increasingly being used in a range of applications, from providing backup power for critical infrastructure to enabling communities to generate and manage their own energy. Microgrids are electricity distribution systems containing loads and distributed energy resources such as distributed generators, storage devices, or controlled loads that can be operated in a controlled, coordinated way either while connected to the main power network or while islanded. The price of power from a microgrid is around one-fifth of the price of diesel, making it an economical option for many people in rural India.

India’s Movement toward Smart Microgrids

The ongoing advancements in microgrid and its subsets such as microgrid control system technologies, including the use of artificial intelligence and machine learning, are improving the performance and efficiency of microgrids and driving the demand for these solutions. Energy storages provide numerous advantages, including balancing supply and demand, enhancing power quality, reducing the intermittency of renewable resources, and providing auxiliary services such as frequency and voltage management in microgrid operation. Moreover, the adoption of smart microgrids as an extension of regular microgrids requires intelligent software and solutions that are managing the effective electricity flow in networks and enabling real time efforts to optimize the grid operations. India’s movement toward digitalization and adoption of smart cities are enabling the establishment of smart microgrids in the infrastructure. The microgrid control system can use data analytics and predictive algorithms to optimize the operation of microgrids and improve energy efficiency. The deployment of microgrid solutions that can store excess energy and provide backup power during outages is being made possible by the development of advanced energy storage technologies, electric vehicle energy stations, and battery energy storage systems (BESS) that use

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lithium-ion and magnesium-ion batteries. The advancement of energy storage systems such as hybrid energy storage systems (HESSs) which are distinguished by the coupling of two or more energy storage technologies, has evolved to achieve the appropriate performance by combining the relevant characteristics of various technologies. Thus, movements toward smart microgrids are expected to drive the growth of the India microgrid market during the forecast period.

Growing Government Support and Initiatives

The continuous development and deployment of microgrids through policies, incentives, and funding programs throughout the country are offering an edge to the market players to establish new microgrids and are driving the growth of the market. The Government of India in an attempt to promote microgrids, have issued a draft national policy on renewable energy-based mini and microgrids. The policy proposed to set-up at least 10,000 renewable micro and mini-grid projects across the country, with 500 MW of generation capacity to be developed through private players by 2022 to cater around 237 million people experiencing energy shortage. In addition, the Government of India's vision of Atmanirbhar Bharat call for the National Renewable Energy Program (NREP) to be implemented to fully use the country's potential for renewable energy is enabling the international microgrid product providers to establish their manufacturing setups. Moreover, in March 2023, the Indian Army under the ‘National Green Hydrogen Mission’ signed an agreement with the National Thermal Power Corporation Renewable Energy Limited to install green hydrogen-based microgrid power plant project in the forward areas along the Northern borders of eastern Ladakh. For instance, India Renewable Energy Development Agency (IREDA) has signed an energy compact with Husk Power Systems with a combined value of USD 4.2 million in debt financing for a project to construct as many as 140 microgrids in Bihar and Uttar Pradesh. These contracts are aimed at advancing the development of efficiency and quality of electrical services in the country, improving the resilience and reliability of the power grid, and shortening the duration of electrical disconnection. Thus, growing government support and initiatives have propelled the demand of microgrids in India.

Growing Demand for Renewable Energy

India currently stands fourth globally in renewable energy installed capacity, including large hydro, along with fourth position in the wind power and solar power capacity. In addition, as of October 2022, a total of 172.72 Gigawatt (GW) of capacity from non-fossil fuels sources have been installed in the country that comprehend 119.09 GW of renewable energy, 46.85 GW in large hydro and 6.78 GW in nuclear power capacity.

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Microgrids have the potential to boost the economy by bringing electricity to remote, Tier 2, and Tier 3 regions, enabling small and medium-sized businesses to grow. Out of the total installed generation capacity, the energy generation from the renewable energy source is 42.26%. Moreover, the country is emphasizing on increasing energy consumption through renewable energy due to the rising environmental concerns and growing energy needs. The Government of India added 14.21 GW of renewable energy (RE) capacity during the period of January 2022 to October 2022 to meet the demand for electricity consumption. This has brought the demand for microgrids and several other applications while constructing the infrastructure of power plants. For instance, in remote Himalayan regions of Ladakh, solar microgrids have boosted tourism income by about USD 24,000 in close to two years of being deployed. The rapid growing concerns for protecting the environment from Carbon monoxide (CO) gas and the proliferation in renewable energy techniques have increased the demand for effective energy management in India.

Furthermore, in line with the Prime Minister’s announcement at COP26, the Ministry of New and Renewable Energy is working toward achieving 500 GW of installed electricity capacity from non-fossil sources by 2030. Microgrids can optimize the use of renewable energy sources and ensure that energy is available when needed. Many utilities service providers have invested in clean, renewable energy sources to run their existing and future facilities as a result of the rising electricity consumption, smart cities, data center power usage, adoption of electric vehicles, and desire to reduce carbon footprint. Therefore, the growing adoption of renewable energy sources such as solar and wind power is driving the need for microgrids that can effectively integrate these sources and manage their variability. Thus, the growing demand for renewable energy is attributing the growth of the India microgrid market.

Market Segmentation

The India microgrid market is segmented into connectivity, type, patten, offering, and end-user. Based on connectivity, the market is divided into grid connectivity and off-grid connectivity. Based on type, the market is segmented into AC microgrids, DC microgrids, and hybrid. Based on pattern, the market is bifurcated into urban, semiurban, and rural. Based on offering, the market is divided into hardware and software & service. The hardware segment is further bifurcated into power generator, energy storage systems, and controllers. Based on end user, the market is divided into government, utilities, military, healthcare, commercial & industrial, and others.

Market Players

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Major market players in the India microgrid market are Exelon Corporation, Hitachi Ltd, Eaton Corporation Plc., Siemens India Private Limited, General Electric Company, Schneider Electric SE, Toshiba India Pvt. Ltd., Mera Gao Micro Grid Power Pvt. Ltd., Gram Power India Pvt Ltd, and Greenpeace foundation.

Report Scope:

In this report, the India Microgrid market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

India Microgrid Market, By Connectivity:

Grid Connectivity

Off-Grid Connectivity

India Microgrid Market, By Type:

AC Microgrids

DC Microgrids

Hybrid

India Microgrid Market, By Pattern:

Urban

Semiurban

Rural

India Microgrid Market, By Offering:

Hardware

Power Generator

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Energy Storage Systems

Controllers

Software & Service

India Microgrid Market, By End User:

Government

Utilities

Military

Healthcare

Commercial & Industrial

Others

India Microgrid Market, By Region:

East India

West India

North India

South India

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the India microgrid market.

Available Customizations:

India microgrid market report with the given market data, Tech Sci Research offers

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customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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Contents

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10. MARKET DYNAMICS

10.1. Drivers
10.2. Challenges

11. MARKET TRENDS & DEVELOPMENTS

12. POLICY & REGULATORY FRAMEWORK

13. COMPANY PROFILES

13.1. Exelon Corporation
  13.1.1. Business Overview
  13.1.2. Key Revenue and Financials (If Available)
  13.1.3. Recent Developments
  13.1.4. Key Personnel
  13.1.5. Key Product/Services
13.2. Hitachi Ltd
  13.2.1. Business Overview
  13.2.2. Key Revenue and Financials (If Available)
  13.2.3. Recent Developments
  13.2.4. Key Personnel
  13.2.5. Key Product/Services
13.3. Eaton Corporation Plc
  13.3.1. Business Overview
  13.3.2. Key Revenue and Financials (If Available)
  13.3.3. Recent Developments
  13.3.4. Key Personnel
  13.3.5. Key Product/Services
13.4. Siemens India Private Limited
  13.4.1. Business Overview
  13.4.2. Key Revenue and Financials (If Available)
  13.4.3. Recent Developments
  13.4.4. Key Personnel
  13.4.5. Key Product/Services
13.5. General Electric Company

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(Note: The companies list can be customized based on the client requirements.)
The data given for any year represents the market during the period, i.e, 1st April of the former year to 31st March of the latter year. Eg: For FY2024E, the data represents the period, from 1ST April 2023 to 31st March 2024.

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