

world water

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Overcoming barriers to innovation

Education, regulation, communication, and the value of water are key tools to help overcome innovation barriers in the water and sanitation sector. **Barry Liner** of Water Environment Federation and **Jennifer Walsh** of Hazen and Sawyer provide an overview of perspectives that foster more innovation in this sector.

As water sector professionals know, freshwater resources are under constant threat from population growth, flooding, drought, pollution, and competition for use. Embracing a culture of innovation is critical in order to address these challenges. The US Environmental Protection Agency (EPA) aims to be a catalyst for supporting technology innovation to sustainably address water challenges while supporting economic development, as shown by its *Water Technology Innovation Blueprint*. The blueprint identified 10 market opportunities to drive technology innovation in the water sector ranging from energy management to monitoring technologies. One of the 10 market opportunities identified is “Improving Access to Safe Drinking Water and Sanitation,” which is an issue in both economically prosperous and developing countries.

This aspirational blueprint outlines the business case for investment in new tools – which was the focus of a series of interactive sessions held at the annual Water Environment Federation Technology Exhibition and Conference (WEFTEC) in 2014, to seek the input and viewpoints from the organizations and professionals who are taking action on these innovations. More than 200 individuals from municipalities, utilities, private industry, and government agencies participated in the technology innovation sessions.

At WEFTEC 2015 – to be hosted in the US city of Chicago, Illinois in September – follow up focus groups, workshops, and listening sessions will address how the water sector is overcoming the barriers to innovation around the blueprint’s 10 themes.

Developed- and developing-world issues

When discussing issues in the developed world, participants in the 2014 WEFTEC sessions identified regulatory changes as being essential to creating space for innovation. Also noted were the risks of enforcement actions from a permit violation also intimidated cash-strapped utilities from adopting innovative technology. As operators bear the greatest financial risk – and perceived greater regulatory scrutiny – from use of these technologies, there is an active disincentive to opt for unconventional technologies.

Small- and medium-sized organizations face an even greater barrier to deploying innovative technologies at their facilities. Frequently relying on a single utility manager, who must address a host of non-water maintenance issues (including trash collection, building upkeep, and even serving as a dog-catcher), these facilities lack the time and resources to properly research suitable alternatives to existing methods. WEFTEC 2014 participants stressed that reluctance to adopt new technologies is not out of disinterest or from unavailable technologies, but from prioritizing unequivocal compliance with permits – including water, air, and even solid waste. Numerous participants suggested that strengthening communication lines for these small operators (with regulators, with bigger operators, and with each other) would be instrumental in getting small-scale operators to consider new and innovative designs and streamline day-to-day management.

According to the World Health Organization (WHO), as recent as 2011 and despite technical advances reaching across the globe, more

SMALL- AND MEDIUM-SIZED ORGANIZATIONS FACE AN EVEN GREATER BARRIER TO DEPLOYING INNOVATIVE TECHNOLOGIES AT THEIR FACILITIES.

than 750 million people did not have access to improved drinking water sources without substantial threats of contamination. WEFTEC 2014 participants stressed this point as well. Additionally, “improved sanitation facilities” listed in the WHO’s data are not only referencing water closets or toilets on a connected sewer system but can be as basic as a ventilated pit latrine, yet still over 2.5 billion people worldwide lacked access in this category. When the non-profit organization water.org reports that more of the world’s population has mobile phones than toilets, it is obvious that technology innovation in the sanitation arena is still needed.

In some parts of the world, dependence on foreign aid is so great that poor communities have been known to sabotage their own drinking water infrastructure (or resist its creation) out of fear that other aid will be taken away. This reliance on foreign aid makes



sustainability of water systems very difficult from a financial and operational perspective. Additionally, many well-intentioned aid projects fail due to lack of funding, maintenance, and communication. Because of this, many in the water sector believe that international aid organizations must work to obtain financial, physical, and operational investments from local and national governments, and innovative solutions must be tailored to each community.

A great example of both success and failure is found in the Majijuna communities in Amazonian Peru. The Majijuna communities live a great distance from electricity, supplies of water treatment chemicals like chlorine, and have no centralized infrastructure. In the previous decade, the Majijuna communities were provided water technology by an aid organization, but the community was provided little training for sustainable use, which led to failure. After the well-intentioned organization left, their technology became unusable primarily because capacity building in the community did not occur.

Capacity building is critical to the success of these water systems and is now recognized by the Majijuna community. After the initial failure, another aid group worked directly with the community in 2013 to design slow filters for each household using sand, which is readily available in that region of the Amazon. At a planning meeting for a new solution to drinking water supply, the elders demanded that the aid organization teach them how to build and maintain the filters. Knowing that the resources they do possess include an abundance of raw water, sand, and an engaged community, the community leaders required each household to build their own filter. Even more importantly, and without outside involvement, community members can now supply the materials and perform operation and maintenance on these new filters. Currently, the elders are seeking to ensure the success of this technology innovation, and after two years, all of the filters are working, drinking water consumption has increased, and community health has improved.

Tools for success

Identifying the factors that can help overcome technology innovation barriers – with respect to the Water Technology Innovation Blueprint’s market opportunity “Improving Access to Safe Drinking Water and Sanitation” – four main potential

tools were identified by the WEFTEC 2014 participants. These four tools included examples from both the developed- and developing-world perspectives in education, regulation, communication, and the value of water.

Education

Implementation of day-to-day operations and maintenance must not be overlooked when planning for larger goals. These daily activities also present opportunities for instilling incremental cultural and mindset change. Better education and conveyance of the economic benefits of clean water is essential for community buy-in. This was especially prevalent during WEFTEC 2014 in the contributions from numerous representatives from developing countries. It was noted that the convenience of close, clean water yields tangential benefits, such as improved school attendance, upward mobility, and income generation. In areas with existing substantial infrastructure, there are similar issues surrounding the need to improve public perception on water reuse, biosolids management, and integrated production – which can help stimulate political inertia and, in turn, impactful implementation. An example of an ambitious program is the Gates Foundation’s Sanitation as a Business, which integrates sanitation with economic development while focusing on the entire sanitation supply chain.

Regulation

Technologies are available to address various water challenges, but questions still remain in deployment and implementation. The WEFTEC 2014 focus groups recommended reframing regulatory instructions to specify what

TECHNOLOGIES ARE AVAILABLE TO ADDRESS VARIOUS WATER CHALLENGES, BUT QUESTIONS STILL REMAIN IN DEPLOYMENT AND IMPLEMENTATION.

Left: Franklin, a young resident of the village of Majijuna, Peru fills his first cup of treated water. Photo by Barry Liner

operators can do as opposed to what they cannot do.

One issue is that some regulations do not optimize the end purposes. For instance, one county had a water reuse project that fed irrigation onto a golf course. The municipality wanted to use the water feed for fire hydrants along the route, but the project was canceled because regulations would have deemed all hydrant use as an illegal discharge.

Wide-sweeping regulations also need to take local needs into consideration. In developing countries, the water-capacity-building goal is to have the decision-making happen at the lowest level so that the community can tailor strategies to their local conditions. In the future, along with protecting the health and wellbeing of the public and the environment, regulations will have to consider how innovative technologies can help conserve water, especially in increasingly drought-prone regions.

Communication

Risk aversion (such as financial, compliance, and social) remains a significant barrier to implementation. However, market opportunities exist that may shift cultural perception and advance implementation. Public perception shapes political and administrative decisions, and the burden is on the water sector to communicate the benefits of new technologies and sustainable solutions to the public.

One approach for communications within the water community includes the development of ongoing feedback mechanisms to allow for course corrections and tracking mistakes. Because this feedback will enable more successful outcomes and sustainable water systems, developers of small drinking-water systems would benefit by sharing information on past successes and novel solutions. This sharing of information is particularly important for identifying the best methods for implementation, management, and education of drinking water and sanitation systems in developing countries.

The value of water

Water is undervalued in virtually all parts of the world. Although funding for infrastructure will always be a challenge or a barrier, the water sector must acknowledge that inaction, though difficult to quantify, also bears a significant cost.

In developing countries, cultural expectations of free water access challenges the funding needs and

sustainability of water systems. As the population continues to grow, the access to water will diminish. In the US, phone, electric, and cable television rates are often higher than water rates, yet the customers expect cheap, high-quality water from the tap and “flush and forget” sanitation.

An example of US efforts to combat this is the founding of the Value of Water Coalition. The coalition is comprised of more than two dozen leading water organizations that have come together to educate the public on the need for infrastructure investment in order to provide clean, safe, and reliable water for future generations. The original founding organizations include professional associations (such as the American Water Works Association, the Association of Metropolitan Water Agencies, the National Association of Clean Water Agencies, the National Association of Water Companies, the US Water Alliance, and the Water Environment Federation), international engineering firms (such as CH2M and MWH Global) and global operations and product providers (such as American Water, SUEZ environment, Veolia, and Xylem). The Coalition is united in elevating the importance of water to the economic, environmental, and social well being of the United States.

In any community – from rural Amazon to urban megacities – education, regulation, communication, and increasing the value of water are critical tools to help drive innovation.

Innovating the future of water

A fifth of the world currently lives in water-scarce areas, which could grow to half of the world’s population facing water scarcity in 2050. Water innovation is critical to ensure that these dire projections do not become reality. The EPA’s Water Technology Innovation Blueprint seeks to help catalyze the global water community to help overcome barriers, while the 10 market opportunities, as outlined in the blueprint, will be the basis for WEFTEC 2015 special sessions on creating the space for innovation.

Authors’ Note

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