NTT DATA

Key technologies for energy traders

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Section 1: Introduction

The energy trading sector faces a myriad of challenges due to the complexities of today's market conditions, geopolitical risks and changing regulatory requirements.

One of the biggest challenges is the growing volatility of energy prices, which impacts all parties – energy consumers, producers, investors and energy traders. This growing volatility adds complexity to the energy trading environment and is predicted to increase in coming years (see Figure 1).

Although Power Purchase Agreements (PPAs) provide a foundation for prices that renewable energy developers and investors can depend on, there is still a risk associated with wholesale market fluctuations.

That explains why energy trading, once dominated by utilities, trading houses, and banks, has now expanded to include renewable energy project developers, Distributed Energy Resources (DER) operators and offtakers.

The more complex and dynamic generation energy mix necessitates quicker transactions to match production volatility, leading to an increased emphasis on fast data analysis, trade speed, and decision-making.

The industry has seen the wider adoption of automated trading, increasingly controlled by AI and algorithms, to speed up decision making and trade initiation.

This shift towards automation underscores the importance of robust data management, visualization, and consumption, impacting areas like scheduling, planning, forecasting, and settlements.

Cloud deployment is on the rise, with buyers seeking interconnected applications forming ecosystems that leverage AI, machine learning, and automation throughout workflows. Managed services are increasingly adopted to maintain these applications and technical environments to highlight their combined impact of these technologies on energy trading operations. From optimizing portfolio performance to enhancing regulatory compliance, the convergence of AI, algorithmic trading, cloud computing, and real-time analytics offers a holistic approach to addressing the diverse challenges faced by energy trading companies today.

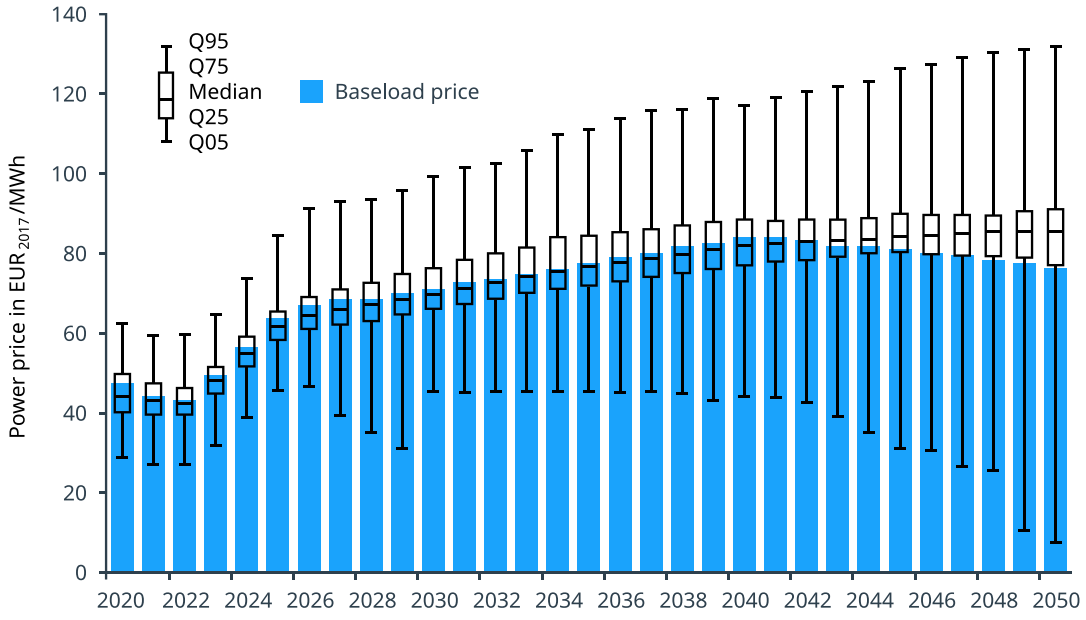


Figure 1. Predicted increase in price volatility in selected EU countries. Credit: Energy Brainpool.

Section 2: Artificial Intelligence

AI is poised to redefine the energy trading sector by bringing powerful new capabilities to a range of business areas, including data analysis, forecasting, and decision support.

The key advantage of AI is that it has the ability to understand patterns, generate new information, and, most importantly, adapt to changing market dynamics. This adaptability is particularly relevant to energy trading and translates to a more nuanced understanding of complex variables influencing the market.

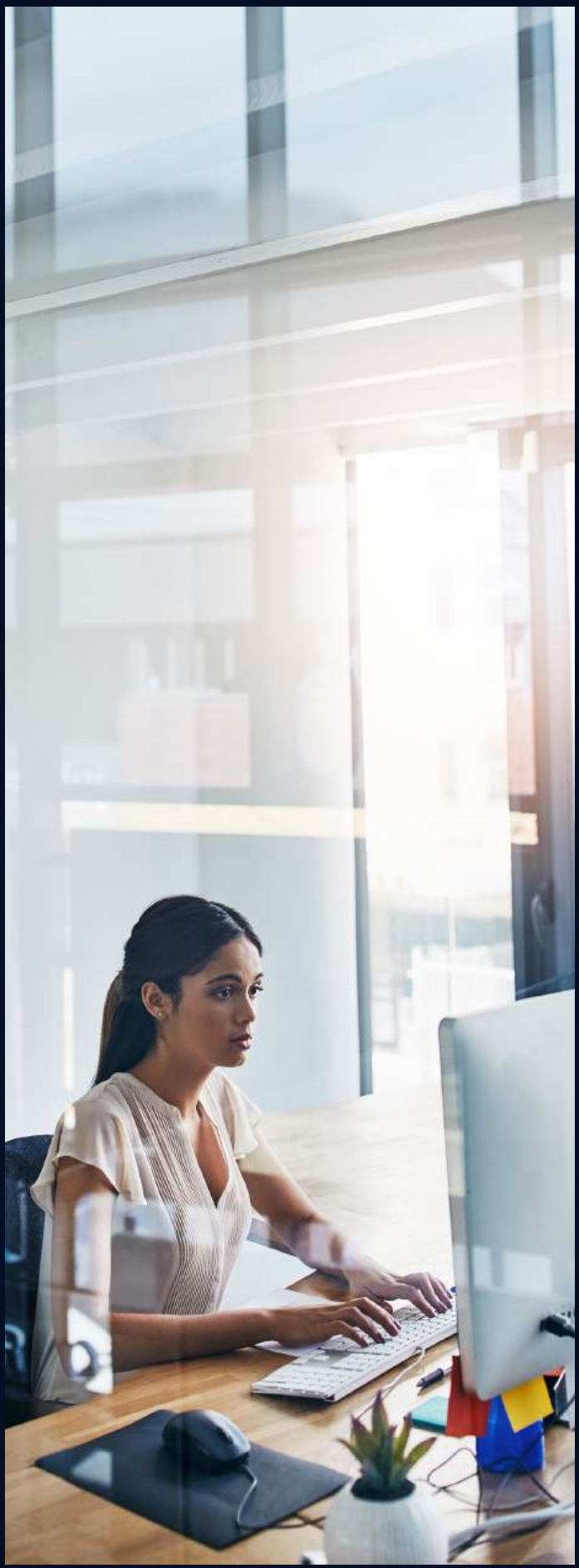
For example, AI can help traders get better zonal and location marginal pricing from historical trends but to do so effectively requires the analysis of large datasets relating to weather, consumption, load, demand, curtailment patterns and so on. For that reason, AI systems will increasingly be married with big data analytics solutions.

GenAI is a type of AI that has come to prominence with the popularity of services such as ChatGPT GenAI, unlike traditional AI, does not rely solely on historical data or predefined rules.

In the context of energy trading, the chatbot interface of GenAI services allows users to query the forecasts generated by an analytics application using natural language.

AI can proactively notify users about their positions and alert them of potential trades. While big data and algorithmic analysis have expanded trading processes, as described below, GenAI offers a more user-friendly face to these quantitative models, making them more accessible to traders.

In short, AI has the potential to reduce overall operational costs while also maximizing margins.



We can identify key areas where AI will impact energy trading:

Market price prediction and volatility analysis

AI can analyze vast datasets including historical market prices, geopolitical events, and environmental factors, to predict future price movements and assess market volatility, complex patterns and correlations.

Demand forecasting and consumption patterns

Energy consumption is influenced by a wide range of factors, such as weather conditions, industrial activities, and societal trends. Energy trading desks can optimize their strategies based on precise predictions, ensuring efficient energy distribution and minimizing wastage.

Optimizing renewable energy investments

AI can assist in optimizing investments in renewable energy sources by evaluating factors like weather patterns, regional energy demands, and government policies. This enables energy traders to strategically invest in renewable projects, balancing sustainability goals with economic viability.

Risk management and scenario analysis

Risk management solutions that incorporate AI can conduct scenario analyses based on a multitude of variables and simulate different market scenarios, including unexpected geopolitical events or regulatory changes, allowing energy desks to proactively identify and mitigate potential risks.

Automated decision support systems

These systems can process a vast amount of information, generate insights, and assist traders in making data-driven decisions, ultimately improving the efficiency and effectiveness of energy trading operations.

Carbon emission reduction strategies

AI can analyze data related to energy production, consumption, and carbon emissions. This enables the development of effective strategies to reduce carbon footprints, comply with regulations, and contribute to environmental goals.

Regulatory compliance and reporting

Navigating complex regulatory landscapes is a constant challenge for energy trading. GenAI can streamline compliance processes by continuously monitoring regulatory changes and automating the generation of compliant reports.

Section 3: Algorithmic trading

Algorithmic trading has played a pivotal role in the transformation of energy trading and today is almost essential for even small trading desks, given that the volume and frequency of trades now surpass the capacities of human traders.

According to statistics from the European Power Exchange (EPEX) around 55% of the total volume traded on EPEX SPOT is being executed automatically.

One of the drivers for algo trading is the growth of energy assets such as DER and battery energy storage systems (BESS), which are more complex to optimize.

These assets are typically owned by small companies, who realize they must use algo trading to compete with the established players in energy markets.

Unlike traditional manual trading, algorithmic trading relies on pre-defined rules and algorithms to execute trades autonomously. Most recently, Machine Learning (ML) is being used in conjunction with the traditional algorithmic trading approaches to identify patterns in historical data and make predictions based on those patterns. By including ML, the algorithms can learn from past experience and adapt to changing market conditions.

These are some of the reasons why trading desks are using algorithmic trading:

Faster speed, greater accuracy

Algorithmic trading operates at speeds impossible for human traders to match, allowing trading desks to respond to changing conditions in real-time and without human error. This accuracy is crucial in energy trading, where small discrepancies in execution can have significant financial implications.

Improved risk management

Automated risk controls help prevent large losses and ensure that trading activities align with predefined risk parameters, removing the emotions and biases that inevitably affect human decision-making, and leading to more rational trading decisions.

Greater liquidity

Algorithmic trading contributes to market liquidity by providing continuous buy and sell orders. This liquidity benefits the overall functioning of energy markets and ensures that trades can be executed without significant price impact.

Diversification

Energy trading algorithms can implement a diverse range of strategies, from simple execution algorithms to complex statistical arbitrage models. This flexibility allows energy trading desks to adapt to different market conditions and optimize their overall portfolio.

Adaptability

Algorithms can adapt to changing market conditions, automatically adjusting trading strategies based on incoming data. This adaptability is crucial in energy markets, where factors like weather patterns and geopolitical events can influence prices rapidly.

Section 4: Real-time analytics

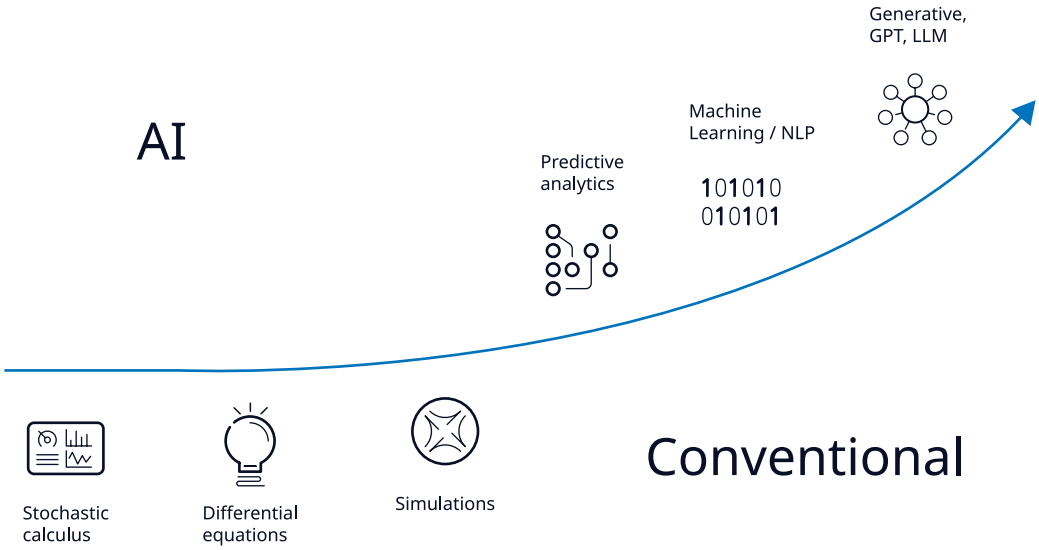


Figure 2. The evolution of analytics in energy trading.

The use of trading analytics today extends far beyond obtaining retrospective insights. Predictive analytics has become a valuable tool for energy trading firms, enabling them to forecast market trends, identify potential risks, and proactively adjust strategies.

As energy traders operate increasingly complex portfolios, they demand more advanced real-time analytics capabilities that will increasingly be supported by ML and AI technologies.

They need solutions that can ingest, enrich and analyze data from multiple sources and then perform analytics at the speed required for high-frequency trading, decision-making, and automated action.

In addition, they need a solution that can scale to support the ever-growing data volumes from traditional and new markets, while providing surveillance to avoid regulatory breaches.

Advanced real-time analytics empowers decision-makers to distil this information into actionable intelligence, providing a competitive edge in an industry where split-second decisions can significantly impact outcomes.

Some examples of how analytics is used in energy companies:

Demand forecasting

By analyzing demand fluctuations, energy traders can make informed decisions on when to buy or sell energy. The trend is to run the demand models several times per day, sacrificing accuracy to gain greater confidence of how the market will evolve in in the next few hours.

Price forecasting

Predictive analytics models analyze historical pricing data, market fundamentals, and geopolitical events to forecast future energy prices. Energy trading firms use these forecasts to anticipate price movements, adjust trading strategies, and make decisions that maximize profitability.

Risk management

Analytics help assess and manage various risks associated with energy trading, including market volatility, credit risk and portfolio structure. By identifying potential risks through data analysis, decision-makers can implement risk mitigation strategies and ensure the resilience of their portfolios.

Asset performance monitoring

Analytics are used to monitor the performance of energy-generating assets, such as wind farms or solar plants. Predictive maintenance analytics can forecast potential equipment failures, allowing operators to schedule maintenance activities proactively, minimizing downtime and the risk to trading positions.

Portfolio optimization

Decision-makers use analytics to optimize their energy portfolios in a diversified and efficient energy mix that aligns with the company's operational, financial and environmental goals, and market conditions.

Carbon emission tracking

Analytics is used to monitor and analyze carbon emissions from energy production and consumption. Companies can assess their carbon footprint, comply with emissions regulations, and implement strategies to reduce environmental impact.

Market intelligence

Analytics tools gather and analyze market intelligence, helping decision-makers stay informed about industry trends, competitor activities, and emerging technologies. With the rise of GenAI, nowadays is easier and faster to access the data, extract insights and produce reports.

Section 5: Cloud computing

Cloud computing has helped spurred the growth of the energy trading and risk management sector (ETRM), reflecting the trend in the utilities and other industries for new IT systems to be invariable developed on cloud platforms.

By 2025, 35% of energy utilities will drive at least 30% of their business via digital platforms based on cloud native technologies, according to market research firm IDC.

Cloud-native, modern, and scalable ETRM platforms are being widely adopted as the primary or supplementary solution for energy and commodity trading, accommodating both new market entrants and those with existing legacy systems.

The latest cloud-based ETRM systems support algorithmic and high-frequency trading and facilitate 24/7 trading across various markets with seamless integration with scheduling tools for fully automated trade capture.

Cloud-based trading solutions also make it easy to participate in energy markets using Direct Market Access (DMA), which allows the trading company to significantly reduce the complexity of its operations by utilizing the contract infrastructure, credit lines and collateralization procedures of an existing market participant.

These are some of the benefits of cloud-based ETRM solutions:

Scalability and flexibility

Cloud services offer on-demand scalability, enabling energy trading desks to adapt to varying workloads and efficiently handle data-intensive tasks during peak trading periods.

Integration of new capabilities

Cloud computing facilitates the integration of new technologies seamlessly. Energy trading firms can easily adopt and integrate innovative solutions, such as GenAI, ML, and data analytics, to enhance their operational capabilities.

Real-time data processing

Cloud platforms provide the computational power necessary for real-time data processing, essential for quick decision-making in energy trading. Advanced analytics and algorithmic trading strategies benefit from the cloud's processing capabilities, ensuring timely insights and responses to market changes.

Cost efficiency

This cloud computing model eliminates the need for significant upfront investments in infrastructure, making it an attractive option for both established players and new entrants in the energy trading sector.

Business continuity

Cloud computing provides robust disaster recovery solutions, ensuring data redundancy and backup capabilities for energy companies, which is particularly important with the growth in cyberattacks that target grid operators and energy infrastructure.

Section 6: How NTT DATA can help

Leveraging our specialist knowledge and experience with energy, utilities and commodities, we deliver value to organizations that need to upgrade and deploy an ETRM system.

NTT DATA supports energy trading businesses to manage and expand their businesses. With a comprehensive portfolio of specialty services that assist with vendor selection, deployment and implementation, NTT DATA provide core services to deliver outcomes at every stage of ETRM performance.

Our global team of more than 250 commodity specialists collaborates with businesses daily to help solve their challenges through a combination of technology enablers and human centric change.

The team is supported by the world-class capabilities and expertise of a technology services company that has been in operation for 150 years, with more than 310,000 professionals in 88 countries.

We work with more than 85% of Fortune Global 100 companies. We also work with partners to provide complete solutions.

By collaborating with recognized industry leaders as well as digital disrupters, we empower our clients to effectively analyze and transform their business.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