The Water Resources Utility of the Future

Executive Summary of the

2015 Annual Report

This Executive Summary provides and overview of the *Water Resource Utility of the Future 2015 Annual Report* which will be published later this summer. Stay tuned!

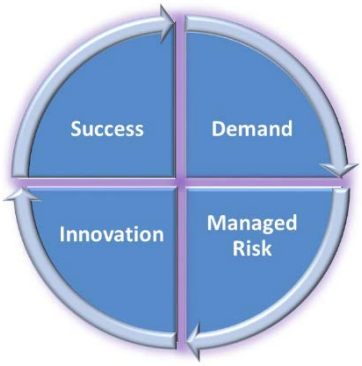
In 2013, the National Association of Clean Water Agencies (NACWA), the Water Environment Federation (WEF), and the Water Environment Research Foundation (WERF) collaborated on *The Water Resources Utility of the Future: A Blueprint for Action*. The *Blueprint* coined the phrase, "Utility of the Future," to recognize for the first time, a fundamental shift in the way America's clean water utilities were beginning to define their role in society: from managers of waste to managers of valuable resources. Early movement towards the UOTF enabled the *Blueprint* to document examples of UOTF initiatives in energy and materials recovery and reuse, water reuse, green infrastructure, and a new openness on the part of clean water utilities to partner with developers of technology, design engineers, and the public and private finance community.

The Business Case for the Utility of the Future

The business case for the UOTF was shown to be compelling. Utilities reduced costs, increased revenues, and helped build local economies, which in turn created demand for clean water services, increasing revenue even further and creating jobs. The environment benefitted through cleaner effluent; reduced demand for carbon-based energy, fresh water, and landfilling of biosolids; greatly reduced greenhouse gas emissions; reduced runoff and flooding by controlling more water at its source; and greener and healthier urban ecosystems. Communities also enjoyed multiple benefits in the form of economic expansion, increased local job opportunities, and higher tax receipts.

Emergence of an Innovation Ecosystem

This *2015 Annual Report of the Utility of the Future* updates UOTF accomplishments since 2013 and explores the newest horizons for innovation. But it also makes a key point – *clean water utilities do not make these sorts of transitions alone*. Innovation across the clean water value chain has occurred within an "innovation ecosystem" comprised of technology developers, consulting engineers and scientists, state and local government, the finance community and a wide range of professional organizations that represent the clean water industry. In addition to the *systems effects* where clean water utilities innovate with the help of both partners and enablers within this ecosystem, *network effects* also help utilities innovate based on the ideas and experiences of their peers.



These *systems and network benefits* are materially responsible for creating a virtuous cycle in which innovation leads to success, and success spreads across the industry leading to more adoption and enhanced demand for innovation. Increased demand stimulates technology development and engineering advances, which result in a growing portfolio of UOTF success. In a sense, this innovation ecosystem behaves like a market for innovation -- and like any market, it is fueled by demand. The cycle will continue as long as UOTFs continue to lead, to take risks, to collaborate, and to create demand. Sustained demand will have the effect of spreading innovation across large, medium, and small utilities from coast to coast and the cycle will continue. This innovation ecosystem is leading toward a water industry of the future.

Recent Utility of the Future Initiatives

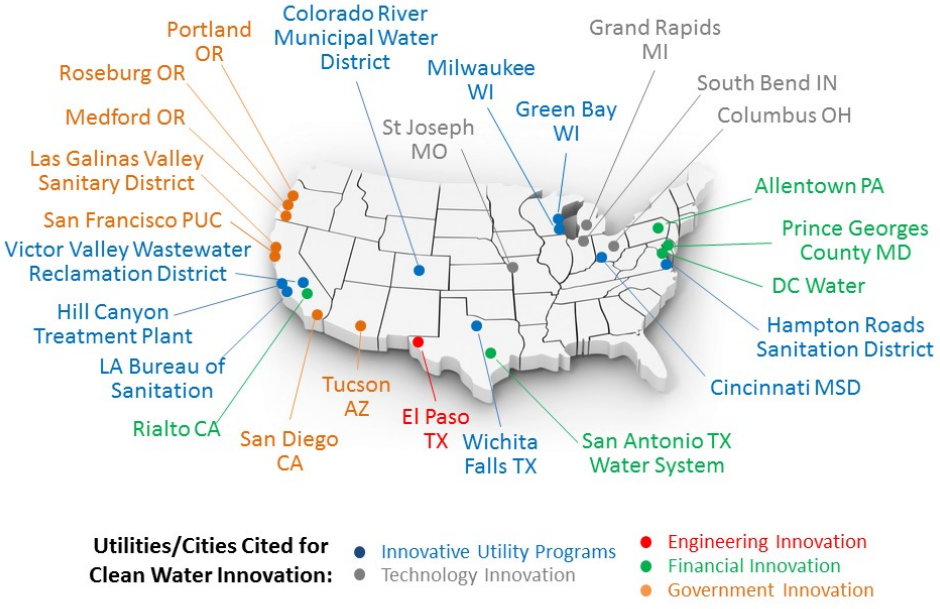
The pace of innovation in the clean water utility sector is on the rise. Basic questions like whether to undertake the transition to a UOTF are no longer asked. What to do and how to do it are still being defined, but they too have firmed up considerably since 2013. Some of the most exciting advances go beyond one-off initiatives to a complete embrace of utility-wide UOTF strategies that seek to optimize energy, nutrient, and water use and reuse; collaboration with non-traditional partners to secure lower-cost water quality gains; and integration across all built and natural assets at the watershed scale. Here, landowners are involved as key partners in green infrastructure solutions, the agriculture community is involved as a key partner in nutrient management, and building developers are involved as key partners in water retention and reuse. Collection infrastructure becomes an extension of treatment infrastructure, and advanced monitoring and control networks are used to manage all water within a watershed to meet customer needs as well as water quality goals.

Advances in Technology

Increased demand, faster adoption, and broadening awareness of UOTF initiatives have renewed investment in clean water technology development. In particular, we are seeing greater acceptance in the US of technologies and solutions from other countries. This is particularly true in anaerobic digestion and membrane-based processes. Real-time data networks are being used much more frequently to monitor and control entire collection and treatment systems in efforts to manage more flow at lower costs using existing infrastructure. Leading edge utilities are incorporating natural environmental resources like streams, ponds, and wetlands into their overall control networks reducing management costs even further while also delivering social and community benefits.

Engineering Consulting

Utility clients are increasingly asking engineers to manage risks, not avoid them. This greatly broadens engineers' license to innovate with bolder designs, broader choices of technology, and greater involvement in design-build and design-build-operate opportunities. To meet new client expectations, consulting engineers now have to collaborate more often within the innovation ecosystem, reaching out to community groups, technology developers, the finance community, and the government. This has tended to accelerate knowledge transfer and the pace of technology adoption – all positive outcomes for the UOTF. It also has resulted in solutions that deliver environmental and social benefits that reach more people.



This map includes those cities and utilities cited by the Report's contributors and is not meant to be comprehensive. Many other cities and utilities also are innovating in clean water.

The Finance Community

Innovations are occurring everywhere within the finance community, in large part as finance institutions transition to meet demands of their UOTF clients. Two trends are most striking: more rational public finance structures and a growing level of comfort with true public-private partnerships. Examples of the former include the advent of longer than traditional loan terms, including "century bonds" to finance and spread the cost of 100-year infrastructure over the multiple generations that will enjoy their benefits over a century; social impact bonds where so-called "impact investors" seeking social as well as economic returns are willing to risk their capital to promote what many consider unproven technologies and solutions as long as they deliver social good; and small systems financing by third party impact investors.

We also are seeing broadening applications of public-private partnerships beyond the traditional long-term concession type transactions where utilities own, but private investors do everything else: design, build, finance, operate, and maintain system infrastructure or major portions of it. "Bolt-on" projects are becoming popular where private vendors finance, build, own, and operate a separate capital facility as long as the utility agrees to a long-term contract to purchase the commodity – energy, water, fertilizer – that it produces. Community-based P3s engage a broad spectrum of community organizations, sometimes aggregated under a private third-party contract, to install and maintain green infrastructure at thousands of locations across a city.

Professional Organizations

Since 2013 the major professional organizations representing the clean water industry have made great strides in their UOTF programs. This includes NACWA, WEF, and WERF all of which were involved in the original *2013 UOTF Blueprint* as well as WateReuse/the Water Reuse Research Foundation (WRRF) which focuses on a narrower, but no less important subject key to the UOTF. NACWA's principal contribution has been in advocacy for UOTF matters at the federal and state levels, where they have been responsible in part for passage of key legislation, a more flexible regulatory regime, support for watershed-based initiatives, and focused funding where it is most needed. WERF has stepped up its research funding considerably in areas that matter most to UOTFs: one-water management, green infrastructure, energy self-sufficiency, and technology innovation. WEF has done the same in their information and education role in areas such as utility leadership, technology innovation, energy and resource recovery, residuals and biomass, and stormwater and green infrastructure. WateReuse and its research arm, WRRF, have funded more than 200 projects pertaining to water reuse over the last two decades and in the last few years, have emerged strongly as a leader in direct potable water reuse.

Government: Going Beyond Regulation

Aside from its traditional role in matters of environmental regulation, EPA and their state counterparts are increasingly supporting UOTF initiatives through targeted grants, technical assistance and guidance, and flexibility (in some cases) on permitting approaches and compliance periods. Some states are participating with local governments in programs that support UOTF initiatives with ordinances that require water use efficiency and reuse and/or green infrastructure. Since 2013, we've seen about a dozen new state and local centers of water technology development and commercialization.

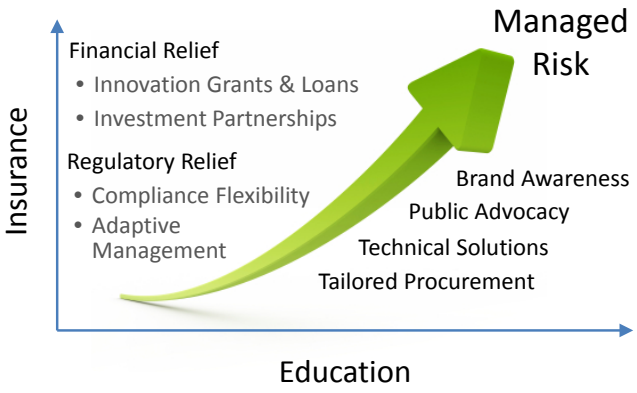
And EPA is not alone. The Department of Energy (DOE), the U.S. Department of Agriculture (USDA) and the Department of Housing and Urban Development (HUD) are getting involved in supporting UOTF goals.

Looking Ahead

In just a few short years, the UOTF brand has been firmly established and momentum continues to build. Since 2013, we have observed broad penetration across the industry and formation of an "innovation ecosystem." An historic opportunity now exists to strengthen the systems and network effects within this ecosystem, which promises to deliver the next generation of water quality gains and community benefits at

costs that customers are able and willing pay. The solution to how we do this is remarkably, but at the same time deceptively, simple: *enable utilities to take more risks.*

Insurance and education are the two most important tools at our disposal. Insurance, in the form of shared financial responsibility and/or shared regulatory responsibility, relieves utility leadership of bearing all the consequences of bold decisions. Education provides utility leadership confidence that bold new ideas can work in practice.



To shift some of the burden of financial recourse from UOTFs and therefore from their customers to others, we will need some combination of federal and/or state grants to effectively reduce capital exposure, true P3s where private partners risk their own capital to enable innovation, developers that push their technologies into the marketplace either directly or through channel partners like technology-forward consulting engineers, and institutional investors with a UOTF conviction that targets environmental and social impacts as well as economic returns.

With regard to regulation, we have observed that more regulation, especially of the "one size fits all" variety, is not necessarily helpful. It is inappropriate to back off water quality goals, but it is entirely appropriate to enable UOTFs to find innovative ways to meet them. When these conditions exist, we have observed that UOTF leaders tend to collaborate with, and encourage through whatever means at their disposal, cooperative behaviors of non-traditional partners like the agriculture community, homeowners, and developers.

In short, we must collaborate more. We must take – but manage – risk. We must ensure that all participants within the clean water innovation ecosystem broaden network effects to include utilities of all sizes. And we must strengthen system effects by engaging all participants — utilities, technology developers, consulting engineers, the finance community, and government — in UOTF successes. More than anything, this is the key lesson of the last two years documented in this *2015 Annual Report of the Utility of the Future*.

National Association of
Clean Water Agencies
1816 Jefferson Place, NW
Washington, DC 20036
202.833.2672
www.nacwa.org

This report was completed with assistance from Kenneth Rubin, Managing Director of Rubin Mallows Worldwide Inc. and Managing Partner of American Infrastructure Holdings LLC. The many contributors to the UOTF Annual Report will be acknowledged upon its publication.