

ELECTRICITY MATTERS

Paul A. DeCotis



The Generative Artificial Intelligence Utility

Generative Artificial Intelligence (Gen AI) is still in its infancy, yet it has started to transform the way people live, work, and play. The cutting-edge technological innovation of Gen AI has unbounded potential and its contributions to the economy and society are still mostly hypothetical. In the short run we might overestimate its transformative impact and in the long run we might underestimate its impact. In either case, unprecedented change is upon us. Think of the changes to the ways in which we live, work, and play as technology evolved from wall-mounted landline telephones to car phones to satellite phones to mobile cell

phones to hand-held smart devices, and the explosion of applications and services available on the device platform.

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Gen AI refers to AI models that analyze and use significant amounts of data, including text, images, and videos, to generate new content. Gen AI models produce new, original, and creative outputs by identifying patterns and gaining knowledge from training data, which is unlike other AI models that rely on predefined rules and inputs. We have recently seen examples of Gen AI-produced art, music, text, and marketing campaigns using the likenesses of well-known personalities in several cases without their consent. While legal issues around the commercial use of Gen AI and content ownership swirl, governments around the world are stepping in to study its use and content creation, recognizing that Gen AI and the industry will require regulation to protect individual ownership rights and copyright laws. The

United States Congress has and will continue to hold hearings to protect individual rights and work toward a code of conduct for the ethical use of Gen AI.

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MACHINE LEARNING VS. GEN AI

Like other transformative effects of Gen AI, the technology has the potential to transform the utility industry in ways we are just beginning to imagine. Utility adoption has been slow, in part due to the newness of the technology and in part due to the regulated and rather rigid organizational structure of utilities built around priorities on customer, employee, and grid safety and reliability. Like most industries, utilities understand Gen AI theoretically and utility leaders are thoughtful about its potential benefits as well as its potential risks, given its infancy in development and use. Utilities are embracing Gen AI model and use case development, but widespread adoption has and will continue to be slow until use cases are more broadly identified, their benefits are peer reviewed and substantiated, and internal organizational structures evolve around the use of Gen AI. Utilities have strict regulations on who has access to customer data and how it is used. As a regulated industry, utility applications of Gen AI have to be deliberately conscious of and comply with state and federal privacy laws.

While utilities are interested in Gen AI and investing in the technology, developing use cases that deliver high value is slow and cumbersome. In most instances, utilities lack an overarching enterprise-wide data governance and organizational structure to deploy Gen AI safely, efficiently, and effectively. Utility leaders are becoming more adept at understanding Gen AI and its potential, but knowing which use cases to tackle first in terms of value creation is challenging. Use cases need to align first and foremost to business needs, and significant change management is needed to fully integrate Gen AI into business decision-making, operations, and corporate culture. Furthermore, it is important to differentiate between Machine Learning (ML) and Gen AI, which still confuses many given the rapid entry of Gen AI into our everyday vocabulary.

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ML uses well-defined algorithms to analyze large amounts of data to execute tasks, make predictions, detect patterns, and provide key insights. Everyday examples of ML applications include traffic alerts and predictions using mapping software, language translation services, and streaming service recommendations based on past viewing preferences. Gen AI can use ML outputs as inputs for content and bi-directional processing, thereby creating new content. For example, Gen AI can be used to identify problems in existing computer code and software, create new marketing materials and campaigns from

existing marketing campaigns with greater intentionality, simplify complex text for readers, and more.

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As a cautionary note for all industries and companies using Gen AI, the most value in its use will be in instances where Gen AI is used in a controlled and regulated manner, compliant with privacy and copyright laws. Widespread use of Gen AI necessitates adopting ethical standards and best practices to minimize the potential harm that can come with its many advantages.

GETTING STARTED

Establishing an enterprise-wide governance and risk management framework and corresponding protocols for Gen AI to protect customer and sensitive operations data is necessary to ensure its proper use to support the business and protect the organization. A few examples of high-level guiding principles to consider when developing use cases for Gen AI can include:

1. Ensuring a common and shared understanding of terminology, differentiating between ML and Gen AI, and how each is to be used very specifically to support the business—either broadly or narrowly.
2. Reviewing and enhancing existing enterprise-wide risk management policies, protocols, and controls to guard against improper and illegal use of customer, operations, or financial data as inputs to the use of Gen AI to ensure legal use and protection of produced content.
3. Creating a complementary and supportive environment for the use of Gen

AI, considering the people, process, and technology needs of the organization and making the investments necessary in all three to create enterprise value.

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Several utilities are using ML and Gen AI to improve business decision-making and outcomes. But it is not necessary to choose either ML or Gen AI when both can deliver quantifiable benefits to the business and improve outcomes. Using ML to monitor grid operations with some predictive analytics has helped utilities to anticipate where extreme weather events might most likely impact the grid, thereby giving operators time to de-energize or take other precautionary measures to prevent widespread outages and protect the grid and customers from what might otherwise have produced more devastating outcomes. ML can be used to monitor and prevent unexpected pipeline methane leaks. Given wind speeds, ML can be used to improve generation from wind turbines and reduce maintenance costs. Labor and professional development training can be improved, and content made more relevant and adaptable to learning styles and conditions using Gen AI—with the added benefit of reducing training costs.

Vegetation management is an area ripe for productivity gains, when aerial surveillance can detect and identify plant and tree species and ground cover and their growth patterns to know when vegetation management is required. The use of Gen AI could provide insights on how vegetation and invasive species might evolve and change

over time, given changing climate patterns. Perhaps the largest high-value area for use case development is in the customer experience space, where customers can interact with their data more easily, and in the field-services space, allowing field personnel to more easily interact with the necessary documentation while in the field to address service orders.

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For reference, **Figure 1** lists some of the common utility use cases. Several of these are developed more completely in the following text.

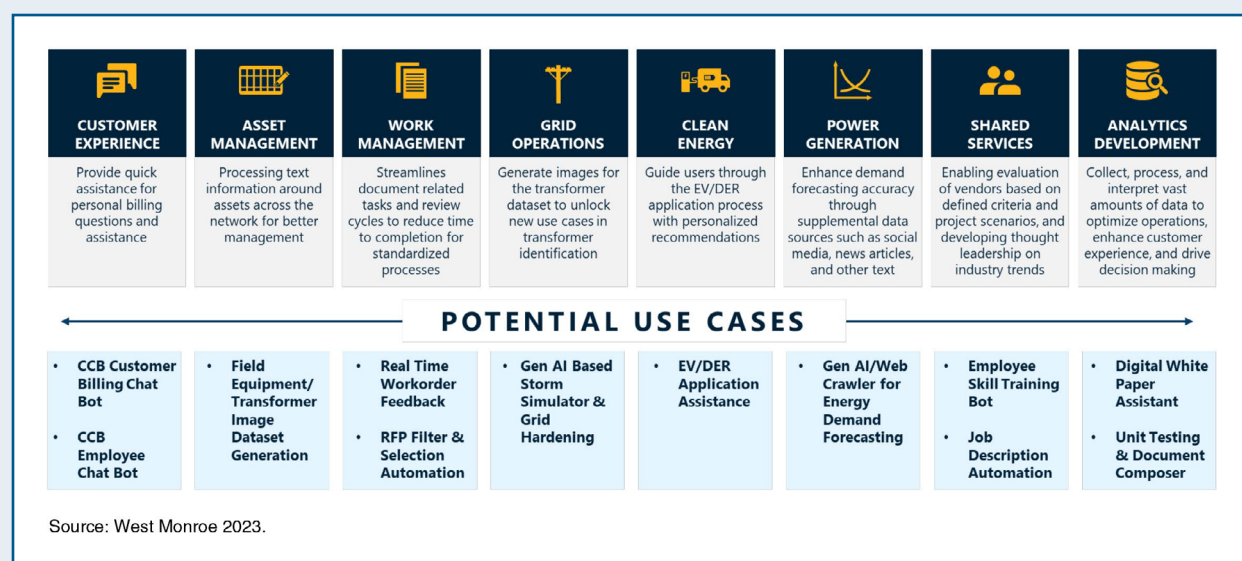
Briefly, the customer experience Chat Bot for billing (first use case in Figure 1) can provide real-time personalized assistance for customers with most types of billing inquiries, including understanding the bill and answering

questions specific to the bill and time of usage, for example. This use case can also improve the customer experience by assisting customers in understanding the accuracy of their bill, providing tailored responses specific to their usage and the measures customers can take to reduce their usage and costs, and streamlining support operations. The billing Chat Bot can also rapidly scale up during emergency situations and improve the response time for customer inquiries.

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An employee Chat Bot can leverage change management materials and procedures to provide utility personnel with support to

Figure 1. High-Value Utility Use Cases



better navigate customer billing and the customer care, relationship, and billing platforms, answer frequently asked questions, and direct employees to support and training resources to address customer concerns. This would enable more widespread self-service support for enhancements and go-live events, while reducing the amount of time change management team members spend on support activities.

Utilities are beginning to use ML and Gen AI to improve decision-making and business outcomes.

The asset management and field equipment image dataset use case (second use case in Figure 1) can supplement existing transformer image datasets, for example—which are often incomplete—with images to unlock real-time computer vision use cases. This use case bridges data gaps, enabling real-time computer vision applications, thereby enhancing and improving model accuracy and broadening the scope of potential use cases in transformer and other field equipment analysis and monitoring.

The workflow management use case (third use case in Figure 1) can assist employees in reviewing and filtering request for proposal (RFP) responses and scoring these proposals. This can streamline the evaluation and scoring of proposals, identify the best-fit proposals based on predefined criteria, predict project outcomes, enhance vendor comparisons, and facilitate more frictionless data-driven decision-making. This in turn can reduce the time required for proposal review and assessment by automating evaluations and identifying the “best” proposals based on predetermined criteria. By enhancing and accelerating vendor comparisons, it ensures data-driven decision-making, leading to more efficient

project execution, maximized returns, and reduction in manual steps for RFP selection. This, like the previous use cases, does not render human evaluations unnecessary—rather, it complements and supports reviews by employees and improves recordkeeping in support of section decisions.

The grid operations use case for storm scenario simulation and grid hardening (fourth use case in Figure 1) can supplement existing datasets and simulations for future scenario planning, for example, extreme weather events and demand changes. Employing Gen AI to enhance datasets and simulate future scenarios provides a more robust foundation for accurate forecasting, planning, and “what-if” scenarios. It also provides insights into how grid operations might change to prevent more severe grid impacts and customer outages.

ML and Gen AI with predictive abilities and adaptive and automated content creation can also highlight the importance of softer human skills in the workplace, like communication, teamwork, collaboration, adaptability and flexibility, leadership, problem-solving, and emotional intelligence. Integrated systems thinking will be paramount and more human-centered leaders in human-center-designed organizations will evolve.

The Gen AI and web crawler use case (sixth use case in Figure 1) can enhance and improve energy demand forecasting. This can supplement traditional demand forecasting with comprehensive insights from news sources and social media, enabling more accurate and proactive decision-making in energy demand planning, capacity and energy purchases, and resource allocation. This use case enriches traditional demand forecasting with news and

social media insights, providing a comprehensive view of energy demand that goes beyond traditional time-series data. It improves prediction accuracy, enabling a retail energy provider to plan and allocate limited resources for their best use. This use case provides a means for retail providers to plan for anticipated demand shifts, optimizes resource use, and captures real-time opportunities for enhancing energy efficiency and reducing energy costs.

CONCLUSION

The full potential of ML and Gen AI in the utility industry has yet to be defined, but it is being hypothesized. The use case examples listed earlier demonstrate that leadership is embracing the collective potential of ML and Gen AI. Gen AI can be used in sourcing and recruiting staff, identifying the skills and expertise needed today, and exposing potential gaps, given where the organization is planning to invest and grow. In fact, Gen AI might devalue specific technical expertise to some extent, as organizations look to recruit people who can ask the right questions and know where to find the answers, rather than recruiting people with native knowledge in specific fields. The

performance gap between experts and lay people could be significantly reduced with Gen AI.

It is important to remember that ML and Gen AI applications and use cases do not render human involvement and insights unnecessary or irrelevant—rather, both complement and support employees in improving productivity and outcomes.

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