AI for Water: Policy at the Speed of Technology

Policy Brief
August 2026

The Water Center
University of Pennsylvania

Acknowledgements

We would like to thank **Maya Halma**, Research and Communications Specialist at The Water Center at Penn, for compiling this report. We would also like to acknowledge the following Water Center staff and affiliated students for their contributions:

- **Ellen Kohler**, Director of Applied Research and Policy
- **Brenton McCloskey**, Director of Strategic Development and Communications
- **Emma Denison**, Communications and Student Manager
- **Caroline Barnhart**, PFAS and Emerging Contaminants Graduate Research Fellow
- **Nevina Rocco**, Research Specialist

Additionally, we would like to extend our gratitude to the following speakers and moderators for generously giving their time and remarks during the forum:

- **Lorena Grundy**, Practice Assistant Professor in Chemical and Biomolecular Engineering, Penn Engineering
- **Sonya Gwak**, Director of Global Academic Programs, Penn Engineering
- **Cary Coglianese,** Director, Penn Program on Regulation
- **Howard Neukrug,** Executive Director, The Water Center at Penn
- **Rohit Aggarwala,** Former Commissioner, NYC Department of Environmental Protection
- **Yvonne Hursh,** Counsel, Joint State Government Commission
- **Beau Schilz,** Water Principal, Amazon
- **Nadine Zerrini,** Associate Director of Innovation, DC Water
- **Rob Ballenger**, Divisional Supervising Attorney, Community Legal Services of Philadelphia
- **Marc Cammarata,** Deputy Commissioner of Planning, Philadelphia Water Department
- **Joseph Danyluk,** OneWater Director, Jacobs
- **Molly Riley,** Program Manager of Climate Adaptation, New Jersey Future
- **Diego Rodriguez,** Industry Sales Engineer, Bentley Systems
- **Ellen Kohler,** Director of Applied Research and Policy, The Water Center at Penn
- **Ken Miles,** Executive Director, Penn Center for Inclusive Innovation & Technology

Finally, we would like to thank the **Penn Program on Regulation** and **Penn Carey Law** for co-hosting the forum and **Penn Arts and Sciences' Department of Earth and Environmental Science** for their support.

Background

As artificial intelligence (AI) expands across the water sector, determining how to deploy it responsibly has become critical. While water utilities have long leveraged digital solutions like the Internet of Things (IoT) and smart technologies,[1] AI's growing capabilities have magnified both the scope and potential impact of these tools. This rapid evolution presents complex questions for the future of the water sector:

- Will the AI transition be a sudden revolution or a gradual shift toward resilient and sustainable water systems?
- How can water utilities best prepare themselves for this transition?
- What are the practical applications of AI in water utility operational optimization, predictive analytics, knowledge management, and administrative support?
- How can we govern AI use responsibly to protect our natural water resources, infrastructure, and the public from its inherent risks and potential abuses?

[1] IoT refers to a network of sensors and devices that collect and exchange data, such as water usage data. Smart technology includes leak detectors, smart meters, and smart grids.

To explore these questions, The Water Center at Penn's 2026 Spring Water Policy Forum, ***Water for AI: Policy at the Speed of Technology,*** convened conversations around responsible and effective AI use in the water sector. The forum brought together roughly 180 water professionals and students, including leaders from academia, water utilities, software companies, nonprofits, and regulatory agencies, for a collaborative day of discussion.

Following tradition, the forum featured a "closed-door" morning session with water professionals focused on fostering peer-to-peer conversation. Participants in this session completed a survey on their use of and thoughts on AI in the water sector. A public afternoon session featured a keynote speaker, a panel with three "setting the stage" speakers, and a panel with five commenters, followed by an audience-wide Q&A. This policy brief summarizes key takeaways from the morning session, the survey, and the afternoon session to further motivate discussion and action on the topic. Specific survey results can be found in Appendix A.

Discussions about AI's role in addressing water system management challenges cannot be separated from discussions about AI's own strain on resources and infrastructure. While this year's policy forum focused primarily on the less-discussed "AI for water" side of the relationship, The Water Center also held a pre-forum webinar on the "water for AI" side in the lead-up to the forum.[2] This webinar, titled *When AI Comes to Town: Water Infrastructure and Community Readiness*, brought together a panel of experts to discuss how data centers affect local communities and their water infrastructure. Together, the forum and webinar were designed to examine both sides of the water-AI relationship: how AI can support the water sector, and how growing AI infrastructure affects water systems and the communities that depend on them.

[2] For more information on the distinction between "Water for AI" and "AI for Water," see the Water-AI Nexus Center of Excellence, which provides short definitions of both: https://water-ai-nexus.org/.

Challenges with AI Deployment in the Water Sector

Throughout the discussions, participants addressed a number of barriers to implementing AI in the water sector. The following is a non-exhaustive list of examples discussed:

Data Privacy and Cybersecurity

Many participants expressed concerns about customer and employee data privacy. Without regulations or policies in place on AI use, it can be unclear who – within or outside the organization – owns or has access to what data. Confidential customer and organization information may be exposed or compromised if it is used in AI applications, especially applications that use internal data to train external models.

Internal Resistance

We heard that members of the water workforce may be hesitant to adopt AI. Some are worried about changes in job descriptions or jobs disappearing entirely; some are unsure how to use AI. Others are reluctant to adopt a new way of doing things and instead prefer to continue working as they always have.

Public Acceptance and Trust

Similar to internal resistance, water systems also face external resistance from the community. Public distrust in AI use and infrastructure can spill over into distrust of water providers as providers begin using AI, especially in public-facing applications like chatbots.

Governance

Varying governance structures across utilities can make it difficult to replicate AI policies and practices. For example, large cities, small municipal authorities, and private water companies can have different governance structures and may therefore handle AI implementation differently. This variation makes wide-scale implementation of a particular AI tool more challenging.

Lack of Training and Preparedness

Participants in the forum expressed concerns about a lack of readiness for AI use, including from a workforce, organizational, and regulatory standpoint. In many cases, water workers may not be familiar with the data they need to use for an AI application or may not be trained on best practices for data security. Water utilities may not have the high quality data needed to build strong AI models. Regulators have been slow to implement restrictions or offer guidance on AI use or data management and may not be prepared to regulate AI at the speed at which it is being implemented.

Data Quality

Poor data quality leads to poor AI outcomes. Many participants stressed that AI models are only as accurate as the data used to develop them, and many small water utilities may not have properly collected and stored enough data. Additionally, data collected decades ago may be of poor quality, causing water utilities to need to collect new data to generate a large enough dataset for AI models.

Funding

Funding for AI implementation can be a major challenge for under-resourced water systems. For example, training and hiring employees with the skillsets needed to implement AI, collecting data, and obtaining AI contracts can all require additional time and resources that may not be supported by traditional grants and loans. Small utilities may get left behind in the AI implementation curve as they lack resources compared to their peers.

Opportunities for AI Deployment in the Water Sector

Rohit Aggarwala's Four Provocations: How Water Utilities Can, Should, and Will Use AI

During his keynote address, former NYC DEP Commissioner Rohit Aggarwala grouped AI uses into four different "provocations" based on their ease of implementation, risks, impacts, and visibility:

1. **The most obvious areas**

Water utilities will – and should – start with the most obvious uses of AI. These are easy to implement, but their impact does not extend beyond making existing information readily accessible. Examples include customer service and employee handbook chatbots.

2. **The most visible areas**

Water utilities will then move to the most visible areas, which will gain traction with empowered internal leaders. Impacts from these uses are meaningful but targeted. Examples include water main break prediction, revenue collection improvement, and meter data automation.

3. **The most important areas**

The greatest opportunity to use AI for water utilities will be dramatically speeding up critical but non-core functions. While these uses are difficult to implement due to a lack of transferability and expertise, the impact can be transformative. Examples include security checks, legal review, and procurement.

4. **The most sensitive areas**

Using AI to replace core processes can be attractive because it garners attention, but it can also be difficult to implement and unlikely to succeed due to significant internal opposition. Examples of such uses include automating treatment plants, process engineering, and regulatory strategy. Such uses may not be worth the risk.

Participants in the policy forum discussed a multitude of ways to use AI across the water sector. The examples below are just a sampling of possible uses discussed during the forum:

Reducing Costs for Providers and Ratepayers

AI tools can help save costs for water providers and in turn improve affordability for ratepayers, allowing the existing workforce to expand its capacity into other needed activities. Examples of cost-reducing AI applications include:

- Reducing non-revenue water through leak detection
- Forecasting budgeting
- Identifying customers eligible for assistance programs
- Easing burdens to enroll in such programs
- Improving rate-setting

Workforce Development and HR

As an aging water workforce retires in the next decade, the water sector will need to recruit and retain new employees and transfer knowledge and expertise. AI tools can assist in the transition through:

- New employee development,
- Document review,
- Handbook chatbots, and
- Knowledge retention software.

Operational Intelligence

Perhaps the most widely implemented use of AI in water to date is operational intelligence. For over a decade, AI models have been used for applications like:

- Flood prediction,
- Pipe failure and water main break prediction,
- Water quality monitoring,
- Energy use optimization,
- Asset and sewer inspections,
- SCADA system monitoring,
- Digital twins, and
- Optimization of treatment dosing.

As AI capabilities continue to advance, these applications are expected to become increasingly accurate, reliable, and effective, enabling utilities to make better-informed decisions.

Customer Service

AI models can easily be implemented in customer service applications, and many water utilities have already done so. Examples include:

- Automating support and training
- Processing customer inquiries
- Connecting customers to assistance programs
- Customer service chatbots

Capital Planning and Prioritization

Perhaps the greatest potential for organizational transformation with AI tools comes from strategic planning. Water utilities are beginning to explore using AI to better inform:

- Prioritization of maintenance and capital needs,
- Resource optimization,
- Infrastructure prioritization, and
- Geospatial interpretation.

Improved Processes and Decision Making

Another high-impact opportunity for AI deployment in the water sector is faster and more efficient decision making. AI can speed up design, engineering, procurement, and construction by:

- Parsing through large amounts of data,
- Digitizing old records,
- Synthesizing information more quickly, and
- Turning fragmented information into usable knowledge.

Some participants remarked that AI can help employees focus their time and energy on tasks that require human judgment by speeding up more routine tasks.

Community Relations and Regulatory Compliance

Participants in the forum brought up creative uses of AI for community engagement, including:

- Stakeholder mapping
- Coalition building

Additionally, smart monitoring systems that can report data directly and immediately can facilitate regulatory compliance and reporting.

The Path Forward: Recommendations

One goal of the Spring Water Policy Forum is to translate dialogue into meaningful change in the water sector. The following ideas emerged from the day's conversations as the most actionable opportunities to make AI use more effective, responsible, and equitable to benefit water systems and the communities they serve.

- **Develop industry-wide standards for AI use:** Water utilities vary in their promulgation of standards for AI use. An industry-wide set of guidelines, created through collaboration with stakeholders, could help standardize policies and provide a framework for utilities who are new to AI on how to adopt it responsibly. One participant referred to the standards in the EU's Artificial Intelligence Act as an example. Such a set of guidelines should be flexible to change as AI rapidly evolves. One standard included in the guidelines could be mandatory training for operators on how to operate systems manually, without the use of AI, in case of an emergency.

- **Convene partners from within and outside the water sector:** Some water providers shared that connecting with other water providers who have successfully implemented AI would be helpful. Holding information sessions, webinars, and forums on this topic will help connect utilities who are at different stages of the implementation process so that they can learn from one another. Other participants also shared that water utilities can learn from data center developers and other industries who have more expertise in AI deployment.

- **Communicate clearly about AI:** As a public steward, the water sector needs to be transparent. Communicating with stakeholders about AI implementation and involving them in the decision-making process can help to build trust and public confidence. One participant noted that public acceptance can only be gained by showing that the benefits of AI implementation outweigh its potential risks and tradeoffs.

- **Utilize a strategic, cautious approach:** Water providers experienced in AI deployment stressed the importance of using an incremental approach to AI implementation, including a "phase 0" readiness and preparation stage followed by a pilot stage. They also noted the need to strategically prioritize high-impact applications like asset management, HR, and leak detection.

- **Use AI to enhance, not replace, human decision making:** Participants agreed that AI should only be used as a support tool. AI should be used to enhance employees' critical thinking and decision making, not replace it. Humans should ultimately hold all decision-making authority and use their critical thinking and judgement skills to oversee all AI use.

- **Consider AI's impacts on equity:** This year's forum was focused on using AI for water. However, participants stressed that any discussion of using AI in the water sector must also be accompanied by a discussion of how the resource extraction of water and energy to make AI possible can negatively impact communities. AI has the potential to worsen environmental justice issues if models are built on biased data and if water providers rely more on AI outputs than community knowledge.

- **Treat data as its own asset class:** Data and AI tools are a piece of digital infrastructure. Participants stressed that they should be treated as such by protecting them with the appropriate safeguards and conducting regular maintenance.

Conclusion

Looking ahead, water sector leaders must work together to implement AI tools and digital solutions in ways that are effective, responsible, and equitable. AI offers a range of promising opportunities for the water sector, including cost savings, operational efficiency, and strategic planning. However, it also poses challenges like governance, internal and public acceptance, and a lack of readiness. As AI technology advances rapidly, utilities and regulators will need to navigate these challenges with caution and care. At the same time, conversations about using AI to strengthen water systems must remain connected to conversations about AI's growing demands on water resources and infrastructure. Addressing "AI for water" and "water for AI" together will be essential to ensuring that AI supports a more sustainable and resilient water future.

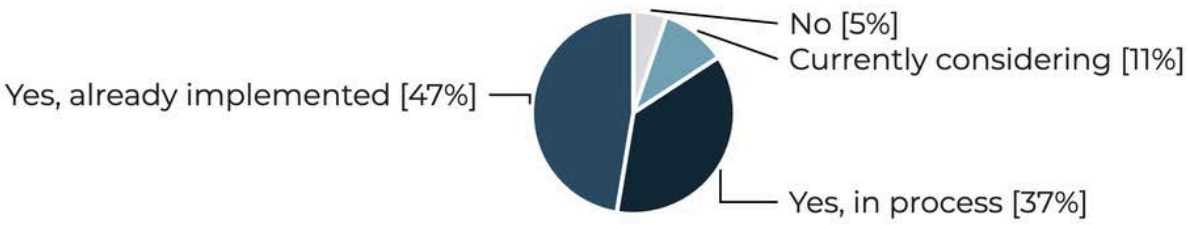
The Water Center at Penn will continue to work with our partners to guide responsible AI adoption by sharing model standards, convening water leaders for shared learning, and leading conversations. We encourage water providers to use this policy brief as a starting point for learning about incorporating AI tools in a way that safeguards and benefits employees, customers, and water.

To learn more about the intersection of water and AI, please visit the Water-AI Nexus Center of Excellence. This initiative, co-founded by The Water Center at Penn, Water Environment Foundation, Amazon, and Leading Utilities of the World, is leading the conversation on using AI to solve water challenges while also addressing water sustainability in the AI space.

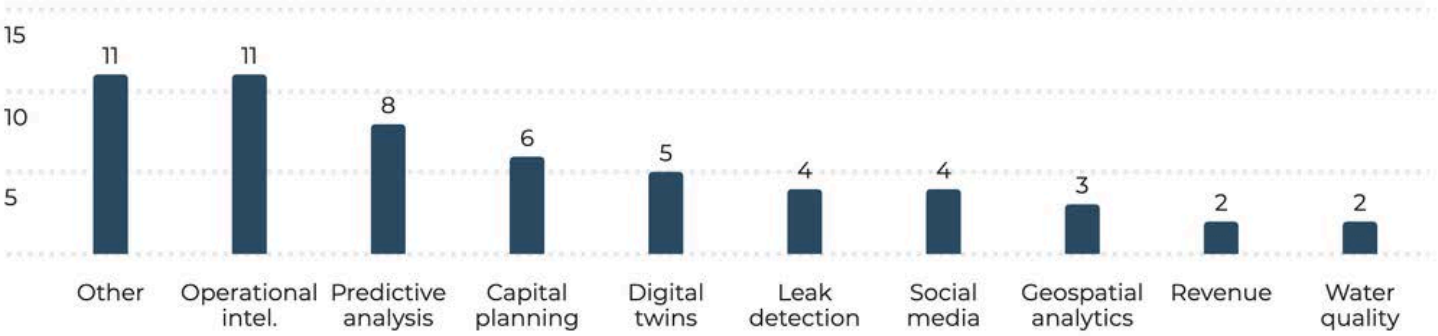
Appendix A: Survey Results

Participants in the closed-door morning session were invited to complete a brief survey on their own use of AI at their organizations and their thoughts on wide-scale AI use in the water sector. 29 participants submitted the survey. A summary of their responses is provided below.

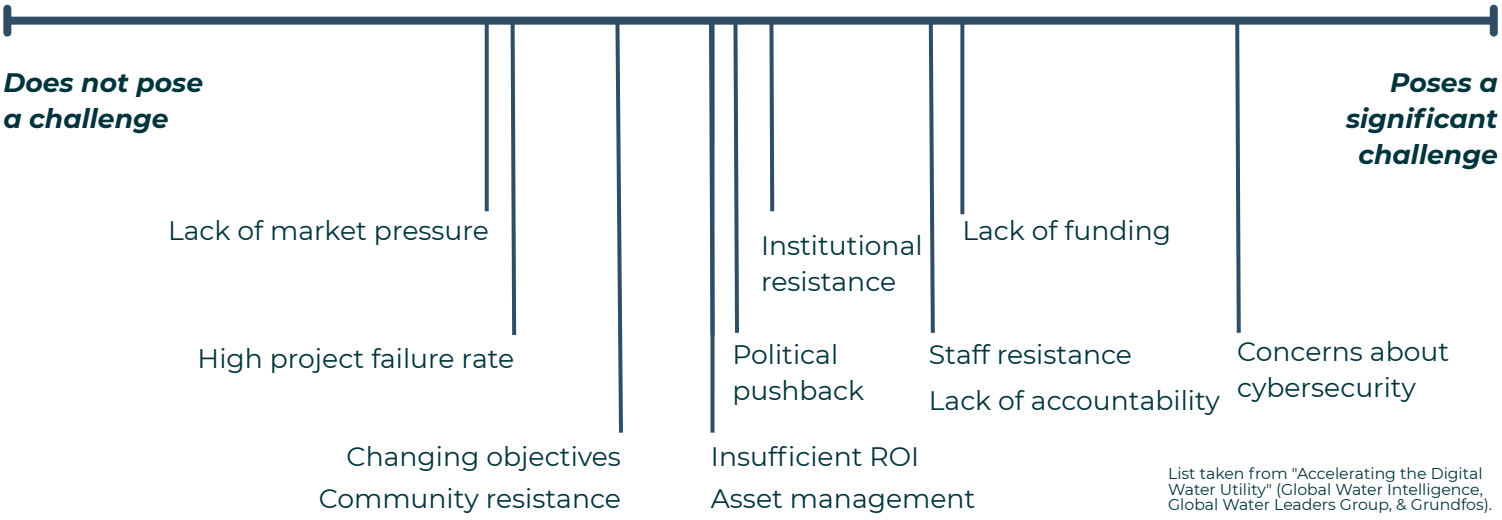
Using your own definition, have you implemented AI at your organization?



If you have implemented AI, how?



How much of a challenge do you think the following items pose to implementing AI as it exists today?



List taken from "Accelerating the Digital Water Utility" (Global Water Intelligence, Global Water Leaders Group, & Grundfos).

What skills do water professionals need to be prepared to best deploy AI tools?

Top responses include:

- Data literacy
- Quality assurance
- Governance and ethics
- Analytical skills
- Critical thinking
- Adaptability

What are the most important practices that the water sector needs to adopt to deploy AI responsibly?

Top responses include:

- Human oversight
- Cybersecurity risk management
- Workforce training
- Data quality
- Clear and ethical governance

Appendix B: What the Experts are Reading

Survey respondents were asked to provide their favorite resources for learning about water and AI. They provided the following reading and viewing materials:

Artificial intelligence risk management framework. (2023, January). National Institute of Standards Technology, U.S. Department of Commerce. https://doi.org/10.6028/NIST.AI.100-1

Black & Veatch 2026 water report. (2026). Black & Veatch. https://www.bv.com/en-US/resources/water-report

Broussard, M. (2023). More than a glitch: Confronting race, gender, and ability bias in tech. MIT Press.

Chandrasekeran, P. (2025). Digital water: GenAI and AgenticAI for water utilities. The International Water Association. https://www.iwa-network.org/publications/GenAI-and-AgenticAI-for-water-Utilities-white-paper

Digital water: Artificial intelligence solutions for the water sector. (2020, August 6). The International Water Association. https://www.iwa-network.org/publications/digital-water-artificial-intelligence-solutions-for-the-water-sector

D'Ignazio, C., & Klein, L.F. (2020). Data feminism. MIT Press.

DuMont, A. (2025). Is the water sector ready for AI? Bentley. https://www.bentley.com/wp-content/uploads/wp-democratizing-ai-ltr-en-lr.pdf

EPA cybersecurity for the water sector. (2025, September 29). U.S. Environmental Protection Agency. https://www.epa.gov/cyberwater/epa-cybersecurity-water-sector

Foged, N., & Samples, S.D. (2025). Project 5290: The emergence of AI in the water sector: Opportunities and challenges for water resources planning. The Water Research Foundation. https://www.waterrf.org/research/projects/emergence-ai-water-sector-opportunities-and-challenges-water-resources-planning-0

Grievson, O., Holloway, T., & Johnson, B. (2022, September 11). A strategic digital transformation for the water industry. The International Water Association. https://www.iwa-network.org/publications/digital-water-book-a-strategic-digital-transformation-for-the-water-industry

Hale, D., & Samples, S.D. (2024). Project 5321: The role of generative AI (GenAI) for the global water sector. The Water Research Foundation. https://www.waterrf.org/research/projects/role-generative-ai-genai-global-water-sector

Kichline, V. (2025, November 12). Consider the public-facing potential of AI in water utilities. Opflow, 51(10), 8-9. https://doi.org/10.1002/opfl.70004

Li, P., Yang, J., Islam, M.A., & Ren, S. (2025). Making AI less 'thirsty.' Communications of the ACM, 68(7), 54-61. https://doi.org/10.1145/372449

Mollick, E. (2024, April 2). Co-intelligence: Living and working with AI. Portfolio.

Principles for AI and the future of work in water: Building an AI-empowered water workforce. (2026). The Water-AI Nexus Center of Excellence. https://water-ai-nexus.org/workforce-insight-report/

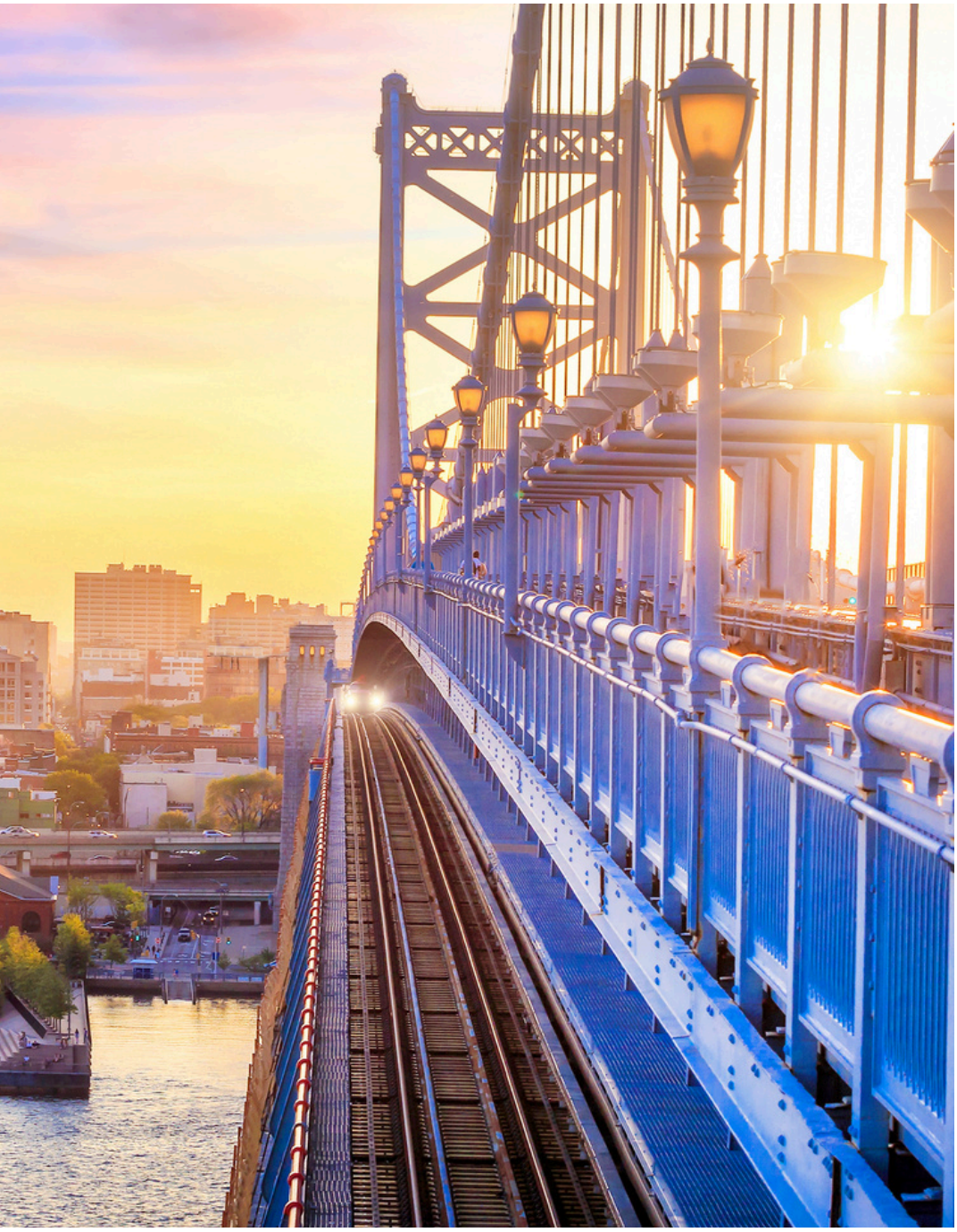
Reimagining water management: Generative AI as a strategic utility asset. (2025, September). Bluefield Research & Xylem. https://swan-forum.com/wp-content/uploads/2025/10/Reimagining-Water-Management-Generative-AI-as-a-Strategic-Utility-Asset-Report.pdf

Roher, D., & Tyrell, C. (Directors). (2026). The AI doc: Or how I became an apocaloptimist [Film]. Cottage M, Fishbowl Films, & Playgrounds.

Singapore's approach to AI governance. (2023, November 3). Personal Data Protection Commission. https://www.pdpc.gov.sg/organisations/resources/guidance-by-topic/singapores-approach-to-ai-governance

Wang, Y., Wilchek, M., & Batarseh, F.A. (2026). From data to policy: A systematic review of AI in water regulations and compliance. NPC Clean Water, 9(33). https://doi.org/10.1038/s41545-026-00555-w

Watering the new economy: Managing the impacts of the AI revolution. (2026, January). Global Water Intelligence. https://www.globalwaterintel.com/documents/watering-the-new-economy



watercenter.sas.upenn.edu
watercenter@sas.upenn.edu
The Water Center at Penn
watercenterpenn
215-898-2786
3600 Market Street, Suite 560, Philadelphia, PA 19104

The Water Center
University of Pennsylvania