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# Quick Answer: What to Expect When Expecting Generative AI in Power and Utilities

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Initiatives: Energy and Utilities Digital Transformation and Innovation

GenAI can enable new intelligent activities and automation capabilities at the scale and pace required for operational efficiency strategies in power and utilities. Digital leaders must evaluate where it fits into their operational efficiency improvement strategy, seize opportunities and redress challenges now.

## Quick Answer

**What should I expect to come with generative AI (GenAI) in power and utilities?**

- Fast, no-regret use cases such as application code development will prove value quickly and help develop expertise.
- Over time, game-changing use cases will proliferate, altering industry and market dynamics.
- Generative AI will bring unanticipated risks, requiring new governance processes and controls.

## More Detail

### Fast, No-Regret Use Cases Will Prove Value and Spur the Development of Expertise

Power and utilities business strategies continue to place more weight on technologies that optimize performance, reduce risk and increase efficiency. Interest and investments in generative AI are rapidly increasing. For most companies, the first wave of generative AI use cases will focus on well-defined needs that deliver incremental value and build capabilities. These no-regret use cases can be organized into four categories (see Figure 1):

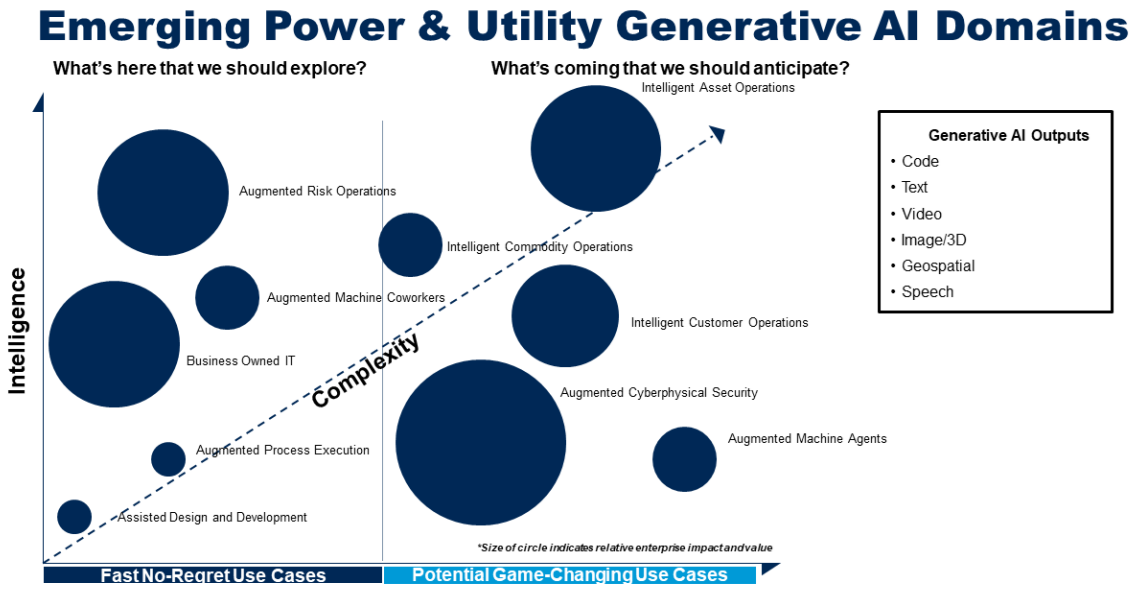
- **Machine-generated code that will alleviate tedious tasks** and allow developers to focus on creative solutions. Examples include:
  - Reducing the time to create and debug code, allowing programmers to focus on delivering creative new functionality.
  - Remedying metadata by automatically correcting mistakes/omissions and improving data consistency though consistently applied standards.

- **Augmented process execution including model training** when insufficient data is available. Examples include:
  - Integrating, consolidating and strengthening the pool of historical operating data, leading to better identification of performance patterns.
  - Creating new virtual sensors that combine data from existing physical sensors to create a virtual proxy that may be more accurate than best-in-class physical sensors.

- **Augmented virtual co-workers that can assist** in the creation of media, images, text, video and audio to align multicompany project teams and train technical field workers. Examples include:
  - Consolidating information on plant and network equipment (e.g., operating manuals, specifications, user guidelines, maintenance requirements, etc.) to boost productivity.
  - Producing marketing collateral for project pitches to regulators, communities and investors to build support and momentum for project approval.

- **Deploying smart assistants that deliver relevant information** to teams making fast risk decisions, performing infrequent, but complex tasks, or that create multidisciplinary alignment. Examples include:
  - Providing access to relevant content in enterprise knowledge systems through natural language queries.
  - Integrating information on specific business assets to optimize operation responses related to logistics, trading, pricing, maintenance and operations.

Figure 1: Emerging Power & Utility Generative AI Domains

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## Over Time, Game-changing Use Cases Will Emerge and Proliferate, Altering Industry and Market Dynamics

As soon as initial use cases lay a foundation for understanding the business value of generative AI, it may become the overarching structure shaping future technology investments. This will occur because generative AI integrates analytic methods that are already being used in a fashion that allows companies to pursue game-changing innovations. Potential examples include:

- **Intelligent commodity operations using probabilistic reasoning in combination with artificial data.** This involves using mathematics to uncover hidden correlation in large amounts of data. For example, generative AI can consolidate environmental data from diverse sources (e.g., supply, field sensors, plant-based computer vision, commercial contracts, lab analyses, satellite imagery, etc.) and make groundbreaking improvements to the accuracy of commodity supply and demand inputs and drivers.

- **Augmenting cyber-physical security using anomaly detection.** This involves using rule-based systems to capture, leverage and maintain existing knowledge at scale. By analyzing sensor data across portfolios of equipment, generative AI can detect hard-to-see risks or operational anomalies and develop innovative algorithms that can apply rule-based decisions 24/7 across the entire business footprint.

- **Intelligent customer operations.** Generative AI can create personalized customer experiences by generating content tailored to the individual customer's needs and interests. For example, a utility company could use generative AI to create personalized energy usage reports showing customers how to reduce their energy consumption.This involves automating “what-if” modeling to find optimal levels that balance trade-off decisions across multiple constraints. For example, generative AI can deliver impactful operating margins by simultaneously optimizing product price and context in response to changes in capacity and flexibility and also simultaneously in response to changes in market and off-market prices.

- **Augmented machine agents using agent-based operational computing.** This involves integrated and orchestrating IT, operational technology (OT) and engineering technology (ET) commuting systems. For example, generative AI can produce geospatial and geotemporal events that enable enterprises to better model and manage operations, enabling real-time adjustments to operating parameters that deliver impressive reductions in unplanned downtime, efficiency improvements and waste reduction.

## Generative AI Will Bring Risks, Requiring New Governance Processes and Controls

Energy and water utilities face new challenges when adopting generative AI. With every technology advancement and impact from generative AI, technology and business leaders must consider added risks and vulnerabilities. Digital leaders must consider taking steps to overcome the following challenges and stay ahead of trouble. Common challenges include:

- **Cyber and cyber-physical security.** Hackers can use techniques like prompt injection to introduce malicious code and spyware into enterprises.

- **Lack of expertise.** Implementing generative AI requires a deep understanding of the underlying algorithms, data requirements and model training techniques.

- **Performance validation.** While AI can automate the generation of requested code, the generated code's performance depends upon the request's format. The result may fail to deliver the intended impact, requiring testing.
- **Ethical considerations.** Generative AI models learn from existing codebases, which may introduce biases or replicate flawed patterns in the training data, such as priority given to one customer class over another.
- **Intellectual property and legal considerations.** There will be legal implications when associated with the training data used by generative AI. Companies must ensure that AI-generated solutions comply with licensing requirements and do not violate intellectual property rights.

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