

Protecting Water Resources and Infrastructure from the Impacts of Climate Change

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No other resource is likely to be more affected by climate change than water, as precipitation patterns change, sea levels rise, and water quality degrades.

If global warming trends are not mitigated, significant disruption to the natural hydrological cycle will increasingly threaten the sustainability of our water supply. The nation's drinking water and wastewater infrastructure is already in need of significant investment to maintain current levels of service over the coming decades. Climate change will stress the system further.

The Water Sector, by taking proactive steps to reduce its contribution to climate change, can be part of the solution. By embracing innovative techniques to reduce energy consumption, such as improved utilization of biogas or expanded biosolids recycling, the Water Sector can greatly reduce its greenhouse gas emissions.

WEF Position

The Water Environment Federation (WEF)[1] will work with all stakeholders to better understand the global implications of climate change on water resources, aid in mitigating future impacts, and adapt the nation's infrastructure to meet supply challenges.

We call on all levels of government to work with water quality professionals and water, wastewater, stormwater and water resource utility managers to:

- 1. Address major contributions to climate change by making the Water Sector more energy efficient and minimizing greenhouse gas emissions;
- 2. Optimize reuse and recycling of biosolids, biogas and water;
- 3. Plan innovative strategies and build "green infrastructure," which is both adaptive to climatic changes and sustainable;
- 4. Encourage adaptation by developing strategies to minimize environmental, economic, and public health risks that will result from climatic changes in the environment; and
- 5. Create a global research network to identify the uncertainties in scientific knowledge and clarify probabilities of climate change.

Energy Efficiency and Reuse/Recycling for Sustainable Water Treatment

More than one percent of all the electricity generated in the United States is used for collecting and treating wastewater. It is through its use of energy that the Water Sector has its greatest opportunities to reduce greenhouse gas emissions and thereby help mitigate a major source of climate change. Meeting the goals of sustainability, climate change mitigation, energy independence, energy efficiency, and affordability of services to the public make it imperative for the Water Sector to act to develop new initiatives and policies that include:

- Encouraging water efficiency among residential and commercial properties, in industries, and throughout the water infrastructure network;
- Encouraging full utilization of the energy products from the wastewater treatment process, such as biosolids and methane gases;
- · Recovering fertilizer value from biosolids;
- Re-using and recycling water and wastewater treatment residuals and biosolids for uses beyond energy;
- Reducing energy use and capacity needs by encouraging water conservation and keeping stormwater out of the collection and treatment systems;



- Researching and developing innovative technologies that provide new energy sources or make existing processes more efficient, including cogeneration, hydropower, growing algae biomass, energy dissipaters, and new diffuser technologies;
- Using reclaimed water for appropriate residential, commercial, industrial, agricultural purposes to conserve and extend freshwater supplies;
- Using groundwater recharge as a solution for restoring aquifers and freshwater supplies.
 Groundwater recharge would help mitigate increasing salinity levels that will occur as a result of rising sea levels;
- Participating in cap-and-trade initiatives to reduce greenhouse gas emissions;
- Developing renewable energy sources, such as wind, solar and organics/food waste digestion, at treatment facilities and pump stations.

Innovation: Implementing a 21st Century Approach to Water Management

Another key opportunity that the Water Sector has to mitigate the impacts of climate change is by pursuing state-of-the-art water management techniques and green infrastructure systems.

Such water management approaches include water recycling and reuse. Water managers have already begun to adapt water usage through source separation, a process in which different qualities of water are provided to consumers and different sources of contaminated water are collected and treated separately.

Green infrastructure is designed to alleviate the impact of storm water on traditional infrastructure and treatment systems by utilizing open and public spaces, wetlands, parks, rain gardens, trees, infiltration planters, green roofs, and porous paving materials to absorb storm water and prevent its runoff into fresh water supplies. Green infrastructure can help restore natural systems and processes that are critical to environmental health.

The benefits of using green infrastructure and technology to mitigate and adapt to the effects of climate change on the water industry include:

- generation of energy savings in construction and operation of systems (compared with traditional infrastructure);
- creation of vegetative systems that remove greenhouse gases and other air pollutants from the atmosphere:
- moderation of temperature changes through shading and evapotranspiration;
- reduced use of concrete in infrastructure construction and maintenance, and;
- · decreased pumping and treatment costs

Adaptation Essential for Water Sector

Water resource managers must work to minimize economic, environmental, and public health risks by adapting systems and supplies to the projected effects of climate change.

A key adaptive approach is integrated water resource management, a systems approach to water resource planning and management which involves stakeholders and customers and helps anticipate and respond to uncertainties. For instance, drinking water providers are taking a watershed approach to protecting source water, improving water quality and availability for more efficient treatment facilities. New technologies, such as water reuse and recycling are being used to minimize freshwater use and demands on infrastructure. Additionally, some low-lying water utilities have designed floodwalls and new pumping regimes to adapt to projected sea level rise.

Water resource managers must also adapt to new information, consistently refining their approach to sustainability. They must continually incorporate locally relevant data into long-range planning and recognize that climate change is altering long-held beliefs about hydrological norms.



Adaptation approaches will in many cases require additional resources. Federal, state and local funding must continue to be directed to the Water Sector to adapt infrastructure and water supplies to climate change.

A Global Research Network

Information about impacts and probabilities of climate change on water resources is critical to decision-making within the Water Sector. We must work with Congress and other stakeholders to develop a global research network that:

- supports access among water resource managers to available research;
- strengthens locally relevant research with respect to water quality, aquatic ecosystems, groundwater, and socio-economic impacts; and
- assists decision-making and planning within the Water Sector, given information that is limited and continually in flux.

Balancing Clean Water Act Requirements with Climate Change Realities

The Clean Water Act will necessarily evolve to balance new risks, costs, and benefits of climate change and sustainability.

Water resource managers must work with the Environmental Protection Agency (EPA) in developing a comprehensive review of its regulatory framework governing water resources. The Water Sector must encourage the EPA to consider the consequences of changing the Safe Drinking Water Act and Clean Water Act with regard to carbon emissions. We must balance issues of compliance, quality water and wastewater service and full environmental protection with progress towards minimizing the impacts of climate change on our communities.

With climate change reduction goals in mind, Clean Water Act permitting programs may need to be more flexible to encourage adaptive management and sustainable practices and to consider the net environmental benefits of certain regulatory requirements. For example, treatment plant upgrades may not be sustainable if they require a tremendous amount of raw materials to construct, as well as extensive energy to operate. A more sustainable alternative reflecting all energy and environmental considerations might call for nonpoint source controls and use of best management practices in lieu of more stringent point source treatment.

[1] Formed in 1928, the Water Environment Federation (WEF) is a not-for-profit technical and educational organization with 36,000 individual members and 75 affiliated Member Associations representing water quality professionals around the world. WEF and its Member Associations proudly work to achieve our mission of preserving and enhancing the global water environment.