

Regional and National Impact of Water IT Project



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- Water IT Project
- Importance of Water IT
- EPA's Role
- Potential Impact



Project Goals

- **Examine the role of information technology (IT)** in the water utility sector for maintaining and improving system operation and performance
 - Use, needs, challenges, opportunities, etc.
- **Gain insights and build connections** that will advance research, meet critical utility needs, and create opportunities for the private sector.
- **Spur regional and national interest** around water IT in the utility sector
- **Position EPA and the region** to meet water utility IT needs . . . regionally, nationally, and globally



Joint Project Team

- EPA researchers
- Water utilities from Cincinnati, Dayton, Northern Kentucky and Arizona
- Wright Brothers Institute (WBI)
 - Accessed through an agreement with Air Force Research Laboratory
 - Tasked with characterizing the water IT sector and leading a series of meetings to identify and explore IT innovation needs, opportunities, barriers, etc., in this region and nationally.



Project Activities

- **Pre-meeting literature analysis of IT used in the water utility sector**
 - Best practices, state of technology, etc.
- **Needs Assessment Meeting, July 19, 2013**
 - Benchmark current IT needs, challenges, and opportunities in the Ohio, Kentucky, and Indiana region
 - Select a Forum topic that aligns with regional utility needs and EPA research competencies
- **Water IT Forum: Leveraging Water IT to Decrease Operating Costs through Water Loss Reductions, September 17-18, 2013**
 - To **gain knowledge, develop insights and build connections** to help EPA and participants **focus/advance** their DWDS water IT research, demonstration and deployment **efforts** regionally and nationally



Why Water IT?

- **Water utility operating and business models are changing**
 - Rising energy costs, aging infrastructure, consent decrees, declining consumption, rate limits, water quality threats, technology advances, etc.
- **IT is a critical element of this change and the continued evolution of the water utility sector**
 - Provides efficiencies, improves performance, and informs decisions
 - Transition from **separately managed** drinking, wastewater, stormwater and source water systems to an integrated urban water management system

Changing water system factors		
Item	Past	Future
Water Supply	Remote	Local
Optimization Function	Infrastructure Cost	Water Use, Energy, Materials, Labor
System Components	Separate Drinking Water, Rainwater, and Used Water Systems	Integrated, Multipurpose Systems
System Configuration	Centralized Treatment	Hybrid (Centralized and Distributed) Systems
Institutions	Single Purpose Utilities	Integrated, Water Cycle Utilities
Financing	Volume Based	Service Based
System Planning	“Plumb up” the Planned City	Integrated with City Planning

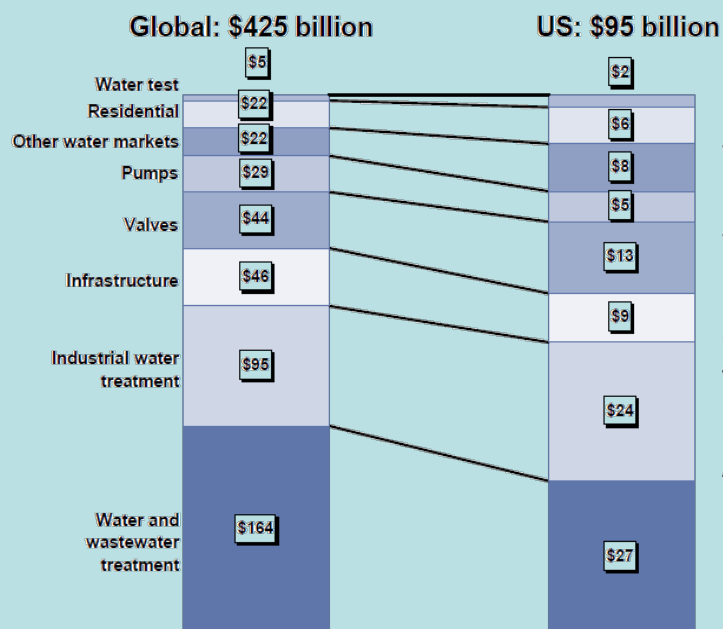
Glen T. Daigger, CH2M Hill. Presented at the Confluence 2nd Anniversary Event: Policy – Market Intelligence – Collaboration, January 16, 2013, U.S. EPA Andrew W. Breidenbach Environmental Research Center, Cincinnati, OH.



Why Water IT? (continued)

- Presents an opportunity for:
 - **Utilities** to foster the development of IT that meets existing needs and paves the way for changes in the future
 - **Private sector** to capitalize on the ballooning water IT market and fill municipal sector niche
 - **Academia, government, and others** to foster innovation that spurs protection of human health and the environment.

Water Innovation Market Opportunity



Estimated world need for investment in water infrastructure: **\$11.7 trillion** through 2030

Source: *Infrastructure productivity: How to save \$1 trillion a year.* McKinsey Global Institute.

Source: Goldman Sachs Research estimates.



Why Water Loss?

Water loss

- Permeated many of needs identified by utilities/researchers at the Needs Assessment Meeting
- Directly impacts utility costs/ revenue and performance
- It's an issue that many systems wrestle, particularly older systems
- Aligns with EPA existing DWDS research competencies
- Relevant other utility/researcher priorities, including
 - » Leak detection, asset management, aging infrastructure, infrastructure assessment, water quality, and water security

Most states water loss limits

- 10 – 15 % of produced water

US Drinking Water System Statistics

- Non-revenue water averages 20% nationally
 - Over 30% for older systems in the NE & MW (*Black & Veatch, 2013*)
- 14% of treated water is lost to leaks
 - some system reporting losses over 60%
- 240,000 breaks occur each year, leading to \$2.8 billion in lost income (*AWWA, 2007*)
- 30% of pipes in systems that serve over 100K are 40-80 years old; 10% are even older
- Only <1% of buried infrastructure is replaced/renewed each year (*Black & Veatch, 2007*)
- Infrastructure replacement could cost over \$1 trillion over the next 25 years (*AWWA, 2012*)
 - Compared to earlier estimates of \$334.8 billion for 2007-2026



EPA and Water IT

EPA' mission is to protect human health and the environment :

- Ensure all Americans are protected from significant risks to human health and the environment where they live, learn and work

We do this using:

- Regulation, policy, & guidance
- Enforcement
- Education
- Research
 - Ensures national efforts to reduce environmental risk are based on the best available scientific information

**A key role for
EPA Cincinnati**





EPA and Water IT (cont'd)

- In general, Water IT is **not an area of regulatory focus**, at least not for water utilities
- Instead, it is **viewed as a tool for enabling** utilities to meet human health and environmental protection goals/standards
- **Thus, EPA's focus is on**
 - **Developing and deploying tools** (models, programs, platforms, databases, etc.) to help water utilities assess, manage, and optimize system operation and water quality . . . a research focus
 - **Encouraging their use** thru education, incentives, etc.

Notable Electronic Information Initiatives

- Nov 2010, Data Sharing MOU between US EPA, ECOS, ASDWA, and Association of State and Territorial Health Officials
 - Promotes advanced IT for data sharing, water quality analysis, consumer reporting, and sharing of tools for oversight, compliance, and enforcement
 - Led to 2011 redesign of the Safe Drinking Water Information Systems by EPA
- Feb 2013, Presidential Executive Order 13636, Improving Critical Infrastructure
 - Includes NIST led development of a **cybersecurity framework** and **voluntary programs** (between DHS, EPA, and others) to urge infrastructure owners/operators to adopt the framework
- May 2013, Presidential Executive Order 13642, Making Open and Machine Readable the New Default for Government Information
- July 2013, Proposed NPDES Electronic Reporting Rule
 - Requires electronic submission of NPDES reports by permittees and regulators



EPA Cincinnati is one of the largest federal R&D water laboratories in the country

. . . with four EPA Office of Research & Development (ORD) Laboratories

- Nat'l Risk Management Research Lab
- Nat'l Ctr for Environmental Assessment
- Nat'l Homeland Security Research Ctr
- Nat'l Exposure Research Lab

. . . state of the art research facilities

. . . and >100 of scientists, engineers, chemists, technicians and students working on a broad spectrum of water research challenges



**Experimental Stream
Facility
Milford, OH**



**AWBERC
Cincinnati, OH**



**Test and Evaluation
Facility
Cincinnati, OH**



Cincinnati is also home to EPA's first regional technology innovation cluster effort

- In May 2010, EPA Cincinnati was charged with exploring whether the OH-KY-IN region contained the “critical mass” (companies and interest) needed to support a water technology innovation cluster
- In Jan 2011 public and private sectors leaders from this region (NKY, Cincinnati, Dayton, SE Indiana) responded by forming Confluence
- On Jan 19, 2011 EPA former Administrator, Lisa Jackson, announced the start of Confluence and committed to:
 - ... Provide \$5 million in support for water technology innovation in the tri-state area
 - ... Continue to actively engage with Confluence and others in the region on water RD&D efforts
 - Participation in Confluence
 - Collaborations and research partnerships (CRADA's, MOUs, etc.)
 - Access to facilities and cutting edge research/IP
 - Technology transfer opportunities
 - Insights (priorities, needs, etc.)
- This meeting and other EPA collaborative projects are the result of that commitment



EPA Cincinnati Water Cluster Projects

- **Commercialization** of EPA and private sector developed water technologies
- **Analysis** of market potential and commercialization opportunities for EPA-developed water technologies
- **Turning** Combined Sewer Overflow (CSO) consent decrees and other urban water **problems into business opportunities**
- **Creating new market opportunities** for water technology commercialization and deployment through simultaneous technology and policy development

All with underlying emphasis on regional economic development

Water IT Projects Funded in 2013

- Expanding Water Provider Access to CANARY through Commercialization
- Field-Scale Demonstration of Real-Time Water Infrastructure Monitoring and Data Fusion Technology to Improve Operations and Enhance Security
- Developing and Commercializing Smart Water Platform—Sensor-Based Data-Driven Energy—Water Optimization in Drinking Water Distribution Systems
- Innovative Sensor Technology for Real-Time, Infiltration-Based Infrastructure Monitoring
- Workshop to Facilitate Technology Development and Transfer to Citizen-Based Water Resource Monitoring Programs



Questions?