

AI-Powered Energy Market to Grow Significantly Amid Global Grid Modernization

Rising renewable energy demand boosts AI in energy, though high costs may hinder growth; carbon monitoring offers new market opportunities.

WILMINGTON, DE, UNITED STATES, June 18, 2025 /EINPresswire.com/ -- According to a new report published by Allied Market Research, titled, "AI in energy market" was valued at \$5.4 billion in 2023, and is projected to reach \$14.0 billion by 2029, growing at a CAGR of 17.2% from 2024 to 2029.



Artificial Intelligence (AI) in the energy sector involves the use of advanced algorithms and data analytics to streamline and optimize energy production, distribution, and usage. Through AI, energy systems can process massive volumes of data from sources such as smart meters, grids, and IoT-enabled devices to improve operational efficiency, forecast energy demand, and support automated decision-making across the value chain.

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AI is revolutionizing the energy sector by enabling smarter grids, optimizing energy use, and accelerating the transition to a more efficient and sustainable energy future.”

Allied Market Research

AI also plays a vital role in integrating renewable energy sources by managing variability and enabling real-time monitoring of power generation and consumption. It enhances grid stability, supports predictive maintenance of energy infrastructure, and helps utilities respond dynamically to fluctuations in supply and demand. As a result, AI is becoming a cornerstone in the transition to

smarter, more resilient, and sustainable energy systems.

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Artificial Intelligence in the energy Market Dynamics:

The rising demand for renewable energy is a key factor propelling the adoption of artificial

intelligence (AI) in the energy sector. As the global energy mix shifts toward sustainable sources like solar, wind, and hydroelectric power, managing their variability and complexity becomes increasingly challenging. According to the International Energy Agency (IEA), solar PV and wind are expected to account for 95% of renewable capacity expansion, with renewables surpassing coal as the largest source of global electricity generation by early 2025. AI addresses these challenges through advanced predictive analytics, helping forecast energy production and demand by analyzing weather data, historical usage patterns, and real-time consumption. This enables better grid stability and smooth integration of intermittent energy sources.

AI also significantly improves the operational efficiency of renewable energy systems. In solar power, AI can optimize panel positioning to maximize energy capture, while in wind energy, predictive maintenance powered by AI minimizes downtime by identifying potential equipment failures early. Additionally, AI enhances energy storage solutions by optimizing battery charge-discharge cycles, ensuring energy is stored when supply is high and released during peak demand. These capabilities enhance the reliability and attractiveness of renewable energy, driving broader adoption and investment in AI technologies across the energy sector.

Despite its benefits, the widespread implementation of AI in the energy market faces obstacles, particularly high initial investment costs. Deploying AI systems involves considerable expenses related to advanced hardware, software platforms, and skilled personnel. Moreover, energy companies often need to upgrade or modernize existing infrastructure to support AI integration, which adds to the financial burden. These cost-related challenges can slow market growth and limit adoption, especially among smaller players in the energy sector.

On the other hand, AI presents promising opportunities in carbon emissions monitoring and reduction. With increasing global focus on sustainability, AI offers real-time monitoring capabilities by analyzing emissions data from power plants, industrial operations, and transportation systems. This enables companies to identify emission hotspots and implement targeted strategies to reduce their carbon footprint. As regulatory pressure and environmental commitments intensify, AI-powered solutions are expected to become essential tools in achieving emission reduction targets, thus unlocking significant growth potential in the AI in energy market.

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Segment Overview:

The [artificial intelligence \(AI\) in energy market forecast](#) is segmented based on component, deployment, application, and region. By component, it includes solutions and services. Based on deployment, it is divided into on-premise and cloud. By application, the market is categorized into energy efficiency, demand forecasting, infrastructure management, renewable energy management, and others. Regionally, the market is analyzed across North America, Europe, Asia-Pacific, and LAMEA. This segmentation highlights the diverse roles AI plays in optimizing energy systems and enhancing operational efficiency across the global energy landscape.

Artificial Intelligence (AI) in Energy Market – Regional Analysis

North America leads the AI in energy market, primarily due to early adoption of advanced technologies, significant investments in smart grid infrastructure, and strong presence of tech giants and energy companies. The U.S. is at the forefront, leveraging AI for grid optimization, predictive maintenance, demand forecasting, and energy trading. Government initiatives promoting digital transformation in energy systems, coupled with a growing focus on renewable integration and carbon reduction, are further fueling AI adoption across the region's utilities and energy service providers.

Europe and Asia-Pacific are also emerging as major contributors to the AI in energy market. In Europe, countries like Germany, the U.K., and France are embracing AI-driven solutions to enhance energy efficiency, support renewable energy integration, and meet stringent climate targets. The region's focus on sustainability and digital innovation is accelerating AI deployment in both public and private energy sectors. Meanwhile, the Asia-Pacific region—particularly China, Japan, and South Korea—is witnessing rapid growth due to rising energy demand, urbanization, and smart city initiatives. Governments in these countries are supporting AI-based energy management to ensure efficiency and sustainability, positioning the region for significant future growth.

Artificial Intelligence (AI) in Energy Market – Competitive Analysis

The AI in energy market is becoming increasingly competitive as key players and tech giants invest in advanced analytics, machine learning, and predictive maintenance to optimize energy systems. Companies such as IBM, Siemens, Schneider Electric, GE, and ABB are at the forefront, offering AI-powered solutions for grid management, demand forecasting, energy efficiency, and renewable integration. These firms are focusing on strategic partnerships, acquisitions, and R&D investments to enhance their AI capabilities and expand their offerings across utility, industrial, and residential segments. The ability to offer end-to-end solutions, combining AI with IoT and cloud technologies, is a major competitive advantage.

New entrants and startups are also disrupting the market by offering innovative AI-based platforms focused on real-time energy monitoring, decentralized energy systems, and smart home applications. These players are agile and often target niche segments such as peer-to-peer energy trading, AI-driven storage optimization, and carbon footprint reduction. As energy systems become more digital and decentralized, the competition is expected to intensify, with companies striving to deliver scalable, cost-effective, and secure AI solutions to meet the growing demand for smarter and more sustainable energy infrastructure.

Key findings of the Artificial Intelligence (AI) in Energy Market study:

1. **Rising Adoption Across Energy Applications:** AI is increasingly being used in energy forecasting, grid optimization, asset management, and predictive maintenance, enhancing operational efficiency across the value chain.

2. Utilities and [Renewables Lead AI Integration](#): Utility companies and renewable energy providers are the top adopters of AI solutions, using them to balance supply-demand, reduce downtime, and integrate variable energy sources.
3. Asia-Pacific and North America Dominate Growth: These regions are leading the market due to strong investments in smart grid infrastructure, clean energy initiatives, and supportive government policies.
4. Cloud and IoT Synergy Enhances AI Impact: Integration of AI with cloud computing and IoT devices is accelerating digital transformation in energy systems, enabling real-time monitoring and automation.
5. Startups and Tech Giants Fuel Innovation: The market is highly competitive, with established firms and emerging startups driving innovation through R&D, partnerships, and AI-driven energy management platforms.

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