

# **AI in Power Generation Market Forecasts To 2034 – Global Analysis By Component (Software, Hardware and Services), Deployment Mode, AI Technology, Power Generation Source, Application, Enterprise Size, End User and By Geography**

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## **Abstracts**

According to Statistics MRC, the Global AI in Power Generation Market is accounted for \$1.8 billion in 2026 and is expected to reach \$7.6 billion by 2034 growing at a CAGR of 19.8% during the forecast period. The AI in Power Generation market encompasses intelligent technologies designed to support the efficient operation and management of electricity generation systems. Artificial intelligence is applied to functions such as predictive maintenance, operational monitoring, energy forecasting, equipment performance analysis, plant simulation, emissions management, and automated process control. These solutions enable utilities to analyze operational data, optimize resource utilization, improve equipment reliability, and streamline power plant operations. Covering software platforms, hardware infrastructure, and professional services, the market serves thermal, hydroelectric, nuclear, solar, wind, and other power generation facilities by enabling smarter, data-driven, and highly automated electricity production.

Market Dynamics:

Driver:

Increasing Digital Transformation Across Utilities

The ongoing modernization of utility operations is significantly encouraging the adoption of artificial intelligence in power generation. Connected equipment, cloud platforms,

smart sensors, and industrial digital technologies continuously produce operational information that AI converts into actionable insights. These systems automate complex processes, optimize plant performance, and strengthen planning capabilities while lowering manual workloads. Digital platforms also improve monitoring and accelerate responses to changing operating conditions. As electricity providers continue upgrading infrastructure and implementing intelligent energy management solutions, AI is becoming an essential component for achieving greater operational efficiency, enhanced visibility, and sustainable power generation.

Restraint:

#### High Initial Implementation and Integration Costs

Large financial commitments required for deploying AI technologies continue to restrict adoption across power generation operations. Utilities must invest in advanced analytics software, digital infrastructure, connected sensors, secure communication systems, and employee training programs. Modernizing older facilities to support AI frequently demands expensive system modifications and extended deployment periods. Many small and medium-sized power producers face challenges in recovering these investments quickly, making adoption less attractive. Combined with ongoing maintenance expenses and uncertain financial returns, substantial implementation costs continue to delay broader acceptance of AI-driven solutions throughout the electricity generation sector.

Opportunity:

#### Expansion of AI-Based Carbon Emission Optimization

The increasing focus on reducing carbon emissions is expanding growth opportunities for artificial intelligence within power generation. AI helps utilities optimize fuel usage, improve plant efficiency, monitor environmental performance, and reduce greenhouse gas emissions through continuous operational analysis. Intelligent technologies also support the integration of cleaner energy sources while improving overall resource utilization. As stricter environmental regulations and corporate sustainability objectives continue to shape the energy industry, AI is expected to become a key technology for enabling cleaner, more efficient, and environmentally responsible electricity generation worldwide.

Threat:

## Economic Slowdowns Reducing Utility Investments

Macroeconomic instability represents a substantial threat to the adoption of AI within power generation. During periods of economic uncertainty, energy companies often reduce spending on new digital technologies while focusing on critical operational requirements. Higher borrowing costs, inflationary pressures, and cautious investment strategies may delay AI implementation and infrastructure modernization programs. Technology vendors may also experience reduced demand for advanced solutions, slowing innovation across the industry. Continued economic challenges could therefore restrain market expansion by limiting financial resources available for intelligent power generation projects.

### Covid-19 Impact:

The COVID-19 outbreak influenced the AI in Power Generation market through both short-term disruptions and long-term growth opportunities. Early in the pandemic, project delays, equipment shortages, and reduced capital spending limited the adoption of AI technologies in electricity generation facilities. Restrictions on workforce mobility further slowed installation and operational activities. Despite these challenges, energy companies accelerated investments in digital technologies to enable remote asset monitoring, intelligent maintenance, and automated plant operations. The increased focus on business continuity, infrastructure resilience, and reliable power delivery boosted AI adoption, positioning the market for stronger growth as the global energy sector recovered.

The Software segment is expected to be the largest during the forecast period

The Software segment is expected to account for the largest market share during the forecast period. AI software serves as the core technology that enables intelligent operations throughout power generation facilities. It supports advanced forecasting, predictive maintenance, equipment diagnostics, process optimization, and real-time operational management by transforming large volumes of data into actionable insights. Utilities rely on software platforms to improve efficiency, maximize power plant availability, optimize renewable energy integration, and strengthen grid reliability. Continuous innovation in artificial intelligence, cloud computing, and industrial analytics, together with increasing investments in digital power infrastructure, continues to reinforce the leading position of software within the AI in Power Generation market.

The Digital Twin & Plant Simulation segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the Digital Twin & Plant Simulation segment is predicted to witness the highest growth rate. Rising demand for advanced operational intelligence is encouraging utilities to adopt AI-powered digital twin technologies that replicate physical power generation assets in virtual environments. These solutions support continuous performance monitoring, predictive maintenance, operational optimization, and scenario analysis while minimizing risks associated with live system testing. By combining artificial intelligence with real-time operational data, digital twins help improve plant efficiency, equipment reliability, and resource utilization. Expanding investments in automation, smart energy infrastructure, and renewable power integration are expected to accelerate the deployment of digital twin and plant simulation solutions throughout the power generation industry.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share, supported by advanced digital infrastructure, extensive deployment of intelligent utility solutions, and continuous investment in modernizing electricity generation systems. Energy companies are rapidly implementing AI for plant automation, predictive analytics, equipment monitoring, and efficient grid operations to enhance performance and reduce operational costs. Strong innovation ecosystems, the presence of major AI and energy technology companies, favorable government support for clean energy initiatives, and growing adoption of renewable power technologies continue to reinforce North America's dominant position in the global market.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR in the AI in Power Generation market throughout the forecast period. Rising energy consumption, rapid urbanization, and ongoing expansion of electricity infrastructure are creating strong demand for AI-enabled power generation solutions. Utilities across the region are investing in intelligent technologies to optimize plant operations, improve equipment performance, enhance renewable energy integration, and strengthen grid stability. Government initiatives supporting digitalization, increasing deployment of smart energy systems, and continuous modernization of power generation facilities are further driving adoption. These factors collectively establish Asia-Pacific as the fastest-growing regional market for AI in power generation.

## Key players in the market

Some of the key players in AI in Power Generation Market include GE Vernova, Siemens Energy AG, Schneider Electric SE, ABB Ltd., Hitachi Energy Ltd., Emerson Electric Co., Honeywell International Inc., Yokogawa Electric Corporation, Rockwell Automation, Inc., Aspen Technology, Inc. (AspenTech), AVEVA Group plc, C3 AI, Inc., IBM Corporation, Microsoft Corporation, Oracle Corporation, Amazon Web Services, Inc. (AWS), Mitsubishi Electric Corporation and Toshiba Energy Systems & Solutions Corporation.

## Key Developments:

In June 2026, Emerson Electric Co. inked a strategic collaboration with SiMa.ai to integrate SiMa.ai's MLSoC (Machine Learning System on Chip) technology into Emerson's industrial PCs. The integration of advanced artificial intelligence capabilities into industrial personal computers will enable Emerson to perform real-time data analysis in factory and remote site environments.

In December 2025, GE Vernova has signed an agreement with Greenvolt Power to supply onshore wind turbines for the Gurbanesti wind farm in C?I?ra?i county, Romania. The contractual scope covers the supply, installation, and commissioning of 42 units of 6.1MW, 158m rotor turbines. This marks the second major onshore wind agreement for GE Vernova Romania within two months, following an earlier announcement to deliver another 42 turbines for the Ialomi?a wind farm in the country.

In November 2025, Rockwell Automation and SLB announced that, following a strategic review, both companies have agreed to pursue an orderly dissolution of their Sensia joint venture. Under the agreement, Rockwell Automation will assume one hundred percent ownership of the Process Automation Business that it contributed to the joint venture, while SLB will fully regain ownership of its contributed assets, including Lift Control and Measurements.

## Components Covered:

Software

Hardware

## Services

### Deployment Modes Covered:

On-Premises

Cloud

Hybrid

### AI Technologies Covered:

Machine Learning

Deep Learning

Natural Language Processing (NLP)

Computer Vision

Reinforcement Learning

Generative AI

### Power Generation Sources Covered:

Thermal Power

Hydropower

Nuclear Power

Solar Power

Wind Power

Geothermal Power

Biomass Power

#### Applications Covered:

Predictive Maintenance

Asset Performance Management

Generation Forecasting

Process Optimization

Fuel & Combustion Optimization

Grid Dispatch & Generation Scheduling

Emissions Monitoring & Compliance

Visual Inspection & Defect Detection

Digital Twin & Plant Simulation

Autonomous Plant Operations

Safety & Risk Management

#### Enterprise Sizes Covered:

Large Enterprises

Small & Medium Enterprises (SMEs)

#### End Users Covered:

Electric Utilities

Independent Power Producers (IPPs)

Renewable Energy Operators

Industrial Captive Power Plants

Government & Public Power Authorities

### Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden



Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of Africa

What our report offers:

Market share assessments for the regional and country-level segments

Strategic recommendations for the new entrants

Covers Market data for the years 2023, 2024, 2025, 2026, 2027, 2028, 2030, 2032 and 2034

Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

Strategic recommendations in key business segments based on the market estimations

Competitive landscaping mapping the key common trends

Company profiling with detailed strategies, financials, and recent developments

Supply chain trends mapping the latest technological advancements

#### Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

##### Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

##### Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

##### Competitive Benchmarking

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