LTIMindtree BlueVerse

POV

Agentic AI

The Next Frontier in Innovation and Safety in Energy and Utilities

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Introduction

Imagine it's 2030. A Category 4 hurricane barrels toward the US Gulf Coast. As evacuation orders are issued, an autonomous AI agent embedded within the regional energy grid springs into action. It reroutes power from offshore wind farms to inland hospitals, optimizes battery storage across microgrids, and dispatches drones to inspect vulnerable substations—all without a single human command. **This isn't science fiction. It's the emerging reality of AI in energy and utilities, powered by Agentic AI.**

While Generative AI has captured headlines for its ability to create content, make predictions, and answer questions, its capabilities often stop short of execution. Agentic AI bridges this gap. **These intelligent systems act independently, set goals, and dynamically adapt to complex environments. Unlike traditional rule-based automation, Agentic AI is proactive, context-aware, and capable of multi-step reasoning.**

According to Gartner, by 2028, 33% of enterprise applications will incorporate Agentic AI, with 15% of day-to-day decisions made autonomously. This shift marks a turning point for industries—especially energy and utilities—where the stakes are high and the need for innovation is urgent.

As the sector faces mounting pressure to reduce emissions, enhance safety, and improve operational efficiency, **AI for energy innovation is no longer optional—it's essential.** Agentic AI offers a transformative approach, enabling autonomous operations that continuously learn from their environment and optimize outcomes in real-time.

This point of view explores how Agentic AI is a technological upgrade and strategic imperative for energy companies navigating the dual challenges of decarbonization and digital transformation. Through real-world use cases, it illustrates how autonomous AI agents are evolving from tools to digital collaborators—helping energy and utility companies transition to a smarter, safer, and more sustainable future.

Why is Agentic AI a natural fit?

Let us consider some factors that make the adoption of Agentic AI compelling for energy and utility companies.

01

Vast and complex data repository

Energy companies generate vast datasets (e.g., seismic imaging, IoT sensors data, Supervisory Control and Data Acquisition systems) that can be leveraged to train AI models and generate actionable insights.

02

Cost and margin improvements

The energy market faces price volatility (e.g., oil price swings) and high capital costs related to exploration and drilling. AI agents can reduce such costs and suggest hedging strategies based on the demand-supply pattern.

03

Ageing infrastructure and workforce

Many energy facilities operate with ageing assets and a retiring workforce. AI agents can play a crucial role in preventing equipment failure and extending the operational life of such assets. Agentic AI can also augment the retiring workforce, filling any knowledge and skill gaps.

04

Strict regulatory compliance

Governments are imposing stricter emission and safety regulations for energy companies. AI agents can help with real-time monitoring and safety audit reporting activities.

05

Geopolitical and supply chain risks

Energy supply chains are vulnerable to geopolitical tensions and disruptions. AI models can forecast disruptions, optimize logistics, and ensure business continuity.

Sustainability goals

06

As energy companies embark on their sustainability journey, AI agents can directly contribute to decarbonization by streamlining energy usage and reducing waste.

Potential application areas in energy

Let us look at potential application areas in the energy industry where Agentic AI can be transformative.

Exploration and seismic analysis

Geospatial exploration agents can analyze vast seismic datasets and suggest optimal drilling locations based on probability, risk, and cost. This reduces the time-to-discovery and exploration costs for energy companies.

Drilling operations

Autonomous drilling agents can monitor and adjust drill bit parameters in real-time using sensor data, thus reducing the Non-productive Time (NPT) and improving safety.

Production optimization

These agents can monitor hydrate formation, scaling, and wax deposition in wells and manage production flow rates using reservoir simulation data, resulting in better hydrocarbon recovery.

Midstream operations

AI agents can use route optimization and predictive scheduling algorithms to efficiently forecast demand and schedule transportation. They can also analyze sensor and drone data used to monitor pipeline conditions and detect anomalies such as leaks and corrosion.

Downstream intelligence

Agentic AI enables demand-driven production planning in refineries and optimizes blending processes to meet product specs like octane rating and sulfur content. Selecting optimal feed stock and reducing costly additives balances quality and cost. Agentic AI also supports market segmentation analysis to align products with regional demand. This showcases the potential of AI for energy innovation in refining operations.

Potential application areas in the power and utilities sector

Autonomous grid management

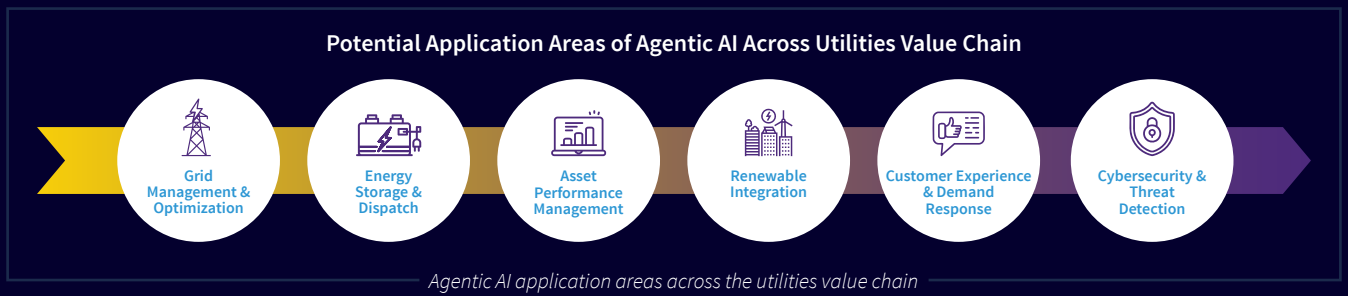
Agentic AI is revolutionizing smart grids through dynamic load balancing and preventing grid failure. AI agents can monitor grid health, anticipate outages, and redirect power flows before disruptions occur.

Energy storage and battery optimization

With the rise of renewable energy, efficient energy storage is becoming increasingly essential. AI agents can decide when to charge / discharge batteries based on market prices, demand forecasts, and grid conditions. Agents can also prevent overuse and degradation of energy storage systems, extending the battery lifespan.

Renewable energy generation forecasting

Unpredictability is a significant challenge for energy generation from renewable resources such as solar, wind, and hydropower. Agentic AI can address this issue through intelligent forecasting using live satellite data, atmospheric conditions, and historical trends.



Agentic AI application areas across the utilities value chain

Challenges and the way forward

While implementing Agentic AI has immense potential for the energy and utility industry, it comes with its own challenges.

01

Regulatory and compliance

The energy and utility industry is highly regulated. Autonomous decision-making by AI agents must align with evolving regulations, which may vary by region and jurisdiction.

02

Cybersecurity and privacy

As AI agents take control of critical energy infrastructure, safeguarding against potential cyberattacks is of utmost importance. Secure data exchange is necessary to prevent unauthorized control of assets and protect customer privacy.

03

Economic constraints

Implementing Agentic AI involves a high initial investment in building infrastructure and training models. Demonstrating ROI and long-term value can be challenging initially.

04

Workforce readiness and trust

Incorporating AI agents in day-to-day operations may face resistance from the workforce. This may require training and AI literacy for the existing staff. Also, Agentic AI systems must offer transparent reasoning and audit trails to gain stakeholder (e.g., operators, regulators) confidence.

05

Governance and accountability

Since Agentic AI involves high-stakes energy decisions, it is imperative to create governance frameworks for trust, compliance, and accountability. Clear protocols for human-in-the-loop decision-making must be established to prevent autonomous overreach.

Use cases

Upstream drilling automation

Consider a use case from a Norway-based provider of AI, machine learning, and predictive analytics solutions for the energy industry, which delivers intelligent drilling support and optimization capabilities. The company has built three Agentic AI models or 'AI-powered engineers' to support the oil and gas drilling process – an AI-powered drilling engineer; an AI-powered well design and planning engineer, and an Agentic AI-powered data management engineer that automates data exchange between different software, unifies and interconnects all data needed, and consolidates multiple workflows. In addition to managing data integration and reporting, one AI agent is responsible for generating documentation and analytical summaries. When deployed together, these intelligent agents collaborate seamlessly—one designs and simulates well plans, another oversees real-time drilling operations with autonomous decision support, and a third ensures smooth data exchange across platforms while automating reporting workflows. This setup also enables the creation of daily drilling reports using agentic AI capabilities. The use case illustrates how agentic AI can transform the oil and gas value chain—from exploration and production to refining and distribution—by enhancing efficiency, decision-making, and data-driven operations.

AI Agents in Oil & Gas drilling application

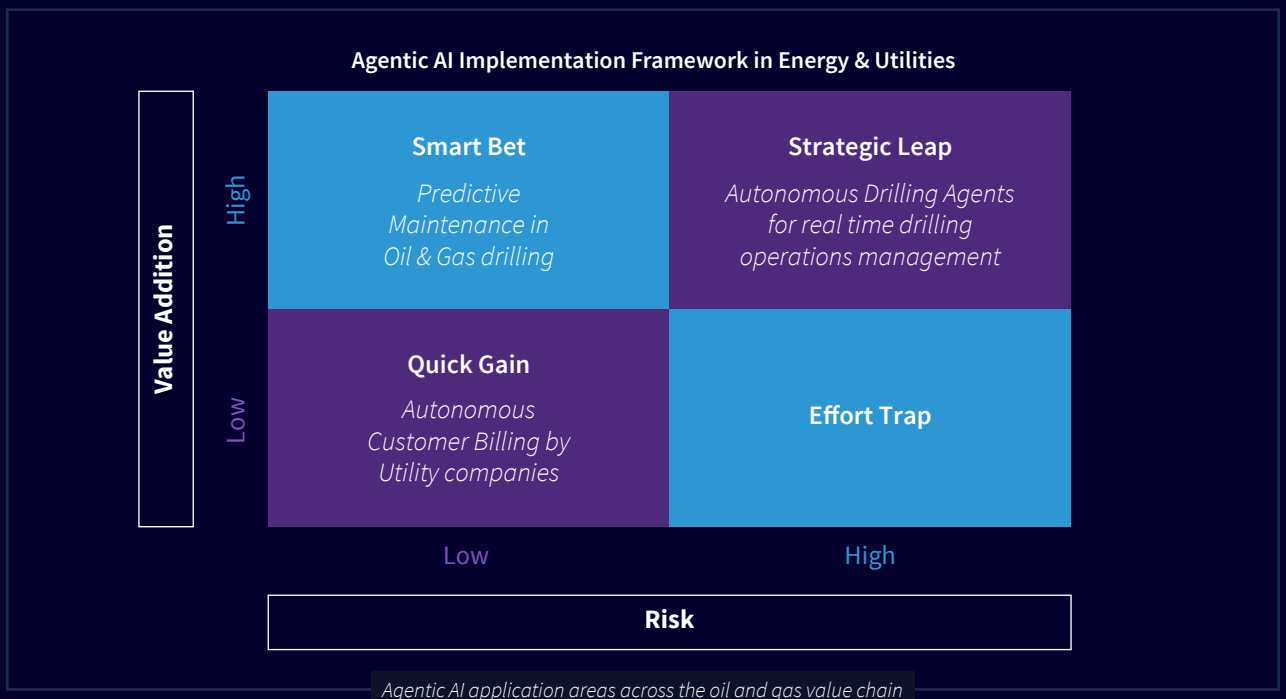
Energy audit transformation

A compelling example of Agentic AI in action comes from AES, a US-based energy company. AES places safety at the core of its operations, conducting over 1,500 management program audits annually—both internal and external. Each audit traditionally required around 100 employee hours, involving meticulous document reviews and accuracy checks. To streamline this labor-intensive process, AES deployed Agentic AI models, selecting Anthropic's Claude on Vertex AI for its robust multi-language capabilities and advanced document analysis. After executing more than 50 agent-led audits, the results were transformative: audit costs dropped by 99%, accuracy increased by 10–20%, and the turnaround time improved by 99.7%.

This case study exemplifies how AI enhances operational efficiency in energy and utilities and redefines safety standards. By automating complex, repetitive tasks, Agentic AI empowers energy companies to focus on strategic priorities while ensuring compliance and reliability.

Charting the AI roadmap

While Agentic AI implementation has many challenges, the key is to formulate a clear implementation strategy. Energy and Utility is a safety-critical industry where delegating critical functions to autonomous AI agents is a very challenging task. AI agents act fast and at scale. They don't stop to reflect like a human unless such checks are in-built in the design. One small logic flaw or error in design can ripple across systems, resulting in real-world catastrophic events such as oil spillage or grid failure. With the latest AI models, such errors can be minimized but that comes at a higher cost. The tradeoff between the cost and accuracy is something that Energy and Utilities companies need to consider at the preliminary stages of charting their AI roadmap. Another consideration should be identifying the right use case for implementing Agentic AI. Identifying low risk use cases to start with would be a good approach.



Agentic AI application areas across the oil and gas value chain

Utility companies can initiate their AI journeys with use cases such as Autonomous Customer Billing, which can be a quick gain. While AI agents can help automate billing cycles and detect anomalies in customer bills, this use case can improve operational efficiency without impacting critical infrastructure.

As a next step towards AI adoption, energy and utility companies can identify low-risk, high-value use cases such as predictive maintenance in oil and gas drilling. AI agents can generate predictive insights based on sensor data from drilling equipment, which can help prevent unplanned equipment failure. Such cases can add significant value to organizations, especially in reducing downtime and improving safety for drilling operations.

At the final stage, companies should target strategic use cases that can transform their business operations. Autonomous drilling agents are a good example. AI agents can manage real-time drilling operations, continuously learn from sensor data, and adjust drilling parameters to optimize performance and safety. Such cases involve a paradigm shift in upstream oil and gas operations. It can move the industry from reactive, human-led processes to proactive, AI-orchestrated execution, unlocking new levels of performance, safety, and sustainability.

Conclusion

Agentic AI is poised to become the backbone of the digital transformation in the energy industry. As AI models evolve to be more autonomous, adaptive, and trustworthy, energy companies must embrace a phased adoption approach—starting with low-risk use cases and scaling toward strategic leaps. The real race isn't just about building standalone AI agents but integrating them seamlessly into complex legacy systems. Companies that act now will seize the first-mover advantage, shape industry standards, and win the race toward intelligent, resilient, and sustainable energy operations.

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Ayan is a seasoned leader in consulting, business analysis, and program management with over 12 years of experience in the energy and utilities sector. He currently drives digital transformation for global energy clients through data and AI-led solutions. His expertise spans strategic program delivery, stakeholder engagement, and technology enablement. Ayan holds an MBA from IIM Bangalore and is passionate about leveraging innovation to create sustainable business impact.