

Decentralized Electricity Generation Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented, By Technology (Solar Photovoltaic, Wind Turbines, Biomass, Micro Hydro, Fuel Cells), By Component (Inverters, Energy Storage Systems, Control Systems, Switchgear, Electrical Machines), By End-User (Residential, Commercial, Industrial, Utilities), By Fuel Type (Solar, Wind, Biomass, Natural Gas), By Region, By Competition, 2020-2030F

<https://marketpublishers.com/r/D8822FDFB7A4EN.html>

Date: July 2025

Pages: 180

Price: US\$ 4,500.00 (Single User License)

ID: D8822FDFB7A4EN

Abstracts

Market Overview

The Decentralized Electricity Generation Market was valued at USD 50.34 Billion in 2024 and is expected to reach USD 85.04 Billion by 2030 with a CAGR of 8.97%. The decentralized electricity generation market refers to the production of electricity through small-scale power generation technologies that operate independently or in conjunction with the main grid. Unlike centralized power systems that rely on large, centralized facilities such as thermal or nuclear power plants, decentralized systems generate electricity closer to the point of consumption, reducing transmission losses and improving energy efficiency. This market encompasses a diverse array of technologies including solar photovoltaic (PV) panels, wind turbines, biomass generators, combined heat and power (CHP) systems, fuel cells, and microturbines, often integrated with energy storage systems and smart grid infrastructure.

These solutions can be installed at residential, commercial, industrial, or community levels, enabling users to generate their own electricity, enhance energy reliability, and reduce dependency on conventional grid-based power. Decentralized electricity generation is driven by increasing energy demand, rising awareness of environmental sustainability, the need to enhance energy security, and the global push towards low-carbon energy solutions. It supports energy democratization by empowering consumers to become prosumers—both producers and consumers of electricity—thereby promoting more resilient and adaptive energy systems. In addition, the market is influenced by factors such as declining costs of renewable energy technologies, growing adoption of electric vehicles, and supportive regulatory frameworks that promote net metering, feed-in tariffs, and financial incentives.

Key Market Drivers

Growing Demand for Energy Security and Resilience

The increasing global demand for energy security and system resilience is a primary driver of the decentralized electricity generation market. Traditional centralized power systems are often vulnerable to outages, grid failures, and natural disasters that can disrupt electricity supply over vast areas. In contrast, decentralized systems—such as solar rooftops, small wind turbines, biomass plants, and microgrids—enable localized energy production, reducing dependency on large-scale generation and transmission infrastructure. This localized approach not only enhances reliability but also ensures continued electricity access in remote or disaster-prone regions. As urban centers grow and rural electrification efforts expand, particularly in developing economies, decentralized solutions offer a practical and scalable way to ensure stable power delivery.

Moreover, industries and critical infrastructure sectors such as hospitals, data centers, and military facilities are increasingly adopting decentralized energy models to secure uninterrupted power supply and mitigate risks associated with centralized grid failures. Decentralized systems also support demand-side energy management, allowing consumers to generate, store, and consume electricity independently while reducing stress on national grids during peak demand periods. This capability becomes especially important in the face of growing extreme weather events and geopolitical tensions that threaten energy supply chains.

The adaptability of decentralized power generation to integrate with battery storage and smart grid technologies further enhances system resilience, making it an attractive

solution for both governments and private sector entities. In addition, the ability to operate in island mode during grid failures ensures continuous power availability, which is crucial for disaster recovery and emergency response. With energy becoming a strategic asset in national security policies, decentralized electricity generation is increasingly seen as a tool to strengthen infrastructure resilience and self-sufficiency at regional, local, and individual levels, thereby driving market growth. Global investment in energy security infrastructure surpassed USD 300 billion in 2024. Over 60% of countries have updated national strategies to enhance energy resilience. The backup power systems market, including batteries and generators, is growing at a CAGR of 12% globally. More than 40 million households worldwide now use backup energy storage or microgrid solutions. Around 70% of utilities globally are investing in grid modernization to improve resilience. Natural disasters and grid outages affected over 1 billion people globally in the past five years, increasing demand for resilient energy systems. Energy storage capacity installations exceeded 100 GW globally by 2024.

Key Market Challenges

Grid Integration Complexity and Infrastructure Constraints

One of the primary challenges facing the decentralized electricity generation market is the complexity of integrating distributed energy resources (DERs) into existing power grid infrastructure, which was originally designed for centralized generation. Traditional grids operate on a top-down model, with electricity flowing from large, centralized power plants to consumers. However, with decentralized systems, power is generated at various points across the network—ranging from rooftop solar and small wind turbines to biomass units and fuel cells—creating a bidirectional flow of electricity that can overwhelm current infrastructure. The absence of advanced grid management technologies in many regions further complicates this issue, as utilities struggle to maintain voltage stability, frequency regulation, and real-time balancing of supply and demand.

Moreover, outdated distribution networks in developing economies lack the digitalization needed to accommodate variable and intermittent power sources, leading to grid congestion, blackouts, or the curtailment of renewable energy. The challenge is intensified by the limited interoperability between legacy systems and modern DER technologies, often requiring costly upgrades or replacements of substations, inverters, and communication protocols. Utilities also face difficulties in forecasting load and generation accurately due to the unpredictability of solar and wind energy, complicating planning and dispatch operations. As decentralized systems proliferate, there is a

pressing need for the deployment of smart grids, real-time monitoring systems, and flexible load management solutions—investments that demand both capital and coordination among multiple stakeholders.

Additionally, regulatory fragmentation and a lack of universal technical standards for DER integration make it difficult for manufacturers and grid operators to implement uniform solutions across regions. This patchwork approach leads to inconsistent performance, inefficient resource allocation, and elevated risks of grid instability. Furthermore, without adequate investment in energy storage systems, surplus power from decentralized sources cannot be efficiently utilized or dispatched during peak demand periods, limiting the overall effectiveness of distributed generation. In regions with high renewable penetration, the absence of synchronized control strategies also increases the likelihood of frequency fluctuations and unintentional islanding, which can compromise grid safety.

Ultimately, addressing the grid integration challenge requires a combination of infrastructure modernization, policy harmonization, and the adoption of cutting-edge digital technologies. Until these solutions are systematically implemented, the growth of the decentralized electricity generation market will remain constrained by technical, operational, and economic bottlenecks associated with outdated grid infrastructure.

Key Market Trends

Rise of Renewable Energy Integration in Distributed Systems

The decentralized electricity generation market is experiencing a transformative shift with the widespread integration of renewable energy sources such as solar, wind, and small-scale hydro into distributed systems. This trend is driven by the global push toward decarbonization, declining costs of renewable technologies, and increasing energy demands from urban and rural populations alike. Solar photovoltaic systems, in particular, are playing a pivotal role in enabling localized energy production at residential, commercial, and industrial levels. Technological advancements in panel efficiency, energy storage, and inverter capabilities have significantly improved the reliability and feasibility of renewables in decentralized setups.

Wind energy, both onshore and micro-turbine based, is gaining traction in regions with favorable wind conditions and policy support. Hybrid systems that combine solar and wind with battery storage or backup generators are also on the rise, ensuring consistent power supply even during intermittencies. As grid parity becomes more widespread,

renewables are no longer reliant solely on subsidies to compete with conventional energy sources, making them more accessible for decentralized deployment. The ease of installation, scalability, and reduced transmission losses further enhance the appeal of renewables in this space.

Moreover, the rising demand for clean energy from environmentally conscious consumers and businesses is accelerating adoption, especially in regions that are aiming for net-zero carbon targets. Governments and private entities are also investing in renewable-powered microgrids for disaster recovery, off-grid electrification, and enhancing energy security. As a result, renewable energy integration in decentralized electricity generation is no longer an option but a necessity, enabling a more sustainable, resilient, and democratized energy landscape.

Key Market Players

Schneider Electric SE

Siemens AG

General Electric (GE)

ABB Ltd.

Eaton Corporation

Engie SA

SMA Solar Technology AG

Bloom Energy

SunPower Corporation

Vestas Wind Systems A/S

Report Scope:

In this report, the Global Decentralized Electricity Generation Market has been

segmented into the following categories, in addition to the industry trends which have also been detailed below:

Decentralized Electricity Generation Market, By Technology:

Solar Photovoltaic

Wind Turbines

Biomass

Micro Hydro

Fuel Cells

Decentralized Electricity Generation Market, By Component:

Inverters

Energy Storage Systems

Control Systems

Switchgear

Electrical Machines

Decentralized Electricity Generation Market, By End-User:

Residential

Commercial

Industrial

Utilities

Decentralized Electricity Generation Market, By Fuel Type:

Solar

Wind

Biomass

Natural Gas

Decentralized Electricity Generation Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia-Pacific

China

India

Japan

Australia

South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Kuwait

Turkey

Competitive Landscape

Company Profiles: Detailed analysis of the major companies presents in the Global Decentralized Electricity Generation Market.

Available Customizations:

Global Decentralized Electricity Generation Market report with the given Market data, Tech Sci Research offers 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).

Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
- 1.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Formulation of the Scope
- 2.4. Assumptions and Limitations
- 2.5. Sources of Research
 - 2.5.1. Secondary Research
 - 2.5.2. Primary Research
- 2.6. Approach for the Market Study
 - 2.6.1. The Bottom-Up Approach
 - 2.6.2. The Top-Down Approach
- 2.7. Methodology Followed for Calculation of Market Size & Market Shares
- 2.8. Forecasting Methodology
 - 2.8.1. Data Triangulation & Validation

3. EXECUTIVE SUMMARY

- 3.1. Overview of the Market
- 3.2. Overview of Key Market Segmentations
- 3.3. Overview of Key Market Players
- 3.4. Overview of Key Regions/Countries
- 3.5. Overview of Market Drivers, Challenges, and Trends

4. VOICE OF CUSTOMER

5. GLOBAL DECENTRALIZED ELECTRICITY GENERATION MARKET OUTLOOK

- 5.1. Market Size & Forecast

- 5.1.1. By Value
- 5.2. Market Share & Forecast
 - 5.2.1. By Technology (Solar Photovoltaic, Wind Turbines, Biomass, Micro Hydro, Fuel Cells)
 - 5.2.2. By Component (Inverters, Energy Storage Systems, Control Systems, Switchgear, Electrical Machines)
 - 5.2.3. By End-User (Residential, Commercial, Industrial, Utilities)
 - 5.2.4. By Fuel Type (Solar, Wind, Biomass, Natural Gas)
 - 5.2.5. By Region
- 5.3. By Company (2024)
- 5.4. Market Map

6. NORTH AMERICA DECENTRALIZED ELECTRICITY GENERATION MARKET OUTLOOK

- 6.1. Market Size & Forecast
 - 6.1.1. By Value
- 6.2. Market Share & Forecast
 - 6.2.1. By Technology
 - 6.2.2. By Component
 - 6.2.3. By End-User
 - 6.2.4. By Fuel Type
 - 6.2.5. By Country
- 6.3. North America: Country Analysis
 - 6.3.1. United States Decentralized Electricity Generation Market Outlook
 - 6.3.1.1. Market Size & Forecast
 - 6.3.1.1.1. By Value
 - 6.3.1.2. Market Share & Forecast
 - 6.3.1.2.1. By Technology
 - 6.3.1.2.2. By Component
 - 6.3.1.2.3. By End-User
 - 6.3.1.2.4. By Fuel Type
 - 6.3.2. Canada Decentralized Electricity Generation Market Outlook
 - 6.3.2.1. Market Size & Forecast
 - 6.3.2.1.1. By Value
 - 6.3.2.2. Market Share & Forecast
 - 6.3.2.2.1. By Technology
 - 6.3.2.2.2. By Component
 - 6.3.2.2.3. By End-User

- 6.3.2.2.4. By Fuel Type
- 6.3.3. Mexico Decentralized Electricity Generation Market Outlook
 - 6.3.3.1. Market Size & Forecast
 - 6.3.3.1.1. By Value
 - 6.3.3.2. Market Share & Forecast
 - 6.3.3.2.1. By Technology
 - 6.3.3.2.2. By Component
 - 6.3.3.2.3. By End-User
 - 6.3.3.2.4. By Fuel Type

7. EUROPE DECENTRALIZED ELECTRICITY GENERATION MARKET OUTLOOK

- 7.1. Market Size & Forecast
 - 7.1.1. By Value
- 7.2. Market Share & Forecast
 - 7.2.1. By Technology
 - 7.2.2. By Component
 - 7.2.3. By End-User
 - 7.2.4. By Fuel Type
 - 7.2.5. By Country
- 7.3. Europe: Country Analysis
 - 7.3.1. Germany Decentralized Electricity Generation Market Outlook
 - 7.3.1.1. Market Size & Forecast
 - 7.3.1.1.1. By Value
 - 7.3.1.2. Market Share & Forecast
 - 7.3.1.2.1. By Technology
 - 7.3.1.2.2. By Component
 - 7.3.1.2.3. By End-User
 - 7.3.1.2.4. By Fuel Type
 - 7.3.2. United Kingdom Decentralized Electricity Generation Market Outlook
 - 7.3.2.1. Market Size & Forecast
 - 7.3.2.1.1. By Value
 - 7.3.2.2. Market Share & Forecast
 - 7.3.2.2.1. By Technology
 - 7.3.2.2.2. By Component
 - 7.3.2.2.3. By End-User
 - 7.3.2.2.4. By Fuel Type
 - 7.3.3. Italy Decentralized Electricity Generation Market Outlook
 - 7.3.3.1. Market Size & Forecast

- 7.3.3.1.1. By Value
- 7.3.3.2. Market Share & Forecast
 - 7.3.3.2.1. By Technology
 - 7.3.3.2.2. By Component
 - 7.3.3.2.3. By End-User
 - 7.3.3.2.4. By Fuel Type
- 7.3.4. France Decentralized Electricity Generation Market Outlook
 - 7.3.4.1. Market Size & Forecast
 - 7.3.4.1.1. By Value
 - 7.3.4.2. Market Share & Forecast
 - 7.3.4.2.1. By Technology
 - 7.3.4.2.2. By Component
 - 7.3.4.2.3. By End-User
 - 7.3.4.2.4. By Fuel Type
- 7.3.5. Spain Decentralized Electricity Generation Market Outlook
 - 7.3.5.1. Market Size & Forecast
 - 7.3.5.1.1. By Value
 - 7.3.5.2. Market Share & Forecast
 - 7.3.5.2.1. By Technology
 - 7.3.5.2.2. By Component
 - 7.3.5.2.3. By End-User
 - 7.3.5.2.4. By Fuel Type

8. ASIA-PACIFIC DECENTRALIZED ELECTRICITY GENERATION MARKET OUTLOOK

- 8.1. Market Size & Forecast
 - 8.1.1. By Value
- 8.2. Market Share & Forecast
 - 8.2.1. By Technology
 - 8.2.2. By Component
 - 8.2.3. By End-User
 - 8.2.4. By Fuel Type
 - 8.2.5. By Country
- 8.3. Asia-Pacific: Country Analysis
 - 8.3.1. China Decentralized Electricity Generation Market Outlook
 - 8.3.1.1. Market Size & Forecast
 - 8.3.1.1.1. By Value
 - 8.3.1.2. Market Share & Forecast

- 8.3.1.2.1. By Technology
- 8.3.1.2.2. By Component
- 8.3.1.2.3. By End-User
- 8.3.1.2.4. By Fuel Type
- 8.3.2. India Decentralized Electricity Generation Market Outlook
 - 8.3.2.1. Market Size & Forecast
 - 8.3.2.1.1. By Value
 - 8.3.2.2. Market Share & Forecast
 - 8.3.2.2.1. By Technology
 - 8.3.2.2.2. By Component
 - 8.3.2.2.3. By End-User
 - 8.3.2.2.4. By Fuel Type
- 8.3.3. Japan Decentralized Electricity Generation Market Outlook
 - 8.3.3.1. Market Size & Forecast
 - 8.3.3.1.1. By Value
 - 8.3.3.2. Market Share & Forecast
 - 8.3.3.2.1. By Technology
 - 8.3.3.2.2. By Component
 - 8.3.3.2.3. By End-User
 - 8.3.3.2.4. By Fuel Type
- 8.3.4. South Korea Decentralized Electricity Generation Market Outlook
 - 8.3.4.1. Market Size & Forecast
 - 8.3.4.1.1. By Value
 - 8.3.4.2. Market Share & Forecast
 - 8.3.4.2.1. By Technology
 - 8.3.4.2.2. By Component
 - 8.3.4.2.3. By End-User
 - 8.3.4.2.4. By Fuel Type
- 8.3.5. Australia Decentralized Electricity Generation Market Outlook
 - 8.3.5.1. Market Size & Forecast
 - 8.3.5.1.1. By Value
 - 8.3.5.2. Market Share & Forecast
 - 8.3.5.2.1. By Technology
 - 8.3.5.2.2. By Component
 - 8.3.5.2.3. By End-User
 - 8.3.5.2.4. By Fuel Type

9. SOUTH AMERICA DECENTRALIZED ELECTRICITY GENERATION MARKET OUTLOOK

9.1. Market Size & Forecast

9.1.1. By Value

9.2. Market Share & Forecast

9.2.1. By Technology

9.2.2. By Component

9.2.3. By End-User

9.2.4. By Fuel Type

9.2.5. By Country

9.3. South America: Country Analysis

9.3.1. Brazil Decentralized Electricity Generation Market Outlook

9.3.1.1. Market Size & Forecast

9.3.1.1.1. By Value

9.3.1.2. Market Share & Forecast

9.3.1.2.1. By Technology

9.3.1.2.2. By Component

9.3.1.2.3. By End-User

9.3.1.2.4. By Fuel Type

9.3.2. Argentina Decentralized Electricity Generation Market Outlook

9.3.2.1. Market Size & Forecast

9.3.2.1.1. By Value

9.3.2.2. Market Share & Forecast

9.3.2.2.1. By Technology

9.3.2.2.2. By Component

9.3.2.2.3. By End-User

9.3.2.2.4. By Fuel Type

9.3.3. Colombia Decentralized Electricity Generation Market Outlook

9.3.3.1. Market Size & Forecast

9.3.3.1.1. By Value

9.3.3.2. Market Share & Forecast

9.3.3.2.1. By Technology

9.3.3.2.2. By Component

9.3.3.2.3. By End-User

9.3.3.2.4. By Fuel Type

10. MIDDLE EAST AND AFRICA DECENTRALIZED ELECTRICITY GENERATION MARKET OUTLOOK

10.1. Market Size & Forecast

- 10.1.1. By Value
- 10.2. Market Share & Forecast
 - 10.2.1. By Technology
 - 10.2.2. By Component
 - 10.2.3. By End-User
 - 10.2.4. By Fuel Type
 - 10.2.5. By Country
- 10.3. Middle East and Africa: Country Analysis
 - 10.3.1. South Africa Decentralized Electricity Generation Market Outlook
 - 10.3.1.1. Market Size & Forecast
 - 10.3.1.1.1. By Value
 - 10.3.1.2. Market Share & Forecast
 - 10.3.1.2.1. By Technology
 - 10.3.1.2.2. By Component
 - 10.3.1.2.3. By End-User
 - 10.3.1.2.4. By Fuel Type
 - 10.3.2. Saudi Arabia Decentralized Electricity Generation Market Outlook
 - 10.3.2.1. Market Size & Forecast
 - 10.3.2.1.1. By Value
 - 10.3.2.2. Market Share & Forecast
 - 10.3.2.2.1. By Technology
 - 10.3.2.2.2. By Component
 - 10.3.2.2.3. By End-User
 - 10.3.2.2.4. By Fuel Type
 - 10.3.3. UAE Decentralized Electricity Generation Market Outlook
 - 10.3.3.1. Market Size & Forecast
 - 10.3.3.1.1. By Value
 - 10.3.3.2. Market Share & Forecast
 - 10.3.3.2.1. By Technology
 - 10.3.3.2.2. By Component
 - 10.3.3.2.3. By End-User
 - 10.3.3.2.4. By Fuel Type
 - 10.3.4. Kuwait Decentralized Electricity Generation Market Outlook
 - 10.3.4.1. Market Size & Forecast
 - 10.3.4.1.1. By Value
 - 10.3.4.2. Market Share & Forecast
 - 10.3.4.2.1. By Technology
 - 10.3.4.2.2. By Component
 - 10.3.4.2.3. By End-User

- 10.3.4.2.4. By Fuel Type
- 10.3.5. Turkey Decentralized Electricity Generation Market Outlook
 - 10.3.5.1. Market Size & Forecast
 - 10.3.5.1.1. By Value
 - 10.3.5.2. Market Share & Forecast
 - 10.3.5.2.1. By Technology
 - 10.3.5.2.2. By Component
 - 10.3.5.2.3. By End-User
 - 10.3.5.2.4. By Fuel Type

11. MARKET DYNAMICS

- 11.1. Drivers
- 11.2. Challenges

12. MARKET TRENDS & DEVELOPMENTS

- 12.1. Merger & Acquisition (If Any)
- 12.2. Product Launches (If Any)
- 12.3. Recent Developments

13. COMPANY PROFILES

- 13.1. Schneider Electric SE
 - 13.1.1. Business Overview
 - 13.1.2. Key Revenue and Financials
 - 13.1.3. Recent Developments
 - 13.1.4. Key Personnel/Key Contact Person
 - 13.1.5. Key Product/Services Offered
- 13.2. Siemens AG
- 13.3. General Electric (GE)
- 13.4. ABB Ltd.
- 13.5. Eaton Corporation
- 13.6. Engie SA
- 13.7. SMA Solar Technology AG
- 13.8. Bloom Energy
- 13.9. SunPower Corporation
- 13.10. Vestas Wind Systems A/S

14. STRATEGIC RECOMMENDATIONS

15. ABOUT US & DISCLAIMER

I would like to order

Product name: Decentralized Electricity Generation Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented, By Technology (Solar Photovoltaic, Wind Turbines, Biomass, Micro Hydro, Fuel Cells), By Component (Inverters, Energy Storage Systems, Control Systems, Switchgear, Electrical Machines), By End-User (Residential, Commercial, Industrial, Utilities), By Fuel Type (Solar, Wind, Biomass, Natural Gas), By Region, By Competition, 2020-2030F

Product link: <https://marketpublishers.com/r/D8822FDFB7A4EN.html>

Price: US\$ 4,500.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/D8822FDFB7A4EN.html>