

Big Data Analytics In Energy Sector - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

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Abstracts

The Big Data Analytics Market In Energy is expected to grow from USD 9.56 billion in 2024 to USD 16.16 billion by 2029, at a CAGR of 11.07% during the forecast period (2024-2029).

Big data solutions aid in collecting and processing data required by oil and gas firms to improve reservoir production efficiency. Various downhole sensors are used to obtain the data (temperature, acoustic, pressure, etc.). Companies, for example, can use big data analytics to create reservoir management systems that provide fast and actionable information about changes in reservoir pressure, temperature, flow, and acoustics. This allows companies to gain greater control over their operations while enhancing profitability.

Key Highlights

Every process currently is driven and supported by the energy sector. Every entity requires more energy than ever before and wants it at a reasonable price, and the advancement of big data and analytics has made it a real possibility. Big data enables enterprises to collect, store, and analyze massive amounts of information (terabytes and petabytes). For years, the power and energy industries have worked with big data and routinely processed large amounts of data.

Unlike conventional electricity meters, which provide data every month, smart meters can give readings on a minute basis that are on a more granular level, causing considerable data generation and resulting in a volumetric increase in data gathered. Data is being collected from both the demand and supply side, owing to the increasing

application of sensors, wireless transmission, network communication, and cloud computing technologies. ?

The volatility in the oil prices leads to high expenditure on energy-related projects, which creates a major demand for big data analytics. The need for quality information is increasing, which is expected to boost the market's growth.?

In the current scenario, the lack of digital skills and digital mindsets aggravated by the lack of skilled professionals and workforce to handle the unstructured data effectively for analysis is one of the factors hindering the market growth. ?

Energy consumption is directly impacted by macroeconomic variables such as GDP growth rates, industrial production, and consumer expenditure. Energy consumption generally rises with economic growth in several sectors, including manufacturing, transportation, and residential. To optimize the processes involved in production distribution and consumption, the energy sector needs increasingly sophisticated analytic solutions. For instance, according to a World Bank estimate, the North American GDP, which was USD 32.32 trillion in 2023, is predicted to increase by 1.5% in 2023-24, suggesting that corporate activity and possible big data analytics in energy sector investments are projected to flourish.

Big Data Analytics in Energy Sector Market Trends

Grid Operations Application Segment is Expected to Hold Significant Market Share

The demand for energy across the world is rising. According to the International Energy Agency, between 2005 and 2030, energy needs are estimated to expand by 55%, with the demand rising from 11.4 billion metric tons of oil equivalent to 17.7 billion, and the forecasted global energy consumption will be 886.3 quadrillion British thermal units by 2050. With renewable energy sources, such as solar power, which contributes electricity to the power grid, utilities can use demand response analytics to determine the timings to release these power sources during peak demand.?

Data analytics possess a critical role in modern industrial systems. In the power grid, traditional fossil fuels face the problem of depletion, and de-carbonization demands the power system to reduce carbon emissions. Smart grid and super grid are effective solutions to accelerate the pace of electrification with high penetration of renewable energy sources.

Traditional electricity meters used in distribution systems only produce a small amount of data that can be manually collected and analyzed for billing purposes. The huge volume of data collected from two-way communication smart grids at various time resolutions requires advanced data analytics to extract important information for billing information and the status of the electricity network. For instance, the high-resolution user consumption data can also be used for demand forecasting, customer behavior analysis, and energy generation optimization.

Smart grid big data analytics can potentially transform the utility industry. However, it needs to be appropriately used to maximize its value. Smart grid analytics divided itself into back-office analytics (certain functions, like overseeing grid connectivity, load forecasting, and reliability reporting) and distributed analytics (analyzing data from meters, sensors, and other devices).

Predictive maintenance and fault detection based on data analytics with advanced metering infrastructure are more crucial to the security of the power system. They are expected to be the solutions that are expected to be now utilized by the early adopters as the solutions have been integrated into their organization. GE's New Analytics Technologies is boosting grid efficiency. The company has also rolled out a new portfolio of predictive analytics that could allow utilities to use data from transmission and distribution networks to achieve better operational efficiency as more distributed assets are introduced to the grid.

North America is Expected to Hold Significant Market Share

North America is one of the leading innovators and pioneers in the adoption of big data analytics. The region offers lucrative opportunities for market growth, exhibiting a massive demand for big data analytics in the energy sector owing to the strong foothold of big data analytics vendors.

The United States plays a key role in proliferating the demand from the North American region compared to Canada. The country has increased demand, especially from oil and gas, refining, and power generation segments. The majority of Americans consider solar and wind power as good sources of energy for the environment. Around 65% of the population suggests that the environmental effect of wind turbine farms is better than that of most other sources.

The oil and gas companies benefit from applying predictive maintenance solutions. IoT-based predictive maintenance enables oil and gas companies to identify possible failures and increase the production of highly critical assets. Thus, companies such as Chevron employed IoT development to roll out a predictive maintenance solution that helps mitigate corrosion and pipeline damage. The solution uses sensors installed across the pipeline to measure the pH, aqueous CO₂/H₂S content, and gaseous leakages along with the pipeline's internal diameter and thickness. The solution collects real-time sensor data and passes it to the cloud for evaluation, analysis, and prediction.

The region has been at the forefront of adopting smart grid technology. A large number of companies operating in the energy utility sector in the region have either fully deployed big data analytics or are in the process of implementation. Many large investor-owned utilities in the US market are still in the process of rolling out smart meters for their customers. According to the US Energy Information Administration, 119 million smart meters were to be installed in the US by the end of 2022, whereas 128 million smart meter deployments were completed by the end of 2023.

Big data is extensively being used for the accurate prediction of meteorological variables in the region. Disparate data sources and models are observed using computational intelligence techniques for real-time analysis. Recently, Bazefield, the market-leading renewable monitoring and analytics platform with off-the-shelf support for wind power, solar, hydro, biomass, battery storage, and other renewable technology sources, enhanced its solar capabilities by embedding the gold standard EnSight, machine learning-based solar advanced analytics package, into Bazefield as one single platform.

Big Data Analytics in Energy Sector Industry Overview

Big data analytics in the energy sector market is highly fragmented due to the presence of global players and small- and medium-sized enterprises. Some of the major players in the market are IBM Corporation, Siemens AG, SAP SE, Dell Technologies Inc., and Accenture PLC. Players in the market are adopting strategies such as partnerships and acquisitions to enhance their product offerings and gain sustainable competitive advantage.

November 2023 - Siemens partnered with Copperleaf, a Canadian-based provider of asset planning software and analytics software for critical infrastructure companies, to

grow its existing ecosystem of grid software partners. The strategic partnership aims to optimize investment and technical grid planning for transmission system operators (TSOs) and distribution system operators (DSOs). The partnership will bring extensive power systems and grid control domain expertise, combining Siemens grid planning, operations, and maintenance software and Copperleaf's assets management capabilities.

Additional Benefits:

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