WHITE PAPER

AMERICAN WATER

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Innovations In The Water Industry: Going "Green"

There is a concern in America over the longevity of the nation's water supply as a result of droughts, threatened supplies and continued population growth. Although some regions are already experiencing water scarcity,[1] meeting water demands is a challenge facing the entire nation. According to a report from the U.S. Government Accountability Office, at least 36 states expect to face water shortages within the next five years. Along with ensuring the availability of water, affordability also poses a significant challenge with the costs of providing water on the rise. Local governments spent $93 billion in 2008 on water and wastewater systems.[2]

These supply and cost challenges require innovative water management solutions. Just as other industries have been "going green" in recent years, the water industry has likewise developed ways to use its resources more efficiently. What's more, these solutions not only make environmental sense, they make economic sense as well.

BACKGROUND

Utilities, businesses and homeowners are becoming increasingly aware of the potential of green solutions within the water industry. For example, common practice is to treat all tap water to the highest standard for potable[3] use, even though only one percent of water is used for drinking.[4] Of the 26 billion gallons of water consumed daily in the United States, approximately 7.8 billion gallons, or 30 percent, is devoted to outdoor uses. The majority of this is used for irrigation,[5] and in commercial spaces, such as offices or shopping malls, much of the water used is for cleaning or flushing. Since very little of our water is used for drinking, there is significant room to find more efficient ways to manage our water use.

WATER MANAGEMENT SOLUTIONS

While there are many water solutions that are "green," primary among them and the focus of this paper is wastewater recycling.[6] Recycling is generally associated with paper and plastic goods, but the green practice also applies to the water industry. The technology involves systematically differentiating wastewater from potable water and treating it for suitable purposes of reuse.

[1] The American Water white paper "Challenges in the Water Industry: Meeting Demand in the West" highlights scarcity challenges in the Western United States.
[2] U.S. Conference of Mayors. "Trends in Local Government Expenditures on Public Water and Wastewater Services and Infrastructure: Past, Present and Future." February 2010.
[3] Potable water is deemed suitable for drinking and meetings drinking water quality standards.
[4] Zinkevich, Andre W. Personal interview. 28 Nov. 2007.
[5] Environmental Protection Agency. "Green Builiding, Conserving Water." December 2012.
[6] Wastewater is all discharged water from residences, businesses, industry or agriculture that is free of food or human waste. Recycled wastewater is also known as reused water or reclaimed wastewater.

Areas in the United States that experience frequent water shortages or supply challenges have been the first to embrace and implement wastewater recycling systems. For instance, in 2003, California recycled nearly 470 million gallons of wastewater per day, and Florida now recycles over 630 million gallons per day.[7]

Water reuse promotes environmental sustainability. Whereas the supply of potable water is subject to droughts, wastewater can be continually recycled, stored and made available regardless of climate conditions.[8] Recycling water serves communities facing water shortages; however, it also serves as a sustainable solution for protecting existing supplies and preventing the need to draw from additional sources. In addition to saving resources, recycling water can benefit the environment by decreasing wastewater discharge.[9]

APPLICATION

Treated wastewater can be re-used in two main ways: non-potable reuse and indirect, potable reuse. The use of recycled water for non-drinking purposes is a common and widely accepted practice that has been used for decades.[10] Nonpotable uses include irrigation for agriculture, landscaping for public parks or golf courses and toilet flush water.[11] Another major nonpotable use is within industrial facilities, such as power plants and oil refineries, as well as in commercial facilities that require significant volumes of water for cooling processes.[12] Recently, use of reclaimed water for commercial and private laundry is being applied. For customers whose water needs make up a significant portion of a community's total demand, nonpotable reuse allows them to drastically minimize their environmental footprint.[13]

In indirect reuse, wastewater can be used to replenish groundwater supplies. This reuse method, called land application, allows treated wastewater to percolate down to aquifers to restore water sources. Land application has become an increasingly favored and applied method of reuse. This has the effect of conserving supplies rather than discharging water into surface water, which ultimately evaporates or runs off into the ocean.[14]

As a means of ensuring public safety, wastewater is treated to a high quality and undergoes processes very similar to that for potable water such as disinfection, though quality standards and requirements for reuse vary by state. To further ensure safety and avoid any confusion, the piping for recycled water is universally marked purple.

ECONOMIC BENEFITS

Wastewater recycling not only addresses supply challenges, but is actually an economical long-term water management solution. Although recycled wastewater is highly treated, it does not need the level of treatment and pumping required by potable water, thus saving a significant amount of energy and money.[15] In fact, initial investments in green building technologies often pay for themselves within the first few years a facility is in operation.[16] Wrentham Outlet Mall in Wrentham, Mass. is a case in point.[17] Implementing

[7] Grumbles, Benjamin H. "21st Century Water Commission." Congressional Testimony. 8 Nov. 2007.
[8] Arber, Richard P. "The Rising Tide." *Environmental Protection Magazine.* March 2000.
[9] Environmental Protection Agency. "Water Recycling and Reuse: The Environmental Benefits." 15 August 2007. <http://www.epa.gov/region09/water/recycling/index.html>.
[10] Environmental Protection Agency. "Water Recycling and Reuse: The Environmental Benefits." 15 August 2007. <http://www.epa.gov/region09/water/recycling/index.html>.
[11] Environmental Protection Agency. "Water Recycling and Reuse: The Environmental Benefits." 15 August 2007. <http://www.epa.gov/region09/water/recycling/index.html>.
[12] Environmental Protection Agency. "Water Recycling and Reuse: The Environmental Benefits." 15 August 2007. <http://www.epa.gov/region09/water/recycling/index.html>.
[13] Arber, Richard P. "The Rising Tide." *Environmental Protection Magazine.* March 2000.
[14] Environmental Protection Agency. "Water Recycling and Reuse: The Environmental Benefits." 15 August 2007. <http://www.epa.gov/region09/water/recycling/index.html>.
[15] Grumbles, Benjamin H. "21st Century Water Commission." Congressional Testimony. 8 Nov. 2007.
[16] Winters, Steven. "GSA LEED Cost Study." The U.S. General Services Administration. October 2004.

an onsite wastewater treatment plant allowed the mall to save $1 million in planning costs and significantly reduces its water bills by reusing half of its wastewater.

Water reuse systems can also facilitate business development by helping water constrained communities sustain larger developments. For instance, Foxboro, MA, a town with very limited water supplies, would not have been able to support the needs of Gillette Stadium using traditional water distribution methods. But by reusing wastewater, the facility can accommodate 68,000 sports fans and save 250,000 gallons of potable water during each major event.[18] This illustrates how water management technology can not only save money but also create opportunities for economic growth.

Indeed, water reuse can be very cost-effective in the long term. In some cases it can actually have a stabilizing effect on water rates: Reducing water volumes generated by wastewater recycling places less stress on current infrastructure, eliminating the need for construction or expansion of new facilities. Likewise, recycling local wastewater can prove less expensive than piping potable water over long distances, purchasing groundwater from other systems or finding and accessing new water sources.[19]

ADDITIONAL GREEN SOLUTIONS

While water reuse is an important water management technology, it is only part of the solution. Going green requires the implementation of additional water technologies that encourage resource conservation and efficiency. For instance, utilities can implement leak detection and repair programs to reduce the approximate 7 billion gallons of treated drinking water "lost" each day primarily due to leaks in drinking water pipelines throughout the country[20] When water leaks through pipes, utilities must then raise water pressure to make up for the loss, requiring more energy.[21] By detecting and repairing leaks, utilities can save water and energy. Households and businesses can do their part by installing low-flow household faucets and toilets, stormwater collection systems and timed or climate-controlled irrigation systems as a means of limiting water usage.[22]

CONCLUSION

As water demands increase and costs rise, water recycling and other green technologies will become increasingly important long-term solutions. It is clear that water recycling serves as a viable solution for reducing water usage and alleviating demands on the water system. Likewise, applying additional green solutions will aid in meeting current and foreseeable needs of the growing population and will ensure water affordability. As new challenges in the water industry arise, so will the opportunities to leverage green solutions for the realization of economic and environmental benefits.

[17] The Wrentham Outlet Mall was designed, built and is operated by American Water Applied Water Management.
[18] National Association of Water Companies. "American Water's Correll, Howard Urge Public-Private Partnerships." 19 Dec. 2006. <http://www.nawc.org/newsflow/121906-nl/members/members.html>.
[19] Environmental Protection Agency. "Water Recycling and Reuse: The Environmental Benefits." 15 August 2007. <http://www.epa.gov/region09/water/recycling/index.html>
[20] American Society of Civil Engineers. "Report Card for America's Infrastructure." 2009 .
[21] Lahlou, Zacharia M. "Tech Brief: Leak Detection and Water Loss Control." National Drinking Water Clearinghouse. May 2001.
[22] Greener Buildings. "Water Efficiency Backgrounder." <http://www.greenerbuildings.com/backgrounders_detail.cfm?UseKeyword=Facility%20Management>