*Transforming water utilities with Gen AI:*
A strategic blueprint for customer-centric innovation

Capgemini

# Introduction

Water companies worldwide are grappling with significant challenges that impact both customer experience and operational efficiency. Declining customer satisfaction, driven by poor communication, escalating bills, unresolved complaints, and inconsistent service delivery, is a pressing issue. These problems are compounded by operational inefficiencies, including outdated infrastructure, resource mismanagement, and the inability to predict and prevent service disruptions.

Recent reports underscore the urgency for innovation. For instance, J.D. Power's 2024 report indicated a 5-point drop in customer satisfaction within the U.S. water sector, primarily due to poor communication and high bills [1]. Similarly, research published by Ofwat and the consumer watchdog CCW in 2024 indicates a significant drop in customer satisfaction with water services. Satisfaction with the quality of water services fell to 58% from 65% in 2021, while satisfaction with wastewater and drainage services decreased to 49% from 56% [2]. In response, regulatory bodies like Ofwat in the UK are imposing penalties of up to 10% of turnovers on water companies for sub-standard service delivery [3].

Generative AI (Gen AI) offers a transformative solution to these challenges. Large Language Models (LLMs) are enhancing customer and employee experiences by rapidly generating solutions and improving efficiency. For example, British Petroleum (BP) uses Gen AI to assist employees with daily tasks, enhancing productivity and transforming workflows [4]. BrainBox AI leverages Gen AI to predict interior building temperatures, cutting HVAC energy costs by up to 25% and greenhouse gas emissions by 40%. Rockwell Automation integrates Gen AI into FactoryTalk Design Studio to help engineers generate code using natural language prompts, automating routine tasks and improving design efficiency [4].

Water utilities also are striving to harness these AI-driven innovations to address their current challenges. By integrating these Gen AI applications, water utilities are aiming to enhance customer satisfaction, improve operational efficiency, and foster a more sustainable and responsive sector. This technological advancement promises to transform the way water utilities operate and interact with their customers, paving the way for a brighter future.

# Transformative capabilities of Gen AI for water utilities

Gen AI can significantly impact water utilities by offering new avenues to enhance their customer experiences and operational efficiency. Its ability to comprehend and generate human-like text enables more responsive customer interactions and better-informed decision-making across various functions. These capabilities foster a more adaptable, customer-centric, and efficient utility operation.

## Enhancing customer experience with Gen AI

Gen AI allows water utilities to have more personalised, responsive, and efficient interactions with consumers. This helps anticipate customer needs, resolve issues quickly, and tailor responses to improve customer satisfaction and engagement. Some of the key use cases outlining these capabilities are detailed below:

### Tailored customer solutions for personalised care based on unique needs

Gen AI is revolutionising how water utilities interact with their customers, enabling highly personalised experiences by analysing behavioural patterns, usage habits, and individual preferences. By examining billing histories, consumption trends, and previous interactions, Gen AI constructs detailed customer profiles. These insights allow utilities to offer bespoke services, such as conservation advice tailored to those with higher water usage.

In addition to profiling, Gen AI enhances outreach efforts by identifying which customers are most likely to engage with new initiatives, whether marketing campaigns or educational programmes. Communications are also refined to reflect linguistic and cultural nuances, ensuring messages are inclusive and resonate with diverse audiences.

The overall impact is significant: hyper-personalised services foster stronger relationships between utilities and their customers. By offering relevant advice and demonstrating attentiveness, utilities not only help reduce water consumption but also build trust, improve satisfaction, and reduce customer turnover.

### Smart AI for faster support to ensure efficient resolution of customer concerns

Gen AI also plays a pivotal role in streamlining customer support, particularly in managing complaints. Using Natural Language Processing (NLP), it can automatically sort and categorise incoming issues from various channels, ensuring that urgent matters are prioritised appropriately.

Drawing on historical data, Gen AI is able to recommend effective solutions for recurring problems, reducing the need for repeated interventions. Furthermore, real-time dashboards provide managers with a clear view of complaint trends, allowing them to identify and address underlying systemic issues swiftly.

This intelligent automation not only alleviates pressure on human support teams but also accelerates resolution times and improves the likelihood of resolving issues at first contact. The result is a more efficient support system that delivers cost savings and enhances customer sentiment.

### Proactive communication – anticipating and solving problems before they occur

Gen AI is allowing water utilities to communicate with their customers by enabling a proactive rather than reactive approach. By analysing infrastructure data alongside weather patterns, Gen AI can anticipate potential issues and optimise maintenance schedules, significantly reducing the likelihood of unplanned outages.

It also plays a crucial role in identifying anomalies in water usage, such as leaks or faulty meters, before they escalate into costly problems. Customers are alerted promptly, helping them avoid unexpectedly high bills and unnecessary water waste. In the event of emergencies, Gen AI ensures that communications are timely and relevant, tailoring notifications based on the customer's location and the specific nature of the incident.

This predictive capability not only helps to reduce the volume of complaints but also enhances the utility's reputation for reliability and transparency, fostering greater trust among customers.

### AI-powered customer support – intelligent assistance that adapts

The technology is also transforming the customer support experience by equipping agents with advanced tools such as intelligent chatbots and virtual assistants. These systems provide personalised, context-aware support around the clock, ensuring that help is always available. Whether through a website, mobile app, or social media platform.

What sets this support apart is its consistency and adaptability. Gen AI learns from previous interactions, enabling it to handle increasingly complex queries with greater accuracy. When a situation requires human intervention, the transition is seamless, with all relevant context passed along to ensure a swift and informed resolution.

This always-on, intelligent support model not only improves accessibility and reduces wait times, particularly during peak periods or emergencies, but also ensures a consistently high standard of service across all channels.

### Generative insights for smarter decisions – turning data into strategic action

Gen AI equips water utilities with the ability to extract meaningful, actionable insights from both customer feedback and operational data. This capability enables decision-makers to respond more effectively to emerging challenges and opportunities.

By conducting sentiment analysis, Gen AI can interpret customer feedback to uncover specific pain points and areas for improvement. These insights help utilities refine their service delivery in ways that are both targeted and impactful. Beyond day-to-day operations, Gen AI also supports strategic planning by generating predictive insights and running scenario analyses. This allows utilities to forecast demand more accurately and anticipate potential infrastructure challenges before they arise.

The value of these capabilities is clear: with real-time sentiment analysis and forward-looking insights, business leaders are better positioned to make informed decisions about infrastructure investments, service enhancements, and customer engagement strategies – ensuring long-term resilience and customer satisfaction.

### AI-enhanced training – personalised, adaptive learning for customer service teams

Gen AI can help elevate training practices within water utilities by offering tailored, immersive learning experiences that adapt to the needs of each individual. Through dynamic simulations, it recreates realistic customer interactions, allowing staff to practise their responses in real time and build confidence in handling a wide range of scenarios.

As trainees engage with these simulations, Gen AI provides detailed, context-aware feedback, helping them to improve quickly and effectively. The learning journey is further enhanced by adaptive pathways that adjust content based on each individual's progress, ensuring that training remains relevant and appropriately challenging.

To keep learners engaged, Gen AI also generates interactive content such as role-playing exercises and adaptive quizzes, which not only improve knowledge retention but also encourage practical application. The result is a more efficient onboarding process and a noticeable uplift in customer service quality which ultimately leads to a better experience for customers.

## Driving operational efficiency through Gen AI

In addition to enhancing customer interactions, Gen AI offers numerous operational benefits that can augment how water utilities manage their essential services. These operational efficiencies not only streamline processes but also significantly enhance customer experience and satisfaction levels. Some of these key use cases are detailed below:

### Predictive maintenance – proactive infrastructure management

Gen AI is significantly enhancing the way water utilities manage infrastructure by enabling a more proactive approach to maintenance. Rather than reacting to breakdowns, Gen AI allows utilities to anticipate them by simulating potential failures based on historical data. These synthetic failure scenarios help identify vulnerabilities before they become costly problems.

Using this insight, Gen AI develops dynamic maintenance schedules that strike a balance between risk, cost, and resource availability. This ensures that interventions are both timely and efficient. When repairs are needed, the system can generate tailored guidance, offering step-by-step protocols informed by simulated degradation patterns and past maintenance records.

By predicting failures and optimising maintenance strategies, utilities can avoid expensive emergency repairs, extend the lifespan of their assets, and maintain consistent service delivery. Ultimately improving operational resilience and customer satisfaction.

### Water quality monitoring – ensuring safe and reliable supply

Gen AI enhances water quality monitoring by providing utilities with real-time insights and automated reporting tools that support faster, more informed decision-making. By continuously analysing data, Gen AI can detect anomalies in water quality and generate narrative summaries that highlight potential issues. For example, it might flag a 15% rise in turbidity and suggest that this could indicate upstream contamination, prompting a review of filtration settings.

These insights are not only timely but also contextual, drawing on historical patterns to provide early warnings that help mitigate risks before they escalate. In addition, Gen AI streamlines regulatory compliance by automatically generating structured reports, reducing the need for manual tracking and documentation.

The result is a more responsive and reliable monitoring system. With real-time anomaly detection and automated compliance reporting, utilities can ensure the consistent delivery of safe water while minimising regulatory risks and operational delays.

### Demand forecasting – optimising resource allocation

Gen AI offers a more dynamic and responsive approach to forecasting water demand than traditional models. By generating synthetic scenarios, it enables utilities to explore a range of "what-if" situations – such as peak demand, droughts, or unexpected usage spikes – helping to optimise water distribution and maintain supply stability under pressure.

It also supports context-aware resource management by factoring in external influences like weather, customer behaviour, and economic conditions. This allows for the development of flexible, real-time strategies that adapt to changing circumstances.

In addition, Gen AI aids long-term planning by modelling potential network expansions. These scenario-based insights support data-driven investment decisions, helping utilities prepare for growth while ensuring service reliability.

With more accurate forecasting, utilities are better equipped to manage supply during high-demand periods or environmental stress, strengthening both operational resilience and sustainability efforts.

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## Energy management – reducing operational costs

Gen AI is playing a vital role in improving energy efficiency across the most resource-intensive stages of water and wastewater management. Namely pumping, treatment, aeration, and sludge processing, which together account for 60–80% of total energy consumption.

By generating optimised pump schedules and aeration control strategies, Gen AI helps reduce unnecessary energy use. It also predicts peak consumption patterns and creates adaptive load-balancing plans, shifting energy-intensive processes to off-peak hours where possible. In addition, Gen AI simulates key treatment processes, such as chemical dosing, filtration, and sludge handling, to minimise waste and improve operational efficiency. These simulations are paired with automatically generated sustainability reports that quantify energy and carbon savings.

The result is a smarter, more sustainable approach to energy management. By optimising these critical processes, utilities can achieve significant cost savings while reducing emissions – supporting both environmental goals and regulatory compliance.

## Leak detection – minimising water loss

Gen AI enhances leak detection by enabling faster, more accurate identification and resolution of issues across water networks. Rather than relying on generic alerts, Gen AI interprets sensor anomalies and translates them into clear, human-readable diagnostics. By analysing historical failure data, it generates natural language recommendations that help pinpoint the root cause of potential leaks.

It also creates predictive geospatial maps by simulating pipeline degradation under various stress conditions. These maps highlight high-risk areas before leaks occur, allowing utilities to take preventative action. When repairs are needed, Gen AI synthesises past maintenance records, failure patterns, and best practices to automatically generate detailed, step-by-step repair protocols.

This intelligent approach significantly reduces investigation time and water loss. By combining advanced diagnostics with predictive mapping and automated guidance, utilities can accelerate repairs, improve sustainability, and enhance financial performance.

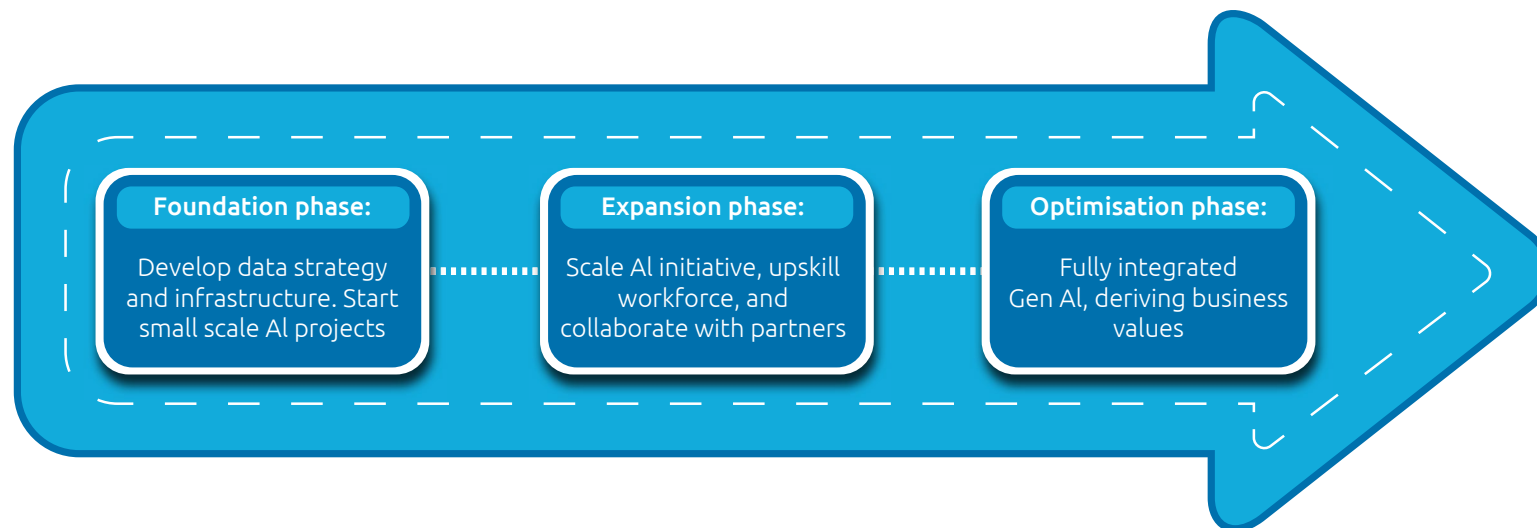# Navigating the future of water utilities with Gen AI

Recognising the importance of adopting Gen AI capabilities, it is essential for water companies to take a phased approach that enables steady growth. This can be accomplished through a strategic roadmap that provides water utilities with a clear path to implement Gen AI, ensuring maximum benefits while minimising risks.

A three-phase adoption strategy is recommended to help water companies effectively implement and harness the benefits of Gen AI use cases as part of their customer experience transformation journey.

**Foundation phase:** Start by developing a solid data strategy and governance framework to ensure data quality and integration. Invest in scalable IT infrastructure to support AI. Begin small-scale Gen AI projects in high-impact areas like predictive maintenance and customer service to demonstrate value and build expertise.

**Expansion phase:** As proficiency with AI increases, utilities should expand AI initiatives to include advanced use cases like real-time water quality monitoring and demand forecasting. This phase highlights the need for workforce upskilling and integrating AI tools into daily operations. Collaboration with technology partners, research institutions, and regulatory bodies is essential for fostering innovation and ensuring compliance.

**Optimisation phase:** In the final phase, fully integrate Gen AI applications across all business functions to automate routine tasks and enhance decision-making. Implement continuous improvement mechanisms to refine AI models based on feedback. Focus on enhancing customer interactions using AI-driven insights for personalised services and proactive communication, thereby boosting customer satisfaction and engagement.

**Foundation phase:**
Develop data strategy and infrastructure. Start small scale AI projects

**Expansion phase:**
Scale AI initiative, upskill workforce, and collaborate with partners

**Optimisation phase:**
Fully integrated Gen AI, deriving business values

## Managing risks and ensuring governance in Gen AI integration

While Generative AI (Gen AI) holds significant potential, it can become a liability if not properly governed. Poorly managed implementations can produce inaccurate outputs, propagate bias, breach privacy, or introduce cybersecurity risks, especially in sectors handling essential services and sensitive data. There have been growing concerns about the unintended consequences of advanced AI technologies in various sectors. Instances have emerged where automated systems have produced biased or unfair outcomes, raising questions about their reliability and oversight. Today, several public resources track and document such incidents, highlighting the importance of responsible and transparent use of these tools.

Effective governance is crucial to ensure that Gen AI models align with the utility's mission, risk appetite, and compliance requirements. It assures accurate, auditable, and unbiased outputs while safeguarding data and providing transparency in AI decisions. By embedding these principles early, organisations can avoid reactive policies and support long-term success. Governance, therefore, enables responsible innovation, fostering ethical and sustainable practices in Gen AI integration.

While governance is essential, it is not an inhibitor but a facilitator of responsible and strategic Gen AI adoption. It ensures that value is created ethically and sustainably, supporting a resilient and future-ready water utility sector.

## Case study demonstrating implementation of a robust Gen AI governance framework for water utilities

To illustrate the effective implementation of Gen AI governance in the water utility sector, we turn our attention to a case study around Applying AI Governance in a leading UK water company.

Cambridge Consultants – the deep tech arm of Capgemini – recently supported a UK water company in developing a strategy for Gen AI governance. They recognised the transformative potential of Gen AI in their operations, and wanted to leverage Gen AI to enhance efficiency, improve service delivery, and drive innovation. They also wanted to encourage innovation among their employees, who were already experimenting with off-the-shelf and publicly available Gen AI tools.

However, the Chief Information Security Officer (CISO) was aware of the inherent risks associated with the deployment of Gen AI, given the generative nature of the technology, the exposure of organisational and client data, and the rapidity with which outputs could be promulgated in different parts of operations. Our brief was to help identify Gen AI use cases, identify areas of risk, and establish a comprehensive governance framework to ensure responsible and effective use of Gen AI.

We developed a 3-stage programme, encompassing:

1. **Stakeholder engagement:** We investigated Gen AI interest, current usage, and possible use cases, with a wide range of stakeholders across the business, from on-the-ground technicians to leaders of digital functions.

2. **Use-case identification:** We identified a specific use-case (event management) to develop and test the governance process for.

3. **Governance process development:** With the use-case identified, we engaged our internal subject matter experts (SMEs) to develop a robust governance process and a supporting software tool.  This was designed to enable stakeholders to systematically identify, track, and mitigate risks arising from the deployment of Gen AI. Key elements included:

   o **Risk assessment**

   o **Accountability framework**

   o **Monitoring and evaluation**

   o **Compliance and regulation**

The outcome was a tool to help the company evaluate and mitigate Gen AI risks in six key areas: **Safety, Security, Technical Performance, Ethics, Regulation,** and **Transparency.** We then ran workshops to introduce the tool and process with their stakeholders. This UK water company now have a turn-key toolkit that enables them to harness the extraordinary capabilities of Gen AI while safeguarding their business from potential risks. With a robust governance framework in place, they are well-positioned to explore and implement additional Gen AI use-cases, driving continuous innovation and improvement.

# Conclusion

Gen AI capabilities offer significant opportunities for water utilities to improve their operational efficiency and enhance customer experience. A structured, strategic approach ensures responsible adoption while fostering innovation. The successful implementation of a Gen AI governance framework demonstrates how a clear roadmap, stakeholder engagement, and strong risk management can enable safe and ethical AI adoption.

This approach helps utilities navigate complexities, ensure compliance, and unlock new value. With the right governance and strategy in place, water companies can lead the future of intelligent water management with confidence and integrity. Capgemini's expertise can support this transformation, ensuring a responsible and impactful journey.

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## Prompting action

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