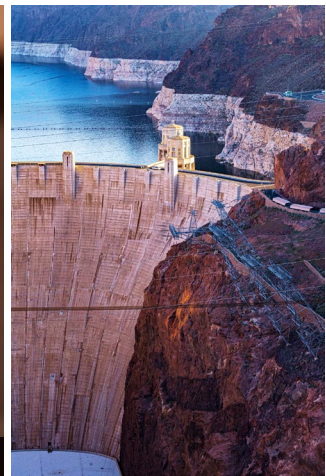
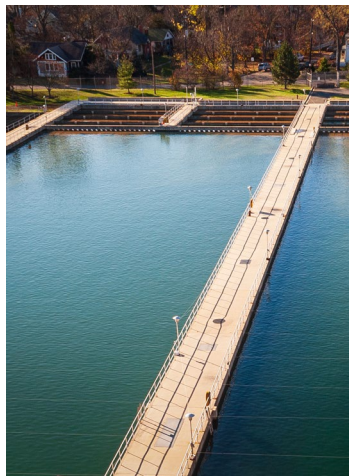




Climate Change in the Drinking Water and Wastewater Sectors and the Impact on Financial Resilience, Insurability, and Credit and Investment Quality

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Executive Summary

Drinking water, wastewater, and stormwater (water sector) utilities are experiencing more costly operational and financial impacts from the increased frequency and severity of climate change-related disasters. As a result, the financial and insurance industries are increasing their focus on climate change risk in their assessments of water sector utilities. Thus, it is important that water sector utilities properly identify, manage, and disclose climate change risk and resiliency efforts to ensure that they can continue to provide essential water services. These activities can also influence the utilities' credit ratings, investor relations, as well as the ability to attract investors and access insurance coverage at an affordable price. If a water sector utility does not provide sufficient information about its climate change threats, vulnerabilities, and adaptation strategies, financial institutions may base decisions on incomplete or publicly available information, which may not provide the most accurate picture of the utility's climate change risk.

In 2013, the U.S. Environmental Protection Agency (EPA) convened a working group with members from the water sector and the financial industry to investigate the above subject matter. The effort concluded that climate change readiness was not a significant factor in assessing water sector utility credit worthiness at that time.¹ However, that mindset has changed and increasingly the financial and insurance industries are considering the effects of climate-related vulnerabilities and how utilities manage associated risks. This can impact the assessments of water sector utilities. In response, EPA convened a new Workgroup in 2022 under its [Creating Resilient Water Utilities \(CRWU\) initiative](#), consisting of subject matter experts from the financial and insurance industries, academia, and water sector utility managers² (see Appendix A for membership). The Workgroup is leading this effort, and its goals were to share information to increase the mutual understanding of how these groups manage and assess climate change risks. Specifically, the Workgroup focused on integrating climate readiness into financial assessments, infrastructure investments, public outreach, and financial disclosures, and to identify effective strategies for water sector utilities to improve their operational and financial strength.

The Workgroup participated in a series of virtual and in-person meetings from June 2022 through January 2023. The Workgroup recognized that water sector utilities that effectively identify, manage, and disclose climate change risk and resiliency efforts in a responsible manner are more highly rated, broaden the investor base, improve insurance access and pricing, and gain more support from ratepayers. The Workgroup further discussed three main topics: 1) data to identify climate change threats at water sector utilities; 2) methods and practices to identify and assess climate change risks; and 3) effective outreach and disclosure practices to manage these risks. The following points summarize the results from the Workgroup process.

Water sector utilities and the financial and insurance industries use many of the same general data sources, tools, and methods to understand the climate change threats that may affect a utility. Uncertainty associated with the type, timing, and magnitude of climate change contributes to challenges in developing and implementing financially responsible climate adaptation strategies. These

¹ Risks and Resilience: Considering the Integration of Climate Readiness into Financial Analyses of Drinking Water & Wastewater Utilities, US EPA, September 2014. Online at https://www.epa.gov/sites/default/files/2016-06/documents/risks_and_resilience_synthesis_document_final_09_09_14.pdf.

² Workgroup members participated as water and financial sector subject matter experts and not as representatives of their respective organizations.

uncertainties present similar challenges for the financial and insurance industries in assessing a water sector utility's climate exposure and adaptation strategies. Some leading utilities use more tailored information, methods, and approaches to account for future climate uncertainty. For example, risk assessments are used to understand and communicate specific climate change-related vulnerabilities and inform operations, capital and long-term planning, and climate adaptation strategies that are robust and flexible across a wide range of climate scenarios. Risk assessments that are measurable and capture a range of financial impacts are generally viewed more favorably in the market.

The financial and insurance industries examine policies, programs, practices, and investments such as capital planning documents, risk assessments, and asset management plans to assess a water sector utility's potential exposure to climate change risk. In addition, these documents can be used to assess a utility's expected resilience. However, the industries' ability to assess a water sector utility's climate change vulnerabilities and risk management strategies can be limited by a lack of access to information about the utility's specific climate change vulnerabilities and adaptation measures. Thus, the industries rely extensively on information provided by water sector utilities to conduct assessments. The increased frequency and severity of extreme weather events driven by climate change and a utility's lack of disclosure of its climate-related risks may constitute a credit and insurability vulnerability.

Water sector utilities that inform stakeholders about their climate change risk and current and future resiliency efforts will likely have more favorable outcomes in the financial and insurance markets. Climate risk management strategies are rapidly evolving, and water sector utilities and the financial and insurance industries are working to translate climate change-related risks into defensible and quantifiable financial assessments. The use of consistent methods, performance indicators, and comparable disclosures may help to better align practices, move to a more quantitative approach to assessing and managing climate risk, and improve climate change resiliency in the water sector.

The Workgroup plans to continue its efforts to improve the alignment between the water sector and the financial and insurance industries. Specifically, the Workgroup will focus on the need to better understand: 1) the data needed to identify climate change threats; 2) methods and practices to identify and assess climate change risks; and 3) effective outreach and disclosure practices to manage these risks. The Workgroup will continue to reach out to other organizations to increase member representation in certain areas and enhance its efforts.

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1. Introduction and Workgroup Goals

The economic impacts from large climate-related disasters in the United States during the past five years have cost an average of more than \$120 billion annually.³ Water sector utilities are experiencing more costly operational and financial impacts from climate-related events. Thus, it is important that water sector utilities properly identify, manage, and disclose climate change risk and resiliency efforts to ensure that they can continue to provide essential water services. In response to these impacts and the concern that climate change will increase the frequency and severity of natural disasters, the financial industry is increasing its focus on climate change risk in its assessments of drinking water, wastewater, and stormwater (water sector) utilities. As a result, utilities that sufficiently identify, manage, and disclose their climate change risk and resiliency efforts can influence their credit ratings, investor relations, and ability to attract investors and access insurance coverage at an affordable price.

In response to this growing concern about climate change risk at water sector utilities, EPA convened a working group in 2022 under its [Creating Resilient Water Utilities \(CRWU\) initiative](#), consisting of subject matter experts from the credit rating and insurance industries, municipal bond market investors, academia, and water sector utility managers⁴ (see Appendix A for membership). The Workgroup is leading this effort, and its goals are to increase the mutual understanding of: 1) how the water sector assesses and manages climate change risks, focusing on integrating climate change readiness into financial assessments, infrastructure investments, public outreach, and financial disclosures; 2) how these risks influence the financial and insurance industries⁵; and 3) effective practices for assessing, managing, and disclosing climate change risks. The Workgroup's objectives include:

- Informing water sector utilities about the financial and insurance industries' evolving interest in and increasing emphasis on climate change resiliency;
- Sharing information about some of the climate change resilience strategies, policies, programs, practices, and investments undertaken by water sector utilities that the financial and insurance industries view as financially well balanced;
- Sharing information with the financial and insurance industries about water sector utility climate resilience goals and practices in the context of effectively balancing near- and long-term infrastructure, operational, and risk management needs, as well as customer service level expectations and affordability issues; and
- Identifying opportunities for future collaboration and information sharing between the water sector and financial and insurance industries.

To help accomplish its objectives, the Workgroup participated in a series of virtual and in-person meetings from June 2022 through January 2023. This report summarizes information discussed during the meetings and identifies opportunities for further discussion and sharing of information learned through this process. The report includes a description of the water sector and financial and insurance industries' perceptions of climate change risk from the Workgroup members' perspectives, a summary

³ NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2023). <https://www.ncei.noaa.gov/access/billions/>

⁴ Workgroup members participated as water and financial sector subject matter experts and not as representatives of their respective organizations.

⁵ Although many key groups were represented in the Workgroup, some important stakeholder groups not involved in the dialogue include bond councils and representatives from the State Revolving Fund and Water Infrastructure Finance and Innovation Act Programs.

of how the water sector and financial and insurance industries align in their climate change risk management strategies to improve operational and financial strength, a description of small water sector utility challenges, and a description of the Workgroup's next steps. The intended audiences of this report are water sector utilities and entities involved in assessing or evaluating the financial strength of water sector utilities with respect to climate change risk. These entities include credit rating agencies and investment management and municipal market analysts. This report is most applicable for water sector utilities that access the financial market to obtain a credit rating or financing (e.g., municipal bond market) or to acquire insurance, but many of the concepts in the report are applicable to all utilities, even if they obtain financing from state or federal sources (e.g., the Clean Water or Drinking Water State Revolving Fund [SRF] Programs).

2. Background

Future climate projections indicate a wide range of climate threats that could impact water sector utilities, including increasing temperatures, shifting precipitation patterns, rising sea level, saltwater intrusion, and more frequent and extreme weather events (e.g., hurricanes, floods, and droughts). These circumstances increase the challenge of water sector utilities meeting their mission in protecting the environment and providing clean and safe water to their customers. They also negatively impact their ability to: 1) access adequate and quality water supplies; 2) manage water demand; 3) protect water resources (e.g., meeting effluent limits); and 4) operate and maintain infrastructure.

Water sector utilities currently manage a wide range of risks as they strive to provide their customers reliable and affordable services. Climate change threats are becoming a greater concern for water sector utilities by both enhancing current threats as well as introducing new threats, and this growing concern is focusing attention on strategies for managing direct and indirect (e.g., local economic or demographic shifts that cause changes in ratepayer base) climate change risks. Some water sector utilities are already taking proactive steps to identify climate change threats and vulnerabilities and implementing adaptation measures⁶ to reduce climate change risk, while others are beginning to consider climate change as a noteworthy risk.

Financial institutions evaluate a water sector utility's capacity to manage climate change risk as part of their assessment of the utility. As a result of the increased focus on managing climate change risk, water sector utilities that are sufficiently identifying, managing, and disclosing climate change risk and

Defining Key Climate Change Terms

Threat: Climatic change conditions (e.g., drought, wildfire, and flooding) that may result in impacts to utility assets and operations.

Vulnerability: The degree to which physical, ecological, and socio-economic systems are susceptible to and unable to cope with adverse impacts resulting from climate change threats.

Risk: The probability that a particular adverse physical climate change threat will occur and the potential consequences if the threat occurs.

Adaptation: Measures and responses that are taken to address the potential effects of climate change risk.

⁶ Mitigation refers to measures that may be taken to address the causes of potential climate change (e.g., reducing greenhouse gas emissions). This report focuses on adaptation to climate risk and not mitigation although the two are interrelated.

resiliency efforts may improve their strength in the financial and insurance markets, which may result in benefits such as credit rating stability and access to adequate and more affordable insurance coverage.

3. Sector Perspectives

a. Water Sector Utility Perspective

Leading water sector utilities understand that it is important to consider how current and future climate change threats might affect their operations and assets, as well as what adaptation strategies are available to reduce risks. They recognize that effectively managing climate change risk can influence their credit ratings, help attract more investors, improve access to affordable insurance coverage, and, most importantly, ensure that they continue to deliver on their missions to provide essential water services reliably and effectively. These water sector utilities use various approaches, frameworks, and tools to assess and manage climate change threats, ranging from “top-down” climate-driven approaches that focus on evaluating scenarios of projections from downscaled climate models to “bottom-up” performance-driven approaches that emphasize identifying and stress-testing critical assets and operations. The goal is to improve resiliency using strategies that are flexible and robust across a wide range of scenarios to help address the uncertainty of future climate events and conditions.

To minimize financial risk associated with climate change impacts, some water sector utilities also use insurance coverage to protect against physical damage to assets and litigation, such as third-party claims alleging a failure to provide services. Some water sector utilities, particularly larger utilities with extensive ratepayer bases and substantial budgets, self-insure at least some, or in certain cases all, of their assets rather than exclusively using commercial insurance. Self-insuring requires utilities to carefully assess their climate change risk and budget to cover potential losses. Climate change impacts not covered by an insurance provider or a budget for self-insurance may present a significant financial risk for utilities as they must depend on their cash reserves or external resources (e.g., bank loans or Federal Emergency Management Agency assistance) to cover losses.

The water sector recognizes the importance of balancing climate change adaptation efforts with other needs. Preparing for and responding to climate change threats may result in increased operations and capital costs, which will have implications for long-term financial planning and rate flexibility. Managing climate change threats will be particularly difficult for smaller water sector utilities, many of which already encounter hurdles in their efforts to provide basic services to their customers. Despite increasing costs and challenges, leading water sector utilities recognize that effectively managing climate change threats, to the best of their capacity, is critical to ensuring the long-term sustainability of their operations and assets.

b. Credit Rating Agencies and Investor Community Perspective

As credit rating agencies and investors look to evaluate the credit strength of water sector utilities, there is a growing focus on climate change risk and how it may impact utilities’ overall credit profiles, including financial position, debt profile, service area, and resource base. Frameworks to evaluate climate risk and resilience are increasingly being used by many key players in the financial market, including credit rating agencies, investment asset managers, and insurance providers.

These key players are interested in understanding a utility’s climate-related risks and whether its response to these risks supports system reliability and financial strength. For instance, Standard & Poor’s (S&P) recognizes that “the urgency to harden infrastructure to meet the rising pressures

associated with climate change and other emerging risks may pressure affordability, and balancing these objectives will be key to maintaining financial performance.”⁷ Credit rating agencies and investors are also interested in the efforts the utility is undertaking to promote climate change adaptation and resilience.

Credit Rating Agency Spotlight: Climate Change and Credit Quality

Moody’s has established a detailed rating methodology to assess a water sector utility’s risk resulting from extreme weather events and climate change.

“Municipal utilities may be directly exposed to extreme weather events due to climate change, such as flooding or droughts, and this may affect credit quality. Government facilities or investments in physical assets could be affected by physical risks and by other sources of environmental risk. Utility systems providing service to coastal communities or communities that are greatly susceptible to drought are highly exposed to environmental risks. Environmental hazards, such as hurricanes, can result in significant system damage requiring unexpected capital spending for repairs, while longer term environmental trends, such as rising sea levels or prolonged drought conditions, can cause more prolonged pressure on system budgeting and spending priorities.”^a

S&P also looks at climate-related risks as part of a utility’s credit assessment. Examples of these risks that can affect credit include:

- Climate transition risk factors, including those related to climate policy; legal, technology, and market changes to address mitigation; and adaptation requirements related to climate change; and
- Physical risk factors, including event-driven or longer-term shifts in climate patterns, such as hurricanes or chronic heat waves.

S&P evaluates the potential impact of these risks in the context of the utility’s operational capabilities and its management’s long-term planning and preparation, risk assessments, and insurance coverage. Incorporating climate-related risks and opportunities into a credit rating analysis requires a qualitative view of an entity’s capacity to anticipate and plan for a variety of emerging risks that could disrupt its credit fundamentals.^b

Sources:

^a Moody’s Investors Series. 2022. *US Municipal Utility Revenue Debt Methodology*.

^b S&P Global Ratings. 2022. *Through the ESG Lens 3.0: the Intersection of ESG Credit Factors and U.S. Public Finance Credit Factors*.

Climate risks are integrated into financial institutions’ assessment of credit quality and investment opportunities. Climate variability directly influences system operations and reliability which affects financial performance. As such, assessing climate vulnerabilities and adaptation measures is an important part of an overall financial assessment and credit picture. Rating agencies and investors are increasingly focused on a water sector utility’s risk management strategies. They are also examining whether policies, programs, practices, investments, and asset management plans exist that mitigate

⁷ S&P Global Ratings. 2022. *Through the ESG Lens 3.0: the Intersection of ESG Credit Factors and U.S. Public Finance Credit Factors*.

potential climate-related risks. The potential impacts of climate change can affect financial performance, rate structure, affordability, leverage, insurance coverage, and economic factors. Ultimately, a utility's exposure to climate-related events could affect its credit quality.

Environmental risk, including climate hazards, is only one factor that goes into an issuer's credit rating. The potential impact of climate change risk may be offset by existing and future adaptation measures if there is a solid plan for and commitment to implementing these measures. Ultimately, the focus on climate change risk in a credit rating or investment decision is about assessing a water sector utility's financial and operational strength in the face of an increasingly uncertain climate.

c. Insurance Industry Perspective

The insurance industry plays a crucial role in helping water sector utilities manage their financial risk associated with climate change impacts, particularly given the increased frequency, severity, and unpredictability of climate hazards. Insurance companies are increasing insurance premiums and rationing the availability and adequacy of coverage, particularly property insurance coverage, for water sector utilities in catastrophe (CAT)-prone areas. The result may be that water sector utilities are unable to secure adequate coverage at affordable rates.

There is a growing concern in the industry about the impact of climate change on water sector utilities. Insurance companies are interested in how water sector utilities are managing climate change risks because they provide insurance policies to utilities that can be impacted by climate events and invest in municipal bonds (including municipal water sector utility issued bonds) as a source of capital for claim payouts. The increase in insurance claim payouts and litigation due to climate change disasters has led insurance companies to focus more on water sector utilities' climate change risks and risk management efforts.

When assessing a water sector utility's risk, insurers are primarily concerned with the likelihood of a claim being submitted and a payout required, as well as the likelihood of litigation against the utility for a climate-related service failure. The types of coverage available, or required, varies depending on state and local insurance-related policies. Insurance providers partner to aggregate and analyze climate data using a proprietary model and identify CAT-prone areas, so each provider views regional climate threats in a similar way.

Insurance analysts prefer that water sector utilities provide a detailed narrative of their operations and assets, construction quality of facilities, and engineering responses to potential risks and vulnerabilities to assess risk and prepare an insurance quote. When preparing the quote, insurance analysts consider the potential losses and the regulatory environment in which the utility operates, such as state liability laws that may vary from state to state. Water sector utilities that engage with underwriters and provide a customized narrative regarding their climate change vulnerabilities and efforts to reduce risk prior to purchasing policies are more likely to receive better coverage and rates.

General insurance coverage held by a water sector utility's ratepayer base, such as households and businesses, can also provide coverage for the impact of climate change events. This is a factor when considering the water sector utility's climate change risk, as natural disasters can lead to migration and cause financial stress that impacts a customer's ability to pay, especially in disadvantaged communities. Ensuring that water sector utilities and their ratepayers have access to adequate insurance at affordable rates will require private organizations and federal, state, and local governments to work together to

improve climate change resiliency and develop sustainable insurance-related policies, programs, and products.

Increasingly, water sector utilities are asking the insurance industry for assistance in incorporating climate change strategies and insurance availability into their preliminary official statement for bond releases. This is done to differentiate their bonds from those of other utilities and secure competitive rates.

4. Climate Change Risk Management Strategies

During its deliberations, the Workgroup discussed in depth three topics related to climate change risk management strategies: 1) data to identify climate change threats at water sector utilities; 2) methods and practices to identify and assess climate change risks; and 3) effective outreach and disclosure practices to manage these risks. The Workgroup identified the need for additional discussion on each of these topics to fill existing gaps in information, understanding, and practice. Better alignment in the areas as described in the following bulleted list will support elevation of overall climate change resilience practice and risk management for water sector utilities. A more detailed summary of the Workgroup discussions that helped identify these gaps and the need for additional discussion is provided in 4.a – 4.c, below.

- Exploring current uses of climate projection data to understand the climate *threat* profile of an individual utility and its surrounding community. This topic would involve conducting a more detailed analysis of data sources and methods used by the water sector and these industries to help them better understand regional and local climate change threats. Workgroup members noted it would be helpful to learn more about how the water sector, financial and insurance industries, and academic sector are using global climate models and downscaled climate projections and what tools are available. Discussions would explore the use of publicly available vs. proprietary data and any potential limitations of each, as well as the limitations of these climate model datasets.
- Exploring current climate change risk assessment methods, approaches, and tools to understand utility climate change impact *vulnerabilities* and related climate change impact *consequences*. The Workgroup identified a lack of consistent, comparable, and reliable information about the potential impacts of climate change on water sector utilities. A broader push for data consistency is important to spur the water sector and financial and insurance industries to assess and price climate change risk and implement climate change resiliency measures more broadly across the water sector. They may also benefit from a suite of common performance indicators to characterize vulnerabilities, adaptation measures, and management of climate change impact consequences. However, it is important to note and further explore the fact that in assessing water utility climate threats, vulnerabilities, and adaptation measures, there are many instances where “consistent and comparable” data sources and metrics may not be appropriate or necessary.
- Exploring current practices, methods, and approaches supporting effective disclosure of climate change impact risk management efforts by water sector utilities. Workgroup discussions highlighted disclosure statements as a lynchpin in the relationship between water sector utilities and the financial and insurance industries that can substantially influence the outcomes of

financial assessments related to insurability, bond ratings, and investor interests. Water sector utilities will benefit from guidance and model disclosures that include the types of information that should be disclosed to the financial and insurance industries and provides context for the target audience. The financial and insurance industries will benefit from standardized disclosure models, which could improve access to basic information and help simplify the review process. Discussions also indicated that disclosure needs and expectations are evolving, creating an opportunity for continued joint learning among the water sector and financial and insurance industries.

a. Identifying Water Sector Utility Climate Change Threats

The financial and insurance industries and water sector use many of the same data sources, tools, and methods to understand the climate change threats that impact a water sector utility. For instance, they use many of the same national, regional, and state data sources (see box below). In addition, the industries and water sector use downscaling of future climate projections from global climate models as one method to estimate climate change threats on a local scale. However, it is important to ensure that these climate model projections are not being overused or misused, including avoiding the incorrect assumption that these are “predictive” models and avoiding assigning precision (spatial and temporal) to model results that is beyond what the models are designed to provide. In addition to these publicly available data, the financial and insurance industries also use third-party proprietary datasets and methods to identify a utility’s climate change risks. These industries also continue to develop in-house expertise and information to assess these risks. Insurance companies partner to aggregate publicly available and proprietary data to identify CAT-prone areas and help ensure that different insurance agencies are evaluating climate change threats in the same way.

Although these data sources and methods can provide an indication of a utility’s general climate change threats and risk, they are of limited use for identifying and assessing its specific climate change vulnerabilities and adaptation strategies.

Examples of Organizations That Provide National, Regional, and State Data Sources to Identify Utility Climate Change Threats

Bureau of Reclamation
California Department of Forestry and Fire Protection (CAL Fire)
Climate Central
Federal Emergency Management Agency
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration (NOAA)
World Meteorological Organization
World Economic Forum
U.S. Drought Monitor (partnership with the National Drought Mitigation Center, NOAA, and the U.S. Department of Agriculture)
U.S. EPA CRWU
U.S. Geological Survey

** This is not intended to be a complete list of all organizations providing data sources.*

b. Practices to Identify and Assess Water Sector Utility Climate Change Vulnerabilities, Consequences, and Adaptation Strategies

The Workgroup noted that an important challenge in assessing a water sector utility's climate change risk and developing and implementing financially responsible climate adaptation strategies is the uncertainty associated with the: 1) type, timing, and magnitude of climate change impacts; and 2) methods used to project these impacts, all of which can have significant implications for a water sector utility's operations, investments, financial capacity, and ratepayer base. In the face of this uncertainty, leading water utilities recommend using climate model projections to guide scenario planning and/or decision making under deep uncertainty to assessing and adapting to climate change threats.

When assessing climate change threats, water sector utilities are concerned about their ability to continue to provide services at an affordable rate in perpetuity, which requires investing in assets that may have a life expectancy of 50 years or more. Leading water sector utilities use tailored information, methods, and approaches to: 1) conduct threat assessments and understand their specific climate change vulnerabilities; and 2) inform operations, capital and long-term planning, and climate adaptation strategies. Examples of the types of information water sector utilities tailor to their specific situation include water demand; the location, condition, and capacity of critical assets; "downscaled" projections from global climate models and other datasets developed in partnership with climate scientists; and results from stress tests and scenario analyses. In general, global climate models and varying downscaled climate models are sufficient to guide water utility climate scenario planning approaches. Regardless of the approach, the goal of these efforts is to improve resiliency using adaptation strategies that are robust, flexible, and financially responsible across a wide range of scenarios to help address the uncertainty of future climate events and conditions.

Financial institutions are primarily concerned with a water sector utility's capacity to absorb the financial impacts of preparing for and responding to climate change, which is dependent on several factors including its customers' socioeconomic characteristics and its ability to leverage external resources within a given time frame. Financial institutions are more likely to determine that a water sector utility's approach to managing climate change risk is robust if the utility has proactively identified its climate change threats and vulnerabilities and is taking steps to reduce risk. They also consider the utility's ability to maintain its financial strength and attend to other priorities with reasonable rate stability and affordability.

However, the financial and insurance industries' ability to assess a water sector utility's climate change vulnerabilities and adaptation strategies is often limited by a lack of access to specific information about the utility. Thus, to conduct their financial assessments, the industries rely extensively on information provided by the water sector utility. If a utility does not provide sufficient information about its climate change threats, vulnerabilities, and adaptation strategies, financial institutions may base decisions on incomplete or publicly available information, which may not provide the most accurate picture of the utility's climate change risk (see the Disclosure section below). Regardless of whether a utility chooses to disclose its climate change threats, the financial industry will assume that climate change threats exist. Therefore, the lack of climate-related disclosures by a utility may indicate that the utility is not actively adapting to climate change impacts.

Utility Spotlight: Accessing Adequate Insurance at an Affordable Rate

The East Bay Municipal Utility District (EBMUD's) Risk Management Division is committed to building long-term relationships with their insurance partners and educating them about EBMUD's commitment to safety, security, reliability, and their loss prevention/loss mitigation efforts. Critical to this mission is their annual Broker & Underwriter tour. During the tour, EBMUD's insurance broker and underwriters for General Liability, Property, Boiler & Machinery, Workers' Compensation, and Crime programs visit multiple District facilities to see firsthand the facilities, observe operations, and interact with staff. The Broker & Underwriter tour has been very successful in communicating risk adaptation activities to the underwriters, and other water agencies have replicated this approach. For example, during the tour of EBMUD's upcountry facilities, staff who work on EBMUD's watershed and climate resiliency programs present information and answer questions on topics such as wildfire prevention. In addition, insurance underwriters recently toured the UC Berkeley Center for Smart Infrastructure, where EBMUD partners with academia, regulators, and infrastructure owners, such as other state and national utilities, to develop approaches to address four primary areas: aging infrastructure, water supply and natural resources, climate change, and emergency and community preparedness. Research topics identified by the Center and stakeholders in the climate change area include recalibrating climate change and supply impact models with the latest climate data; developing standards for resiliency, measures, and carbon accounting; and evaluating the impact of climate change on wildfire risk and developing better tools to prepare for and mitigate these changes.

Insurance companies assessing a water sector utility's risk are primarily concerned with the likelihood that: 1) a claim will be submitted, and a payout required; and 2) a party will file litigation against the utility, such as for a climate-related service failure or lack of preparation for climate change. The information requested on a typical insurance form is not specific enough to allow providers to base an insurance proposal on a water sector utility's unique climate change risk. Insurance providers often lack the time, resources, utility-specific technical expertise among their staff, and access to specific information about the utility to effectively assess its climate change risk. Thus, utilities that provide a customized narrative regarding their climate change vulnerabilities and efforts to reduce risk prior to renewing or purchasing policies are more likely to receive quotes from more providers and be offered better coverage and rates because they are not grouped into an area-wide risk profile. Examples of information a water sector utility might provide include the construction quality of the existing facilities and development and funding of adaptation measures.

Utility Spotlight: Incorporating Climate Resiliency into Capital Improvement Programs

San Francisco Public Utilities Commission (SFPUC) is considering the climate-smart capital improvement planning (CIP) methodology developed by the University of Washington and California Polytechnic State University, San Luis Obispo. Dr. Jan Whittington (University of Washington) has a model that integrates lifecycle cost, decarbonization, and resilience into typical capital improvement programming processes, which has been field tested over ten years in international settings with the World Bank and other global organizations. The broad areas under consideration include: 1) generating spatial models forecasting the magnitude of climate-exacerbated hazards (e.g., urban heat, flooding, sea level rise, and landslides/liquefaction) at resolutions and timescales adequate to evaluate capital investments over their lifespan; 2) evaluating the possibility of applying the climate-smart CIP model to ongoing SFPUC projects; and 3) taking initial steps toward establishing a method of measuring social equity and/or vulnerability in CIP. The SFPUC is considering the methodology's ability to generate outputs that would enhance the SFPUC's green bond and Environmental, Social, and Governance (ESG)-related reporting as well as assist capital planning decision making.

The Workgroup discussed some practices that may help water sector utilities effectively incorporate climate change resiliency investments into their operations and capital planning process and help the financial and insurance industries assess the utility's approach. The box below includes examples of practices that Workgroup members in the financial and insurance industries recognized as indicative of a robust approach by a water sector utility. Similarly, Workgroup members in the water sector identified these as effective practices for improving climate change resilience.

Examples of Effective Practices for Incorporating Climate Change Resiliency Investments into Water Sector Utility Operations and Capital Planning

- Establishing and implementing policies that indicate the water sector utility, including its board, is committed to preparing for climate change. Ensuring that the commitment results in financial investments in climate change adaptation measures and effective messaging to stakeholders.
- Integrating climate change risk management thinking and planning throughout the water sector utility; ensuring that the proper skillsets are involved in making operations, capital investment, and planning decisions; and ensuring that there is a clear decision-making process.
- Partnering with other regional entities and climate scientists to collaboratively assess climate risks and build resilience.
- Establishing a long-term planning process (e.g., integrated resource plan) that looks 50 to 60 years ahead and considers climate change threats and vulnerabilities.
- Investing in robust, financially responsible adaptation measures that provide flexibility to adapt to uncertainties in future climate projections. Demonstrating the business case for such investments and the financial capacity to absorb the associated costs.

- Conducting climate change threat and vulnerability assessments using stress testing, scenario planning, “downscaled” climate projections, and high-resolution models to: 1) project the impact climate change risk will have on operations and critical assets (existing and proposed); and 2) identify adaptations needed to ensure that the water sector utility will be able to provide essential services in the future. Documenting what assumptions and data the utility is using to forecast different climate futures.
- Identifying the potential consequences of failing to address climate change risk on the water sector utility, its customers, and the larger community. Evaluating whether state or federal assistance would be available to offset losses.
- Developing outreach and disclosure materials to tell stakeholders the story about the water sector utility’s climate risks and measures they are taking to address the risks, including measures in its capital plan.

The water sector and financial and insurance industries may benefit from establishing common assumptions regarding the data sources and methods used to identify and assess a water sector utility’s climate change threats, vulnerabilities, and adaptation strategies. For example, the Workgroup suggested exploring a potential framework or a suite of key performance measures that could be applied across the water sector and financial and insurance industries to use and interpret data.

Potential benefits include:

- Increasing the water sector’s resiliency by making it easier and more cost effective to identify climate change threats and justify the need to implement adaptive measures;
- Supporting regional partnership efforts by ensuring consistency across discussions;
- Providing clarity to water sector utilities about how the financial and insurance industries assess climate change threats and vulnerabilities and how to improve outcomes linked to financial assessments (e.g., bond ratings) and insurance coverage and costs;
- Spurring the municipal market to better price climate change risk in its assessments; and
- Improving the financial and insurance industries’ confidence in its assessment of the robustness of utility resiliency efforts.

The water sector and financial and insurance industries may also benefit from establishing a suite of metrics or performance indicators to assess climate change risk on water sector utilities and the effectiveness of adaptation measures. If possible, such a suite would include indicators to identify threats and assess the consequences and vulnerabilities of a utility’s physical assets and revenue base due to climate change over time. The water sector and financial and insurance industries could compare these indicators to the utility’s financial capacity to address climate change risk and its financial standing. Further discussion regarding indicators needs to include consideration of the potential unintended consequences of such an approach, and the highly regional and extremely varied circumstances of water sector utilities. Indicators that might be appropriate for a specific water sector utility, or group of utilities, may not be appropriate for others due to several factors, including differences in region, number of customers served, range of services provided, institutional structure, and whether the utility serves urban or rural areas. Discussions about potential indicators should be approached with extreme caution and in a highly collaborative manner and begin with an understanding of indicators already used by the sectors, such as those in the American Water Works Association

(AWWA) benchmarking program. It is important that these conversations are not driven solely by the financial industry, which has different responsibilities and perspectives than water providers.

Utility Spotlight: Incorporating Climate Change into Strategic Planning and Priorities

DC Water’s assets span across the National Capital Region, in and around Washington DC in the mid-Atlantic region of the US. This region is vulnerable to three types of flooding: riverine flooding from upstream watersheds; coastal flooding from the Atlantic Ocean via the Chesapeake Bay and Potomac River; and interior flooding when heavy rainfall overwhelms stormwater infrastructure. DC Water is part of the District of Columbia’s Flood Task Force, which brings multiple federal, state, corporate, and non-governmental organizations together to identify and address increasing flood risks. For example, many of DC Water’s assets are directly adjacent to the tidally influenced Potomac and Anacostia Rivers. Given the potential for riverine flooding, DC Water is constructing a 500-year storm event floodwall at Blue Plains, the world’s largest advanced wastewater treatment plant which sits on the banks of the Potomac River. DC Water’s strategic plan is structured around five Organizational Imperatives, which are defined as outcomes essential to achieving DC Water’s strategic ambitions. One of these five imperatives is for DC Water to be “resilient,” with specific themes focused on climate adaptation, climate mitigation, a resilient water supply, and emergency response, among others. Actions to support these themes not only advance DC Water’s strategic priorities, including addressing climate risks, but also advance the goals of the Flood Task Force.

c. Outreach and Disclosure for Water Sector Utility Climate Change Risk Management

The increased frequency and magnitude of climate-related impacts has heightened the importance of water sector utility outreach and disclosure. Failure to provide adequate disclosure—including disclosure of a water sector utility’s exposure to climate threats and vulnerabilities and adaptation measures to address these vulnerabilities— is a credit weakness. By providing transparent and comprehensive information about their efforts to identify and address climate change risks, water sector utilities can attract more investors, strengthen their credit profile, and access adequate insurance coverage at affordable rates. Additionally, disclosing information about their climate change resilience can help water sector utilities build stronger relationships with ratepayers and become an employer of choice for people that want to help address the impacts of climate change.

Financial institutions assess water sector utilities’ climate adaptation strategies to ensure that they have policies in place, have sufficiently incorporated climate change risk into their programs and planning efforts, and have budgeted for adaptation measures. To achieve the best outcomes in the financial markets, utilities can consider disclosing the following items regarding their climate change risk and resiliency efforts:

- Operational and financial risks associated with climate-related events, including near-term and longer-term effects of potential gradual climate shifts;
- Management’s approach to addressing risk management, including the roles of different water sector utility staff and the governing body in addressing climate change risk and developing climate change risk disclosures;

- Information regarding the water sector utility’s strategic plan and long-term planning efforts (e.g., integrated resource plans, watershed management plans, and long-term financial plans), which should provide the foundation for managing climate change risk and uncertainty;
- Current and planned climate adaptation measures;
- Impacts that climate change adaptation measures, including capital investments, are expected to have on the water sector utility’s ability to provide services, financial capacity (e.g., rates, coverage, liquidity), and customer affordability issues; and
- An evaluation of projects in its capital improvement plan under projected future climate scenarios.

Utilities can incorporate climate disclosure into their standard disclosure documents, such as offering statements or annual disclosure posted on Electronic Municipal Market Access website. An additional option could be to do a separate Environmental, Social, and Governance (ESG) or Sustainability report. ESG reports are becoming more common in other sectors, and several privately owned water sector utilities—and at least one publicly owned water sector utility—issues ESG reports on an annual basis. Workgroup members from the water sector stated that including risk in disclosures may help utilities improve transparency and public relations, increase investor confidence and ratepayer support, and better align their disclosures with their strategic plans and goals.

Water sector utilities may benefit from guidance and a model disclosure document that provides context for the target audience and outlines information that should be in a disclosure. Such guidance can also encourage water sector utilities to provide information on the climate models and data they use to assess and manage climate change threats, including assumptions used in the modeling. This guidance should be developed in conjunction with leading water utilities in this space.

5. Needs of Small Water Sector Utilities

Some water sector utilities, especially ones serving small, underserved, and disadvantaged communities, lack capacity to effectively identify and manage climate change risk. Other water sector utilities may not prioritize climate change risk because they strive to keep rates and debt obligations low. Small water sector utilities that are not able to proactively assess and manage climate change risk may be more vulnerable not only to the direct physical risk from climate change threats (e.g., damage to critical assets), but also to less favorable outcomes in the financial and insurance markets. Because these utilities lack economies of scale, have more limited staffing, and typically have low nominal cash positions compared to larger water sector utilities, the financial and insurance industries often consider them higher risk. Even smaller water sector utilities with adequate or exceptional technical and managerial capacity may be considered more of a risk as the resignation or retirement of a few key personnel can drastically impact their ability to operate and manage the utility.

The potential outcomes in the financial market may be less of a driver for smaller water sector utilities (compared to larger utilities) to proactively manage climate change risk because: 1) they typically have fewer capital projects; and 2) often seek funding or financing from state or federal programs (e.g., SRF). However, for small water sector utilities that access the markets for financing or insurance, even a small increase in loan rates or the inability to obtain adequate insurance coverage at a reasonable price can be difficult for these utilities to absorb due to their small customer base and typically low nominal cash availability.

Small water sector utilities provide critical services to their communities. Thus, regardless of the potential outcomes in the financial market it is important that they proactively assess and manage climate change risk. The Workgroup noted that small water sector utilities will need additional technical, managerial, and financial assistance to effectively manage climate change risk and may benefit from the following:

- State and federal policies that encourage, or require, climate change risk management practices and offer support for implementation;
- Access to regional climate risk databases, guidance, and a simple methodology that can be used to assess climate change risk and incorporate climate adaptation measures into operations and capital improvement projects (several programs can serve as models to help with this, including EPA’s CRWU initiative and the State of California’s Countywide Drought Planning efforts);
- Partnerships with other water sector utilities to leverage technical assistance opportunities, share data and other resources, and develop regional solutions to address climate change risk, if appropriate (some small utilities in California are creating Regional Technical Advisory Groups that could serve as models for this); and
- Guidance that helps water sector utilities understand the information that they should report to demonstrate that they are addressing climate change risk.

The Workgroup plans to include additional representation from small water sector utilities in its next steps to further explore these issues.

6. Next Steps

Workgroup members affirmed a strong interest in continuing to meet and develop a roadmap for their future efforts. The forum provides a unique opportunity for the water sector and financial and insurance industries to elevate and improve alignment related to climate change resilience practice, with a particular emphasis on the intersection of climate change resilience and financial risk in the water sector. Workgroup members intend to broaden Workgroup participation to include additional representatives from the insurance industry and medium and small water sector utilities to share more diverse experiences and improve reach into these sector areas.

The Workgroup’s roadmap for future efforts includes the following components: 1) further exploration of key discussion topics; 2) development of products to support elevating climate change resilience practice across the water sector and financial and insurance industries; and 3) focused outreach to promote lessons learned from the Workgroup discussions.

a. Key Discussion Topics

As described in the previous section, the Workgroup selected three topics for additional discussion to support the elevation of overall climate change resilience practice and risk management for water sector utilities. Those three topics are:

- Current practice in the water sector and financial and insurance industries related to the types and uses of climate projection data to understand a water sector utility’s climate *threat* profile;
- Current practice in the water sector and financial industry related to climate change risk assessment methods, approaches, and tools to understand utility climate change impact *vulnerabilities* and related climate change impact *consequences*; and

- Current practices, methods, and approaches supporting effective disclosure of climate change impact risk management efforts by water sector utilities.

b. Product Development

The Workgroup anticipates focusing on the development of three products depending on the outcome of the deliberations related to the key discussion topics listed above. Potential products include:

- A set or sets of climate projection data recognized as supporting effective characterization of regional climate change threats;
- Potential climate change risk assessment methods, approaches, and tools recognized as supporting effective characterization of climate change vulnerability and related consequence; and
- A description of effective disclosure practices, methods, and approaches (along with the possibility of a disclosure guide or model disclosure template/format) that represent effective practice for communicating water sector utility climate change resiliency efforts to the financial industry and other stakeholders.

c. Focused Outreach

During discussions, Workgroup members emphasized the importance of outreach and education to utilities, particularly through water sector associations, state regulators, and SRF programs, as well as insurers, rating agencies, and investment banks/managers. The Workgroup identified approaches to share additional information between the water sector and financial and insurance industries, with the focus on: 1) sharing information from the Workgroup process beyond this report; and 2) continuing discussion among the water sector and these industries to advance mutual understanding of key (and evolving) topic areas. Potential approaches on how best to share information among the water sector and financial and insurance industries include conducting webinars to share results of Workgroup discussion thus far; developing case studies to illustrate specific trends or innovative approaches; and including climate change finance topics in more sector conferences, workshops, and other types of sector gatherings. Members also indicated it will be helpful to distribute the Workgroup's final report to a wide variety of audiences, including the Water Utility Climate Alliance, the AWWA climate change committee, and other associations in the water sector and financial and insurance industries.

The Workgroup looks forward to continuing its efforts and invites input from stakeholders in the water sector and financial and insurance industries on how to best identify and share climate change resilience- and financial assessment-related developments, expectations, and effective practices; improve alignment among the water sector and these industries; and continue to identify new opportunities for collaboration and information sharing.

Appendix A: Workgroup Members

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Mike Brown	San Francisco Public Utilities Commission (SFPUC)
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Dan Fuchs	SFPUC
Paul Fuller	Allied Public Risk
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Adan Ortega	California Association of Mutual Water Companies & CalMutuals Joint Powers Risk & Insurance Management Authority
Matt Ries	DC Water
Emily Robare	Pacific Investment Management Company LLC (PIMCO)
Usha Sharma	Denver Water
Sophia Skoda	East Bay Municipal Utility District (EBMUD)
Erika Smull	Breckinridge Capital Advisors
Staff Member	Moody's
Staff Member	S&P
Taylor Winchell	Denver Water
Karri Ving	Brown and Caldwell
Tim Worley	Ortega Strategies Group
Jan Whittington	College of Built Environments, University of Washington