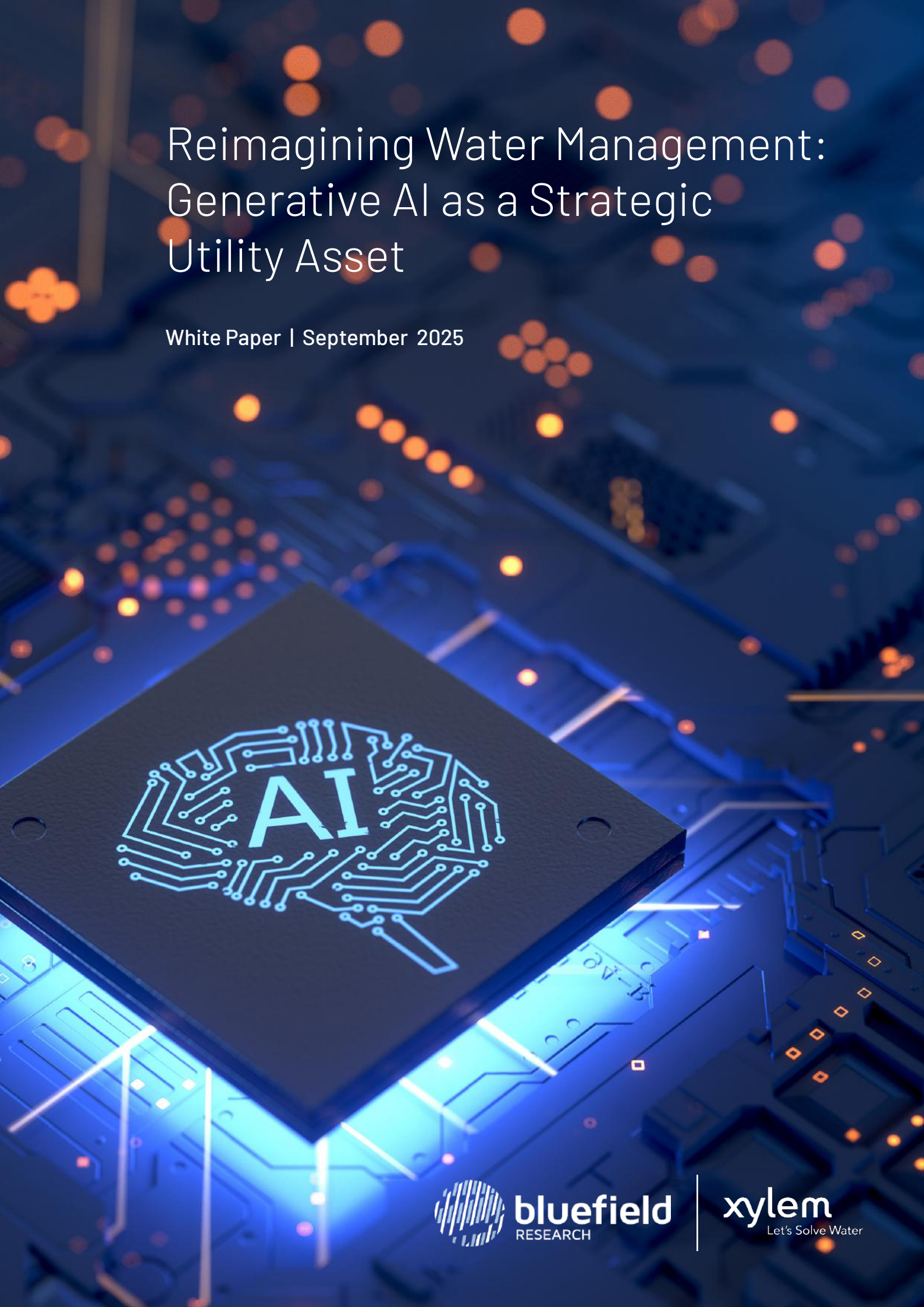
Reimagining Water Management: Generative AI as a Strategic Utility Asset

White Paper | September 2025



bluefield RESEARCH | xylem Let's Solve Water

Contents

Foreword 1

Generative AI and the Future of Water Management 2

1. Defining Artificial Intelligence 3

2. Why Now? The Convergence of Need and Innovation 4

3. Mapping GenAI to the EUM Framework 6

4. Targeted Impact, Strategic Path: Where GenAI Delivers Today—and Where It's Headed 9

4.1 Digital Diffusion: How AI is Crossing Borders and Reshaping Water Utilities Globally. 9

4.2 Strategic Pathways: Current Use Cases and Emerging Potential . . 11

4.3 Active Frontiers: Where GenAI Is Already Creating Value 11

4.3.1 Infrastructure Strategy and Performance 12

4.3.2 Operational Optimization 13

4.3.3 Customer Experience and Satisfaction 14

4.3.4 Water Resource Sustainability 16

4.4 Emerging Potential: Strategic White Space for GenAI 17

4.4.1 Enterprise Resiliency 18

4.4.2 Regulatory & Reliability Performance 18

4.4.3 Financial Viability 19

4.4.4 Stakeholder Understanding and Support. 20

4.4.5 Community Sustainability 21

4.4.6 Workforce Development 21

4.5 Responsible Use and Governance: A Critical Pillar for AI in Utilities . 22

5. Conclusion: GenAI Is a Utility Tool, Not a Tech Trend 23

6. Glossary 24

Foreword

Matthew Pine
Chief Executive Officer
Xylem

Water utilities are facing unprecedented pressure. Aging infrastructure, rising demand, climate volatility, and chronic underinvestment are converging into a single urgent reality: systems built for stability must now perform under strain. At the same time, expectations are increasing for resilience, transparency, and efficiency. Meeting these demands will require more than incremental improvements. It calls for new tools, fresh thinking, and renewed determination.

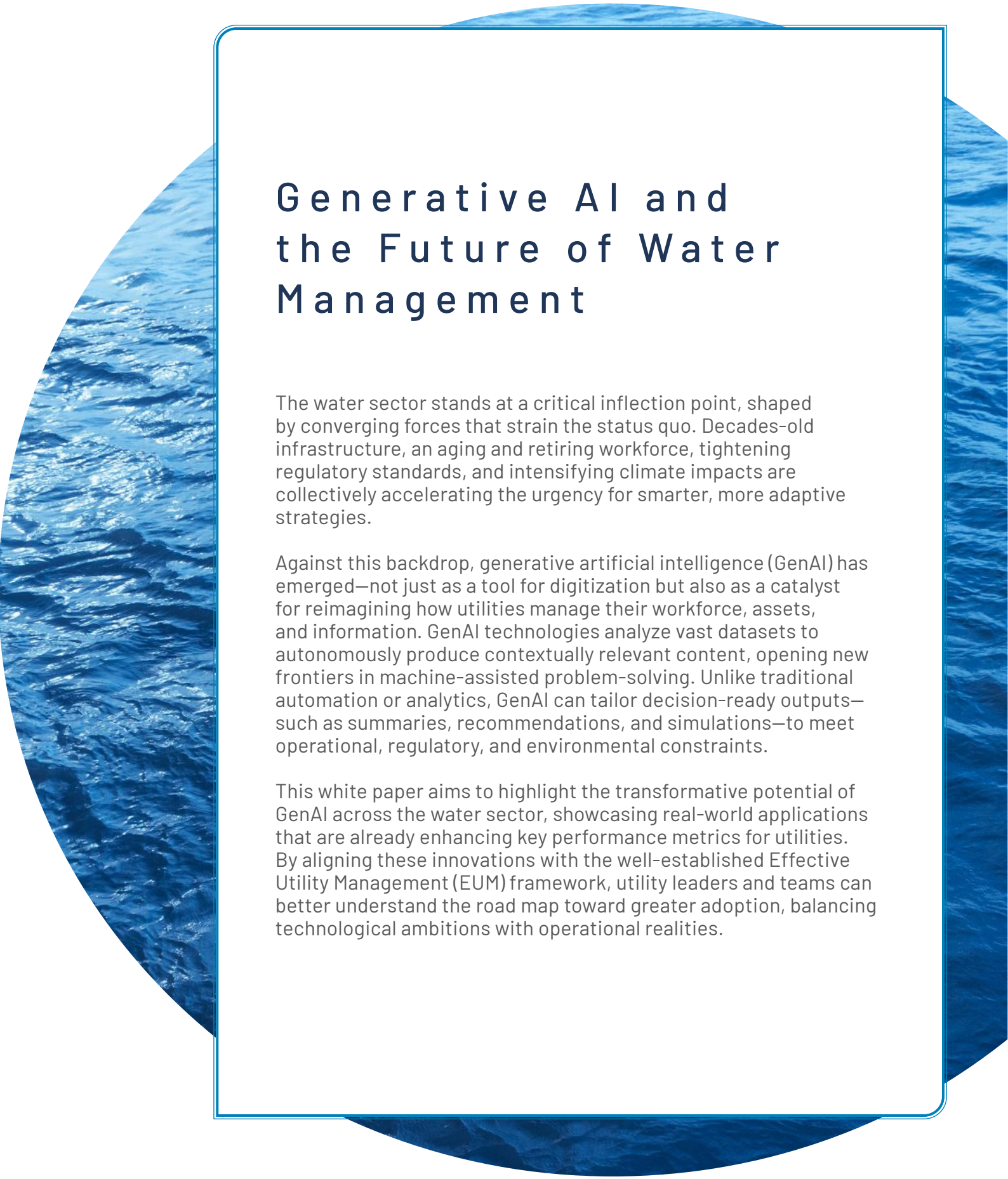
One of the most promising tools is Generative AI. While much of the public conversation has centered on novelty, the real opportunity for utilities is more practical: to use GenAI as an asset that helps teams work more intelligently, make faster decisions, and preserve institutional knowledge at scale. This is not a distant vision. Early use cases are already emerging in cities around the world. These applications are currently focused and limited, but they are also encouraging.

This is not a time for hype. GenAI is not a magic fix or a substitute for human expertise. However, when used effectively, it can enhance that expertise, enabling utilities to navigate complexity with greater clarity and speed. The question is no longer whether the technology can help, but how we can create the right conditions to explore, innovate, and drive impact responsibly.

Achieving this requires institutional readiness. Clean and connected data, clear ownership, and strong governance are essential. Processes must be in place that allow human and machine intelligence to work together. Without this foundation, even the most promising pilots will falter. With it, GenAI can evolve from a tool of experimentation to a core part of how utilities plan, operate, and serve.

This paper outlines a pragmatic path forward: address real friction points, design with scalability in mind, and focus on meaningful outcomes. The value of GenAI lies not in novelty but in reliability, scalability, and measurable results. It is one of several strategic levers that can help utilities bridge the growing gap between expectations and capabilities.

This moment does not require certainty, but it does demand leadership and a willingness to explore. Let's lead with purpose and make this technology work for the challenges that truly matter.



Generative AI and the Future of Water Management

The water sector stands at a critical inflection point, shaped by converging forces that strain the status quo. Decades-old infrastructure, an aging and retiring workforce, tightening regulatory standards, and intensifying climate impacts are collectively accelerating the urgency for smarter, more adaptive strategies.

Against this backdrop, generative artificial intelligence (GenAI) has emerged—not just as a tool for digitization but also as a catalyst for reimagining how utilities manage their workforce, assets, and information. GenAI technologies analyze vast datasets to autonomously produce contextually relevant content, opening new frontiers in machine-assisted problem-solving. Unlike traditional automation or analytics, GenAI can tailor decision-ready outputs—such as summaries, recommendations, and simulations—to meet operational, regulatory, and environmental constraints.

This white paper aims to highlight the transformative potential of GenAI across the water sector, showcasing real-world applications that are already enhancing key performance metrics for utilities. By aligning these innovations with the well-established Effective Utility Management (EUM) framework, utility leaders and teams can better understand the road map toward greater adoption, balancing technological ambitions with operational realities.

1 Defining Artificial Intelligence

Within this rapidly shifting environment, artificial intelligence (AI) has emerged as a foundational enabler of innovation. However, it is essential to recognize that not all AI systems are the same. There are two distinct categories: machine learning (ML) & advanced analytics and generative AI (GenAI). Each category offers unique capabilities with different implications for utility operations.

As utilities confront mounting operational complexity, both ML & advanced analytics and GenAI offer critical yet distinct pathways for innovation. ML & advanced analytics delivers precision and efficiency for well-bounded tasks, while GenAI introduces a new dimension of intelligence—one that navigates ambiguity, scales human expertise, and unlocks latent value in unstructured data.

Recognizing the differences between these technologies—and how they can complement each other—is essential for utility leaders seeking to modernize their decision-making processes. When strategically deployed together, ML & advanced analytics and GenAI represent a continuum of digital capabilities that can transform water management, leading to a more resilient, responsive, and resource-optimized future.

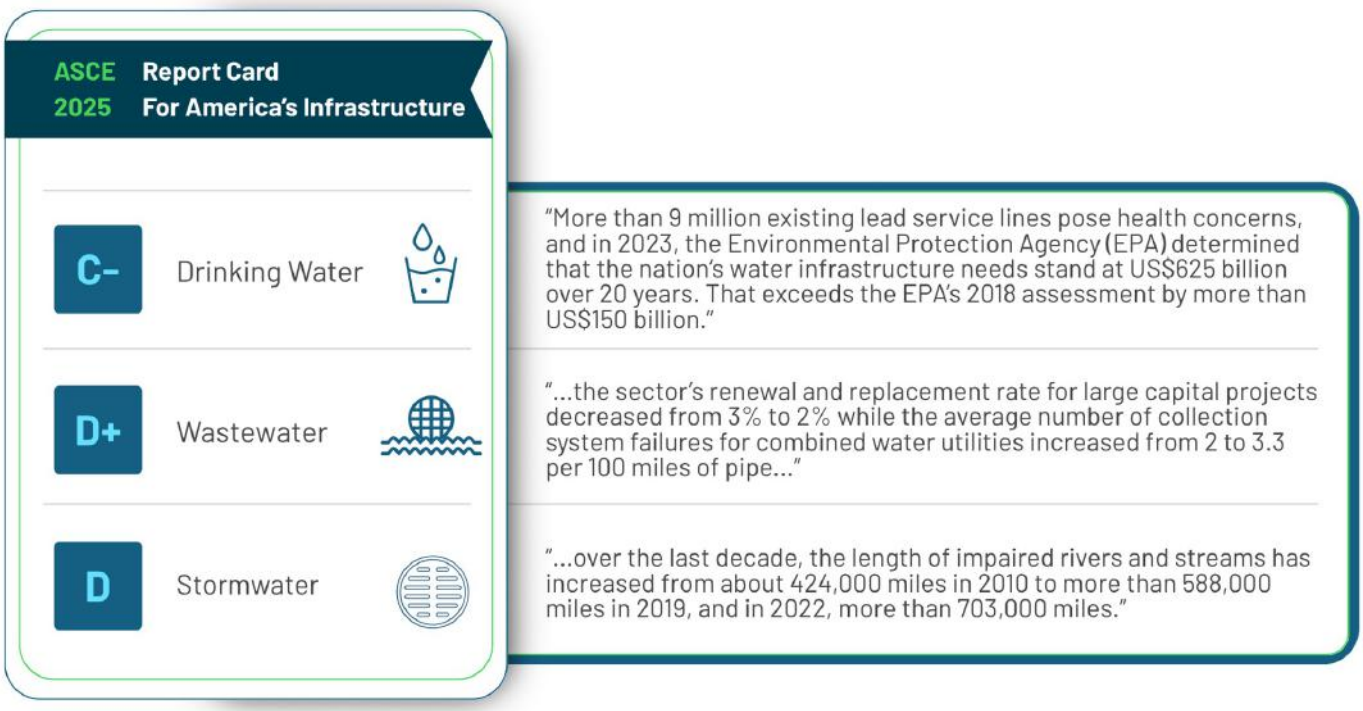
Machine Learning & Advanced Analytics is engineered to perform specific tasks, such as leak detection, demand forecasting, and asset failure prediction. It uses rule-based or trained models on structured datasets. These applications are often deterministic and narrowly scoped, offering measurable value through automation and pattern recognition within predefined parameters.

Generative AI extends the capabilities of traditional AI by leveraging large datasets and advanced models to produce original, contextually relevant content. This content includes tasks such as summarizing technical reports, drafting regulatory filings, generating maintenance recommendations, and simulating scenarios—all tailored to meet operational, regulatory, and environmental constraints. GenAI is probabilistic and adaptive, making it particularly well suited for environments with unstructured data and complex decision-making processes.

2 Why Now? The Convergence of Need and Innovation

This technological leap arrives precisely when the water sector is facing unprecedented challenges. According to the American Society of Civil Engineers' 2025 Report Card, the U.S. will require a US$625 billion investment in drinking water infrastructure over the next two decades. Compounding this issue, workforce demographics signal an impending knowledge exodus, as more than 30% of water professionals are projected to retire by 2030, while only 10% of the workforce is under the age of 24. These structural pressures—coupled with climate-induced operational volatility and persistent financial strain—are pushing utilities to treat enhanced efficiencies not as aspirational targets but as essential operational imperatives.

Exhibit 1 *U.S. Infrastructure Grade, American Society of Civil Engineers*

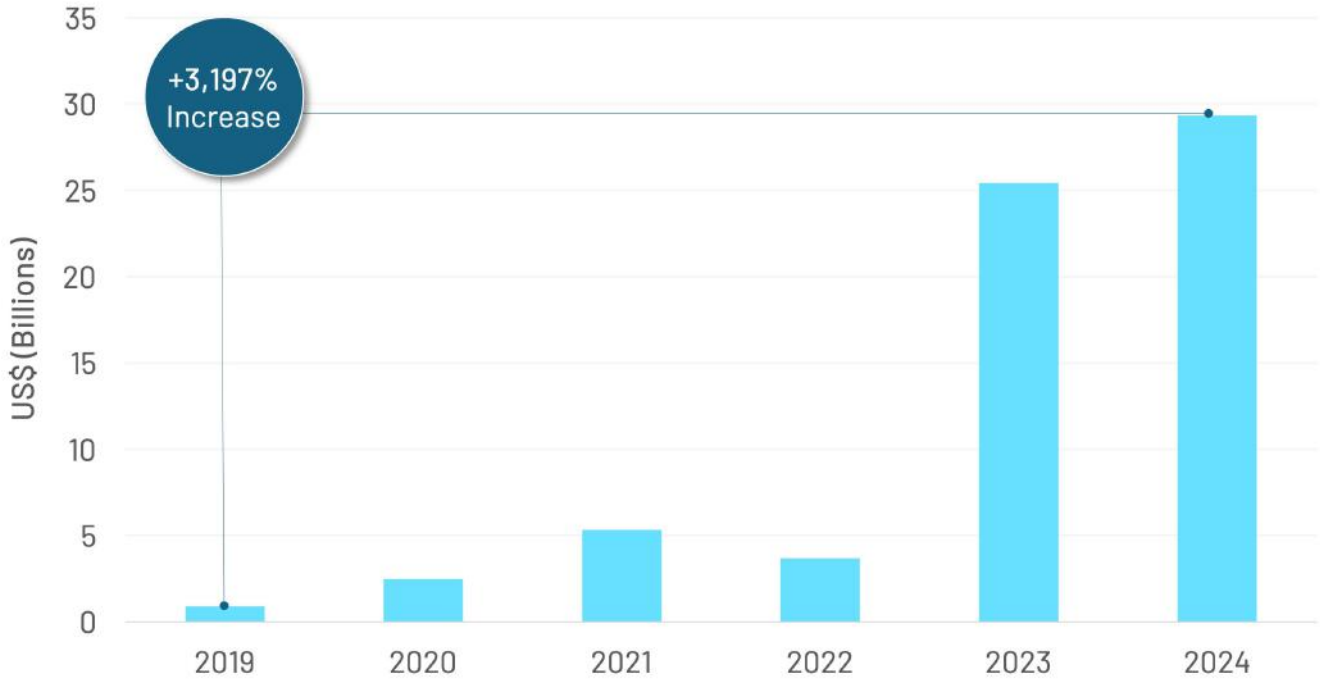


Source: American Society of Civil Engineers, Bluefield Research

GenAI's capabilities are advancing at an unprecedented pace, transforming tasks that once demanded specialized expertise or resource-intensive workflows into streamlined, automated processes across all sectors. The water sector is no exception; due to its complexity, breadth, and heavy reliance on legacy systems, the water industry stands to benefit significantly from these advancements.

While today's GenAI solutions, even in their infancy, are capable of drafting compliance documents and extracting operational insights, tomorrow's applications hold the promise of fundamentally reshaping the industry—from autonomous infrastructure management systems that predict and prevent failures before they occur to integrated decision platforms that optimize resource allocation in real time across entire watersheds.

Exhibit 2 *Global Private Investment in GenAI*



Note: This data is expressed in constant 2021 US$. Inflation adjustment is based on the U.S. Consumer Price Index (CPI)
Source: Quid Monitor via AI Index Report (2025); U.S. Bureau of Labor Statistics (2025), Bluefield Research

At a high level, tech juggernauts such as Amazon and Microsoft are developing workflow solutions specifically for utilities. These solutions combine ML and large language models (LLMs) to generate faster and more accurate assessments and predictions in the field that can be leveraged across the organization to enhance overall efficiency. While many of these deployments are still in the infancy or ideation phases, some industry pioneers (such as DC Water, Hampton Roads Sanitation District, and Anglian Water) are already demonstrating the value of GenAI. Their implementations span a range of functions, from customer engagement to asset management optimization, delivering measurable outcomes such as reduced operational costs, enhanced staff productivity, and stronger community relationships. These early success stories are fundamentally reshaping industry perspectives on operational possibilities and strategic horizons.

3 Mapping GenAI to the EUM Framework

Exhibit 3 *10 Attributes of Effective Utility Management*

Source: U.S. Environmental Protection Agency, Bluefield Research

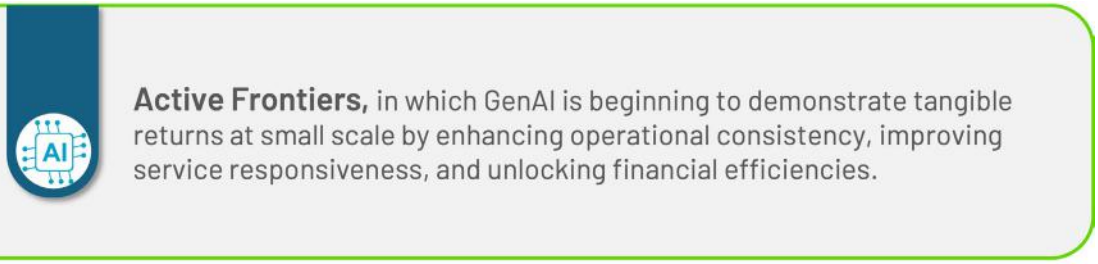
The EUM framework, developed in 2008 by the U.S. Environmental Protection Agency (EPA) and leaders in the water sector, remains the most widely adopted utility management model in the U.S. Designed by utility leaders for utility leaders, this framework serves as an operating system for sustainable performance, grounded in 10 core attributes and five management keys that collectively support long-term success.

Today's market opportunities for GenAI, when mapped to the EUM landscape, can be understood in active frontiers and emerging potential.

EUM enables utilities to benchmark their current state, define priorities, and align strategies with evolving challenges across its 10 key attributes. The model's focus on leadership, operations, infrastructure, and stakeholder engagement makes it compatible with the capabilities of GenAI.

By embedding GenAI within the EUM framework, utilities can activate latent value in their data systems, break down functional silos, and leverage insights across teams and time frames. In this way, EUM not only complements GenAI but also provides a solid foundation for its purposeful, sustainable, and scalable deployment.

Generative AI remains in its early stages of adoption in utility operations and planning. Rather than serving as a wholesale replacement for existing systems, it offers targeted, high-value solutions that address specific challenges. As a result, today's market opportunities for GenAI, when mapped to the EUM landscape for utilities, can be understood in two main categories:



Active Frontiers, in which GenAI is beginning to demonstrate tangible returns at small scale by enhancing operational consistency, improving service responsiveness, and unlocking financial efficiencies.

Emerging Potential, in which its application is even more nascent, and the strategic fit is on the horizon. Areas like public trust, training, and sustainability strategy that will benefit as digital maturity and governance evolve.

This framing helps utilities prioritize their efforts by starting with areas that demonstrate momentum and proof points, while also seeding innovation in sectors poised for near-term gains.

Active Frontiers:

- **Infrastructure Strategy & Performance:** Manages asset costs effectively over the long term, ensuring they align with reliability goals and meet community needs.
- **Operational Optimization:** Continuously improves operations by utilizing data, technology, and efficient resource management.
- **Customer Experience & Satisfaction:** Provides reliable, affordable service that meets customer needs and expectations.
- **Water Resource Sustainability:** Ensures long-term water availability and quality through integrated watershed management and reuse strategies.

Emerging Potential:

- **Enterprise Resilience:** Identifies and manages a wide range of risks to ensure continuity and responsiveness during disruptions.
- **Regulatory & Reliability Performance:** Delivers water and recovered resources that meet or exceed regulatory and customer-defined standards.
- **Financial Viability:** Maintains stable, predictable finances through comprehensive life cycle planning, sound rate structures, and effective revenue strategies.
- **Stakeholder Understanding & Support:** Builds trust and support from customers, regulators, and the community through engagement and transparency.
- **Community Sustainability:** Aligns utility activities with the broader economic, environmental, and social goals of the community.
- **Workforce Development:** Attracts, retains, and develops a skilled, motivated workforce that possesses strong institutional knowledge.

4 Targeted Impact, Strategic Path: Where GenAI Delivers Today—and Where It's Headed

As adoption spreads across geographies—ranging from early movers in the U.S. to digitally ambitious utilities in Asia Pacific, Europe, and the Middle East—operational needs, rather than geographic boundaries, drive the relevance of GenAI. Active deployments are beginning to demonstrate measurable gains in cost control, service quality, workforce productivity, and infrastructure planning, with standout examples from Hampton Roads Sanitation District (Virginia), Anglian Water (United Kingdom), DC Water (Washington, D.C.) and Las Vegas Valley Water District (Nevada). These trends define a clear strategic path: Build momentum in proven areas while laying the digital foundation for broader, system-wide transformation.

4.1 Digital Diffusion: How AI is Crossing Borders and Reshaping Water Utilities Globally

AI in the water sector is unmistakably borderless. While its adoption often begins in digitally mature markets, it is increasingly expanding across geographies as utilities confront shared operational challenges. According to an analysis by Bluefield Research, there are 107 documented utility-led AI initiatives spanning five regions. These examples were compiled through a systematic review of utility disclosures, vendor case studies, news sources, and Bluefield's proprietary research, providing a representative, albeit not exhaustive, overview of global activity.

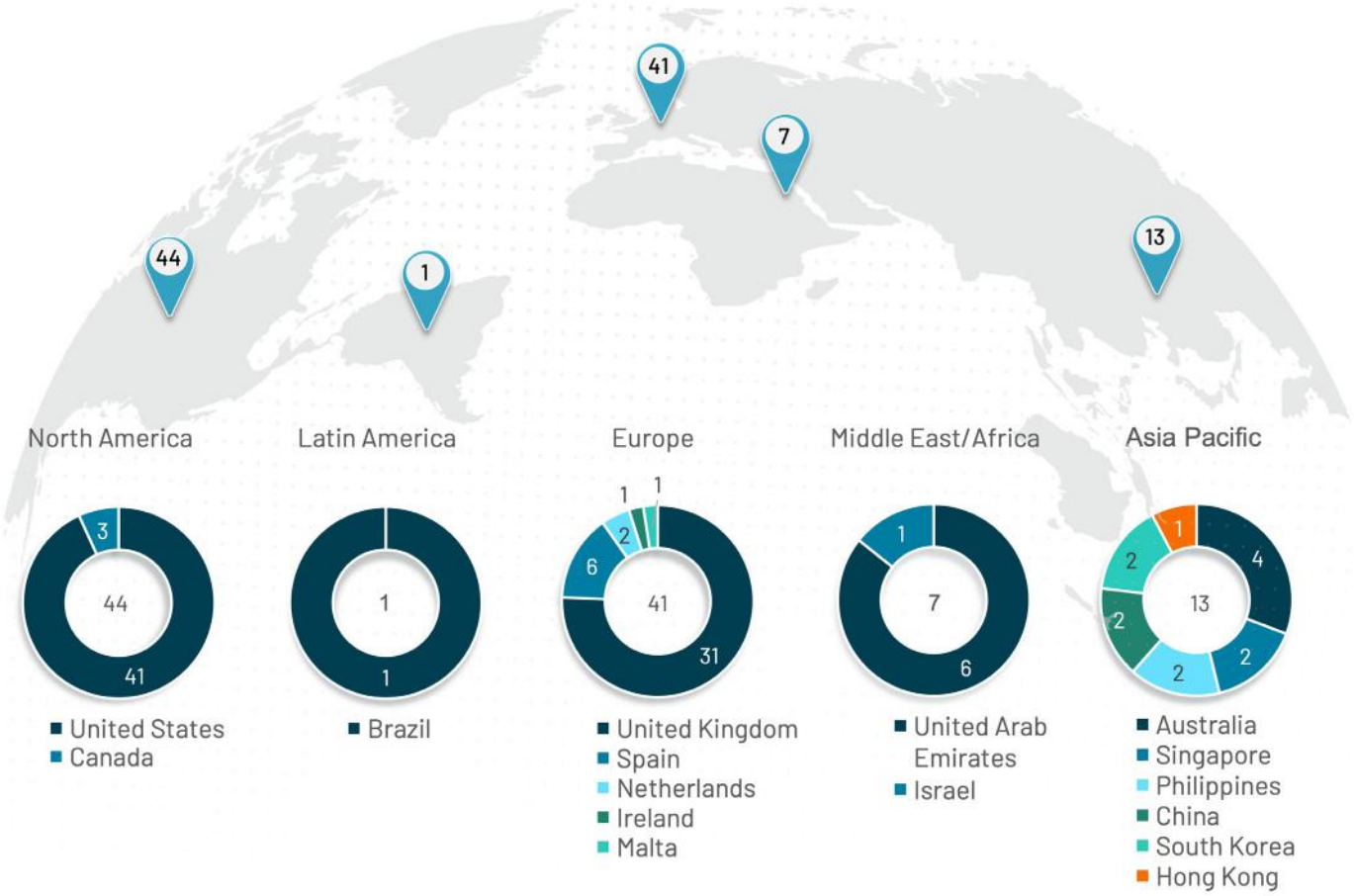
The following list highlights key regional insights:

- The Asia Pacific region leads global project diversity, with 13 initiatives spanning Australia (4), Singapore (2), China (2), the Philippines (2), and other locations. This trend demonstrates a healthy appetite for digital transformation across both developed and emerging markets.
- The U.S. maintains the highest level of single-country adoption, underscoring North America's role as a launchpad for commercial AI vendors and early utility experimentation.

- Europe and the Middle East show targeted deployments, particularly in the U.K. and Israel. In these regions, national digital strategies and water stress issues are driving innovations in utility services that align with broader policy frameworks.

Exhibit 4

Tracking AI Adoption Across the Global Water Landscape: 107 Identified Projects Across Five Regions



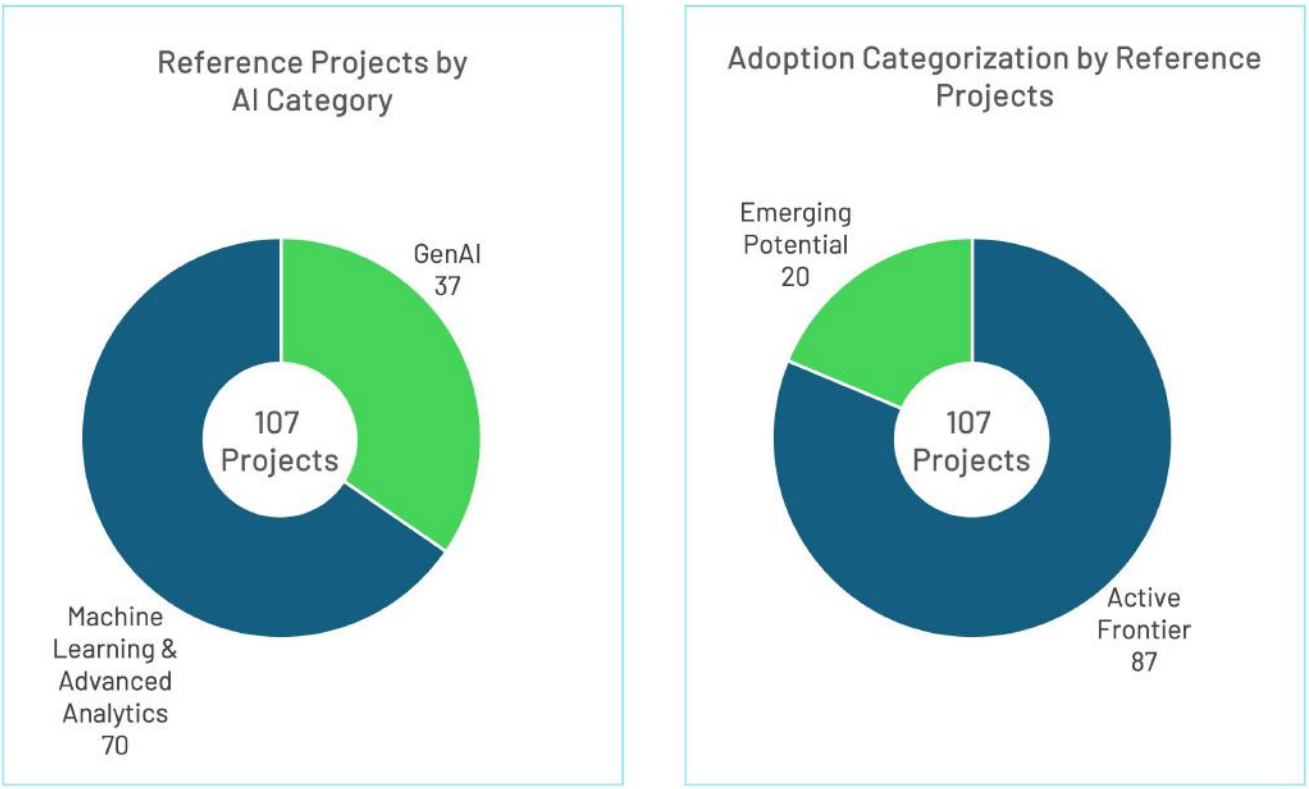
Note: These projects have been identified as examples of artificial intelligence applied to the water sector, globally. It is not exhaustive but is demonstrative of the expanding geographic breadth of its usage
Source: Bluefield Research

While the global map illustrates a sense of dispersion, the more critical narrative lies in how utilities are applying AI. Industry leaders are not deploying these technologies just for novelty; they are adopting them to address recurring operational challenges, such as leak detection, process optimization, and customer service automation. This signals that GenAI and ML & advanced analytics are not merely technological options but rather strategic responses to the evolving pressures of utility management, which include aging infrastructure, workforce transitions, climate impacts, and regulatory requirements.

4.2 Strategic Pathways: Current Use Cases and Emerging Potential

The role of Gen AI in utility operations and planning is still changing quickly, with its current impact defined by targeted, high-value use cases rather than sweeping systemic change. This approach enables utilities to make informed investment decisions—capitalizing on proven applications that deliver results today, while strategically advancing innovation in areas with strong near-term promise.

Exhibit 5 *Municipal Utility Reference Projects Leveraging AI*



Source: Bluefield Research

4.3 Active Frontiers: Where GenAI Is Already Creating Value

Utilities are moving from pilots to production. The initial wave of GenAI deployments is no longer just theoretical—it is now delivering significant operational, financial, and customer-facing value. Framed by the EUM model, these initiatives outline a clear strategy: Begin by addressing the most pressing pain points, scale up where the benefits compound, and govern across functions to ensure lasting impact.

Exhibit 6 *The GenAI Pathway in Practice*

Source: Bluefield Research

4.3.1 Infrastructure Strategy and Performance

As utilities are inundated with operational data, GenAI is transforming this information into strategic insights by connecting infrastructure planning with behavioral outcomes and long-term goals.

broader IMPACT

Converts raw data into action, enables equitable planning, and bridges the gap between infrastructure management and public engagement.

- Organizations such as SAWS, Yorkshire Water, and LVVWD leverage GenAI to integrate diverse datasets for risk-based capital planning and pipeline renewal strategies.
- The city of Zaragoza and LVVWD are deploying customer-facing conservation platforms powered by GenAI. These platforms feature tools for non-revenue water alerts and gamified household benchmarking.
- San Jose Water uses AI tools to track environmental and equity metrics, ensuring that its investments align with community expectations.

4.3.2 Operational Optimization

Utilities currently face a growing funding gap of US$690 billion for wastewater and stormwater by 2044, according to the American Society of Civil Engineers. Currently, only 30% of the required capital needs are being met. GenAI is emerging as a valuable cost-control lever, enabling improved operations and maintenance (O&M) management, deferred capital expenditures, and more reliable budgeting.

broader IMPACT

Enhances process reliability, shortens learning curves, and establishes scalable frameworks for multisite operations.

For example, the Hampton Roads Sanitation District (HRSD) utilizes GenAI to assist operators in determining the optimal timing for aeration and pump schedules. This approach reduces variability and improves plant stability, which is particularly important, given that one-third of its workforce has less than five years of experience.

Similarly, Yorkshire Water has developed a knowledge engine that unifies documentation, process controls, and asset data, allowing operators to access critical information precisely when needed.

The city of Grand Rapids has deployed AI to monitor pump behavior in real time, flagging anomalies before failures occur.

Case Study: Hampton Roads Sanitation District (HRSD) Process Optimization

INITIATING SMALL-SCALE AI DEPLOYMENT AND BUILDING OUTWARD

The Hampton Roads Sanitation District (HRSD) is piloting a GenAI-driven platform at one of its 14 wastewater treatment plants to optimize operations such as power consumption and chemical dosing. In collaboration with three other utilities—DC Water, Clean Water Services, and Metro Water Recovery—HRSD is contributing to the development of a unified, agentic AI system tailored to utility workflows.

- **Initial Focus:** Achieve incremental process optimization with immediate cost savings.
- **Longer-Term Goals:** Automate and prioritize workforce tasks.
- **Strategic Aim:** Develop a nimble, modifiable, and expandable AI solution that can fit within any of HRSD's 14 plants, each having unique configurations and challenges.
- **Industry Impact:** HRSD sees itself as a key reference case for sector-wide adoption of AI.

4.3.3 Customer Experience and Satisfaction

As customer service expectations rise, many utilities are struggling to staff their customer service teams effectively. GenAI offers a solution that facilitates broader customer engagement, improves response times, enhances accessibility, and builds customer trust—all without adding headcount.

broader IMPACT

Boosts public trust, reduces resolution times, and enhances accessibility for diverse customer segments.

For Example, DC Water is in the early stages of developing a modern customer service experience through two-way Natural Language Processing (NLP) technology with GenAI capability. This investment will support its customer needs 24x7x365 in multiple languages with greater staff efficiency and service.

Similarly, Maynilad Water in the Philippines uses AI and satellite analytics from Asterra to proactively detect leaks and service interruptions. This approach increases transparency and improves service reliability.

Case Study: The Evolution of AI Implementation at DC Water

TRANSFORMING CUSTOMER ENGAGEMENT AND OPTIMIZING OFFICE PRODUCTIVITY

DC Water is deploying GenAI to reshape both its customer service and internal operations. Serving over 2.5 million people, the utility is pioneering AI implementation on two strategic fronts: frontline training and engagement and office efficiency.

- **AI-Enabled Modules:** DC Water's investment in Microsoft Copilot and associated user training is paying off. Over the past year the number of subscriptions has doubled to 85 employees across the utility. Among those recently surveyed and trained, the measurements show a 68% year-over-year increase in time saved, 77% daily usage frequency, and a "moderate to significant improvement" in quality among 78% of the survey participants. This sums up to a compelling ROI (25+) in Microsoft Copilot. Plans are to further scale Copilot across the DC Water for added benefit among staff.
- **Customer Care Experience:** The vision is to personalize the customer experience with modern GenAI-enabled technology. Relevant data will be available to support two-way NLP-enabled conversation, including CRM, consumption, and billing data. Leveraging these data sources along with the ability to automatically fulfill tasks becomes an opportunity to further service our customers for a more rewarding experience in multiple languages, 24x7x365, and an opt-out option should some customers prefer human agents or call back.

4.3.4 Water Resource Sustainability

GenAI Role: *Integrated watershed modeling, adaptive reuse planning, and dynamic allocation.*

Water availability, climate resilience, and resource optimization are deeply entwined. GenAI offers a significant leap forward in helping utilities navigate these complexities, integrating hydrological, regulatory, and operational data into forward-looking strategies that protect long-term supply while enhancing environmental stewardship.

The Las Vegas Valley Water District (LVVWD) is implementing a gamified customer portal that uses AI to drive household-level conservation behaviors based on real-time advanced metering infrastructure (AMI) data and business analytics. Although still in its early stages, this program signals a growing shift toward AI-enabled behavioral nudges and improved demand-side forecasting.

HRSD's multi-plant pilot also aims to optimize energy and chemical use. These actions not only lead to cost savings but also reduce environmental load and extend water reuse cycles.

broader IMPACT

By merging meteorological forecasts, land use changes, sensor inputs, and regulatory constraints, GenAI can dynamically recommend modifications to pumping schedules, reservoir drawdowns, or wastewater reuse levels.

Case Study: Las Vegas Valley Water District

GAMIFYING WATER CONSERVATION THROUGH AI INTEGRATION

To tackle persistent water scarcity, the LVVWD is building on its 450,000 smart meter (AMI) deployments with an innovative, AI-driven conservation program. This initiative aims to engage customers via a gamified neighborhood water use platform powered by real-time data analytics.

- **Next-Gen Conservation:** Planned gamification program leverages AMI data, customer addresses, and usage patterns to promote behavioral change.
- **Cross-Functional AI Team:** Internal AI group identifies data opportunities and technology options, funneling insights to a strategic steering committee.
- **Agile Governance:** AI policy remains in "draft" form to keep pace with rapid innovations while ensuring proper oversight on ethics, procurement, and cybersecurity.
- **Sector Signal:** LVVWD's approach illustrates how utilities can effectively integrate behavioral nudges with data systems to achieve long-term sustainability goals.

4.4 Emerging Potential: Strategic White Space for GenAI

While Generative AI is already delivering results across six core attributes of utility performance, three areas—Enterprise Resiliency, Regulatory & Reliability Performance, and Stakeholder Understanding & Support—remain underdeveloped but hold great potential. These domains are characterized by complexity, cross-functional dependencies, and high stakes, making them ideal for GenAI's strengths in contextual reasoning, real-time guidance, and personalized communication.

The opportunity is clear: *As digital foundations mature, utilities can deploy GenAI to extend value beyond operations and finance, expanding into areas such as public trust, regulatory compliance, and crisis response.*

Exhibit 7 *Growth Areas for GenAI in Water*

Entry Point / Attribute	GenAI Role / Opportunity	Leading Signals	Strategic Leverage	EUM Impacts
Cost Control	• Operational decision support	• HRSD (O&M forecasting)	• Cost containment, Budget resilience	• Financial Viability; Infrastructure Strategy & Performance
Process Optimization	• Embedded guidance, institutional memory	• Arcadis–SAWS platform integration	• Institutional knowledge capture, Risk mitigation	• Operational Optimization; Workforce Development
Customer Service	• 24/7 multilingual chat, reduced call load	• DC Water (chatbot), LVVWD (gamification)	• Trust-building, Equitable service access	• Customer Experience & Satisfaction; Stakeholder Support
Admin Productivity	• Copilot-assisted workflows	• City of Houston (Microsoft 365 Copilot pilot)	• Task automation, Staff capacity enhancement	• Workforce Development
Strategic Planning	• Capital risk modeling and integration	• GLWA, Toledo (AI alerts, risk-based planning)	• Scenario forecasting, Resilient investment strategy	• Infrastructure Strategy & Performance; Regulatory & Reliability
Water Conservation	• Gamification and feedback tools	• LVVWD (smart meters, customer portals)	• Customer engagement, Demand management	• Water Resource Sustainability; Community Sustainability
Enterprise Resiliency	• Scenario modeling, recovery protocols	• Northern Ireland Water (early warning systems)	• Disaster readiness, Continuity of operations	• Infrastructure Strategy & Performance; Operational Resilience
Regulatory & Reliability	• Automated summaries, alerting, compliance logs	• GLWA, Toledo (compliance flagging)	• Reduced regulatory burden, Proactive reporting	• Regulatory & Reliability Performance
Stakeholder Understanding	• Tailored communications, multilingual content	• DC Water (chatbot), LVVWD (outreach)	• Trust-building, Equitable service access	• Stakeholder Understanding & Support
Workforce Development	• Digital training assistants, institutional knowledge codification, AI coaching	• WEF (learning platforms), NYC DEP (digital twin training)	• Upskilling, Retention, Succession planning	• Workforce Development; Operational Optimization

Source: Bluefield Research

4.4.1 Enterprise Resiliency

GenAI Role: *Real-time continuity guidance, shift-level instructions, and scenario modeling.*

Utilities face growing disruptions—from climate events to cyber threats. GenAI can convert static contingency plans into dynamic tools for effective response and continuity. By transforming static playbooks into real-time, scenario-aware guidance tools, GenAI enables frontline teams to access critical information during disruptions.

Signal

Northern Ireland Water's early warning system for energy reliability, while not fully GenAI-powered, offers a data backbone for adaptive response protocols and predictive alerts.

Opportunity

Embedding GenAI into ICS/SCADA environments could guide operators through step-by-step recovery, escalate communications, and even simulate the propagation of outages in real time.

4.4.2 Regulatory & Reliability Performance

GenAI Role: *Automated compliance tracking, draft generation, multilingual alerts, and performance analytics.*

GenAI can alleviate the burden of reporting obligations and audit risks.

Regulatory compliance is one of the most resource-intensive and risk-sensitive aspects of utility operations. As requirements expand in scope and complexity—encompassing water quality, cybersecurity, affordability, and equity—utilities are burdened by reporting obligations and audit risks.

GenAI can alleviate this burden by automating report generation, tracking permit deadlines, summarizing performance data, and generating plain-language compliance updates.

Signal

The Great Lakes Water Authority and the city of Toledo are using GenAI-style automation for risk flagging, predrafting reports, and providing multilingual alerts, laying a foundation for broader adoption.

Opportunity

Generating draft versions of National Pollutant Discharge Elimination System (NPDES) permit reports, annual water quality reports, or customer-facing boil water notices—complete with audit-ready traceability—can free up staff time while reducing risk exposure.

How to Spot a Good AI Use Case

A quick screening guide for utility leaders:

- Data Rich – Contains sufficient, high-quality data for effective AI modeling.
- Complex Problem – Involves variables or complexities that straightforward rules can't address.
- High Impact – Delivers significant operational or customer value when a solution is found.
- Recurring – Occurs frequently enough to justify the investment in addressing it.
- Human Friendly – Supports and enhances operator judgment rather than replacing it.

4.4.3 Financial Viability

As utilities face intensifying financial constraints, aging infrastructure, and climate-related stresses, GenAI is emerging as a critical lever for improving operational efficiency, enhancing capital planning, and ensuring long-term economic resilience.

broader IMPACT

Strengthens affordability, supports rate planning, and enables defensible investment decisions across asset portfolios.

For example, HRSD has optimized chemical and energy usage by utilizing GenAI connected to historical and process data, delivering early reductions in O&M costs and improved budget forecasting.

Similarly, the San Antonio Water System (SAWS) integrates data from its computerized maintenance management system (CMMS), supervisory control and data acquisition (SCADA) systems, and geographic information systems (GIS) through a GenAI-enabled platform to inform long-term reinvestment and capital planning.

4.4.4 Stakeholder Understanding and Support

GenAI Role: *Personalized FAQs, equity explainers, digital twin interfaces, and real-time public dashboards.*

Public trust is a strategic asset. As utilities face growing demands for transparency and equitable service, they must communicate complex information in formats that are accessible and tailored to specific audiences—without expanding communications staff.

GenAI can generate customized content (FAQs, infographics, decision summaries) for ratepayers, regulators, and advocacy groups—bridging the gap between technical complexity and community understanding.

Signal

DC Water's chatbot and LVVWD's gamified customer engagement pilot offer early glimpses of personalized, scalable outreach models.

Opportunity

GenAI could power dynamic "digital twins" or interactive dashboards that explain rate changes, water quality metrics, or infrastructure investments in plain language.

Case Study: Anglian Water

ENHANCING COMPLIANCE AND OPERATIONS WITH VISUAL AI TOOLS

Anglian Water, serving nearly 7 million people in the East Anglian Region of the UK, is advancing its regulatory and operational performance through targeted applications of AI and data analytics. The utility's strategy centers on leveraging historical and new data to enhance resilience and ensure compliance in a tightly regulated market.

- Strategic Focus: AI deployment targets three priorities: leveraging historical data, improving processes, and generating new streams of operational data.
- Visual GenAI in Action: The utility is in the process of field trialing and rolling out video-enabled AI to identify safety issues at plant sites and generate automated reports, targeted at aiding future regulatory and operational tracking purposes.
- National Leadership: As the leading utility behind the U.K.'s Ofwat-funded Safe Smart Systems program, Anglian is shaping long-term AI resilience strategies for the sector.
- Realistic AI Vision: Even implementing partial AI-assisted operations could enable 24/7 support, freeing staff to focus on higher-value tasks over a ten-year horizon.

4.4.5 Community Sustainability

GenAI Role: *Localized policy modeling, equity assessment, and program codesign.*

As utilities face increasing expectations to deliver equitable, environmentally conscious services, many community-focused initiatives remain fragmented or reactive. GenAI offers an integrative solution, enabling utilities to analyze unstructured community data, simulate outcomes, and collaboratively design programs that address local needs and requirements.

Signal

Zaragoza and San Jose Water are leveraging GenAI to integrate equity metrics and non-revenue water data into localized performance dashboards. These tools enhance planning transparency, allowing decision-makers to align infrastructure investments with community goals. Similarly, Anglian Water is piloting video-based GenAI tools for automated safety diagnostics and environmental assessments, visually communicating localized risks and fostering public engagement.

Opportunity

GenAI can simulate the potential impacts of proposed infrastructure projects or rate adjustments on different neighborhoods by using demographic overlays and real-time data. Additionally, it can also produce "equity explainers" or dynamic digital twins—interactive tools that help stakeholders visualize how capital investments translate into localized environmental and social outcomes.

4.4.6 Workforce Development

As utilities brace for a demographic shift—with over 30% of the U.S. water workforce expected to retire by 2030—it is critical not only to retain knowledge but also to rapidly upskill a younger, less experienced cohort. GenAI is emerging as a frontline tool for ensuring institutional continuity and empowering employees.

broader IMPACT

Builds digital literacy, reduces dependence on static procedures, and cultivates a more resilient, high-performing workforce that is aligned with long-term operational goals.

Signal

DC Water has deployed Microsoft Copilot licenses for 65 administrative staff members, assisting with tasks such as scheduling, writing, and data analysis. Staff survey results show an average time savings of 10 minutes per task, with 95% user approval, signaling early gains in productivity and morale. Meanwhile, HRSD's GenAI assistant serves as a digital mentor for operators, offering real-time guidance and bridging the knowledge gap caused by workforce turnover.

Opportunity

As frontline expertise diminishes, GenAI can help by embedding dynamic standard operating procedures, automating rote tasks, and providing real-time troubleshooting—all in plain language. These tools can accelerate onboarding, reduce the burden on supervisors, and empower newer employees to make confident, informed decisions without overreliance on senior staff.

4.5 Responsible Use and Governance: A Critical Pillar for AI in Utilities

Artificial intelligence represents more than its tactical application as a technological tool; it is emerging as a strategic capability that also depends heavily on trust, transparency, and responsible use. As utilities deploy AI to manage critical water resources, ensure public health, and optimize infrastructure assets and operations, governance at local, national, and regional levels will be crucial not only for maintaining compliance but also for gaining a competitive advantage.

At the forefront of this change, the EU Artificial Intelligence Act, adopted in 2024, explicitly classifies AI systems used in water utilities for safety-critical functions (e.g., leak detection, system optimization) as high-risk systems. Consequently, these systems are required to have documented risk management processes, transparency, and human oversight. For utilities in the EU and for global vendors serving them, compliance is not optional.

However, governance extends beyond mere regulation. Maintaining public trust in water systems is essential, particularly as utilities integrate sensitive data, including customer billing information, consumption patterns, leak detection systems, and environmental monitoring data. The concept of responsible AI governance is shifting from being an aspirational goal to an essential requirement. Utilities that regard governance as a core capability, rather than an afterthought, will be best positioned to deploy AI strategically, sustainably, and at scale.

Key Dimensions of Responsible AI Governance for Utilities:

- Transparency and Explainability – AI systems should produce understandable, auditable outputs—critical for ensuring operational safety and compliance with regulatory requirements.
- Data Privacy and Security – It is crucial to adhere to the General Data Protection Regulation (GDPR) and local data protection regulations to protect customer and operational data, especially as utilities expand their use of remote monitoring and customer-facing AI services.
- Human Oversight – Even sophisticated AI systems must allow for human review and the ability to override decisions, particularly in safety-critical operational contexts.
- Risk Management and Accountability – It is essential to document decision-making logic, maintain logs, and clearly define roles and responsibilities.
- Equity and Inclusion – Design AI applications to avoid reinforcing service inequities or bias, especially when used for rate setting, customer outreach, or conservation programs.

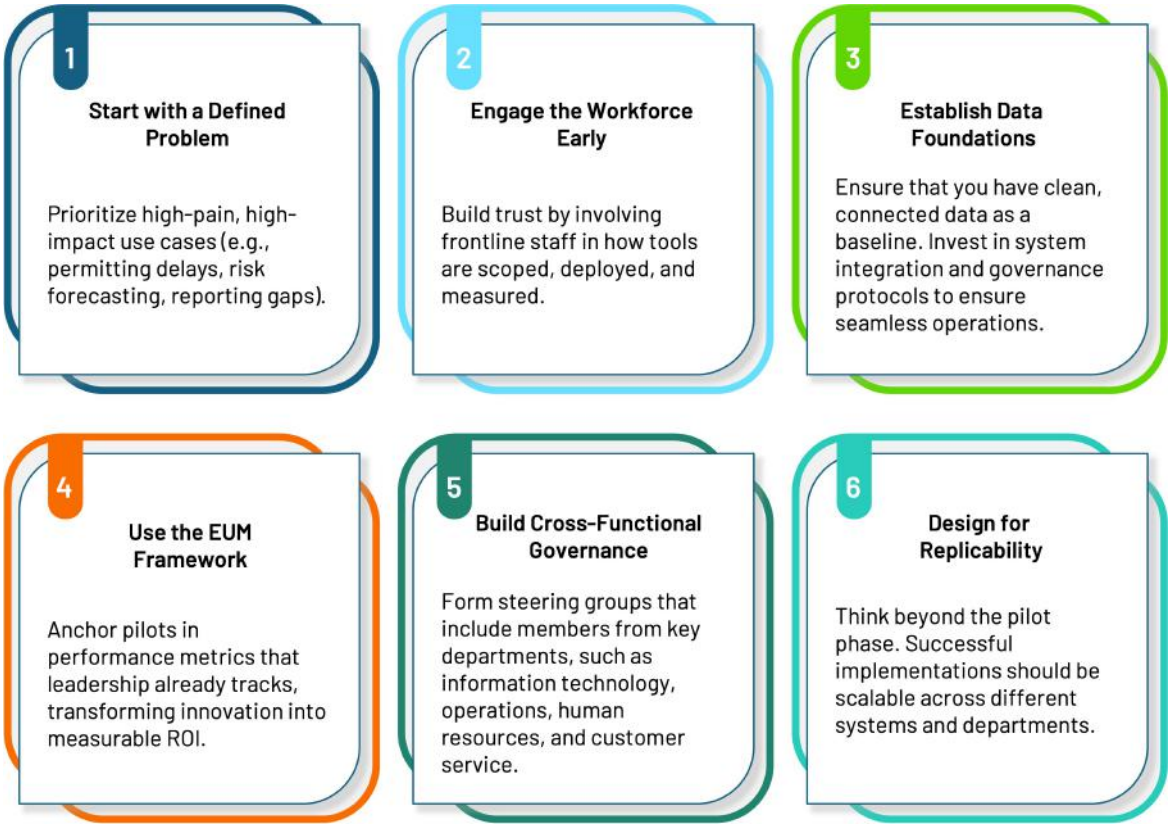
5 Conclusion: GenAI Is a Utility Tool, Not a Tech Trend

Generative AI is transforming how leading utilities plan, operate, and engage, with measurable improvements in cost control, staff productivity, and customer responsiveness. However, its ultimate value may lie ahead, in areas that have yet to receive sufficient digital investment, such as resiliency, regulatory performance, and public trust.

By aligning future GenAI pilots with these high-impact yet untapped capabilities, utilities can unlock the next wave of performance gains and establish a digital foundation for a more resilient, responsive, and trustworthy sector.

Utilities aren't technology companies, and they don't need to be. However, they are system organizations responsible for delivering essential services under growing operational, financial, and environmental pressures

Now is the time to lead—not just react.



6 Glossary

AI	Artificial Intelligence
AMI	Advanced Metering Infrastructure; an integrated network of metering hardware that enables two-way communication between the centralized utility and individual end points of measurement.
agentic AI	Capable of achieving outcomes independently; possessing adaptive capabilities.
CCTV	Closed-circuit television.
community of practice	A dedicated utility group formed for a shared purpose based on expertise and interest.
condition assessment report	A detailed assessment of the current state of a utility asset, usually made for future planning and investment.
early warning system	A system designed to provide timely warnings about potential problems or hazards that could impact a utility's infrastructure or services.
GenAI	Generative Artificial Intelligence; encompasses technologies capable of analyzing and discerning patterns in extensive training datasets and autonomously constructing material that shares comparable characteristics to this training input.
LLM	Large Language Model
ML	Machine Learning
ML & advanced analytics	AI tools engineered to perform specific tasks, such as leak detection, demand forecasting, or asset failure prediction, using rule-based or trained models on structured datasets.
Ofwat	The Water Services Regulation Authority, or Ofwat, is the body responsible for regulating the economic aspects of the privatized water and sewerage industry in England and Wales.
O&M	Operations & Maintenance

About

Bluefield Research

Boston
Barcelona
Chicago
Paris
San Francisco

North America: +1 617 910 2540
Europe: +34 932 716 546

waterexperts@bluefieldresearch.com
www.bluefieldresearch.com

Bluefield Research is a leading provider of global water market data and insights. We advance strategies for utilities, companies, and organizations addressing the challenges and opportunities in water.

Bluefield delivers robust, in-depth data and analysis not provided anywhere else in the water sector.

Xylem

Xylem Inc.
301 Water Street SE, Suite 200
Washington, DC 20003
United States

www.xylem.com

Xylem is a leading global water solutions company dedicated to advancing sustainable impact and empowering the people who make water work every day. From moving, treating, and measuring water to optimizing and maintaining water systems, Xylem collaborates with customers to solve their most critical challenges. Together, we are building a more water-secure world.

bluefield RESEARCH | xylem Let's Solve Water