Implementing Innovation: An Orientation to the LIFT Program and its New Features

Thursday, March 29, 2018

1:00-2:30 pm ET

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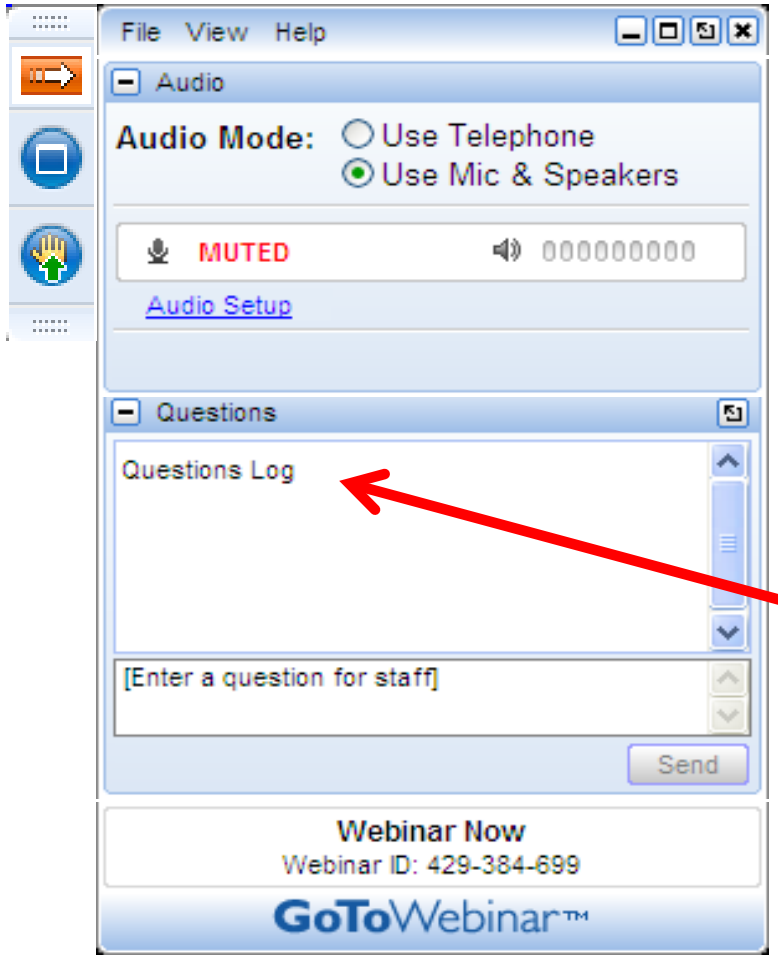
How to Participate Today



- **Audio Modes**
  - Listen using Mic & Speakers
  - Or, select “Use Telephone” and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- **A recording will be available for replay shortly after this web seminar.**

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Today's Moderators

Aaron Fisher
The Water Research Foundation

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Today's Speakers

Erika Bailey
City of Raleigh, NC

Fidan Karimova
The Water Research Foundation

Morgan Brown
Water Environment Foundation

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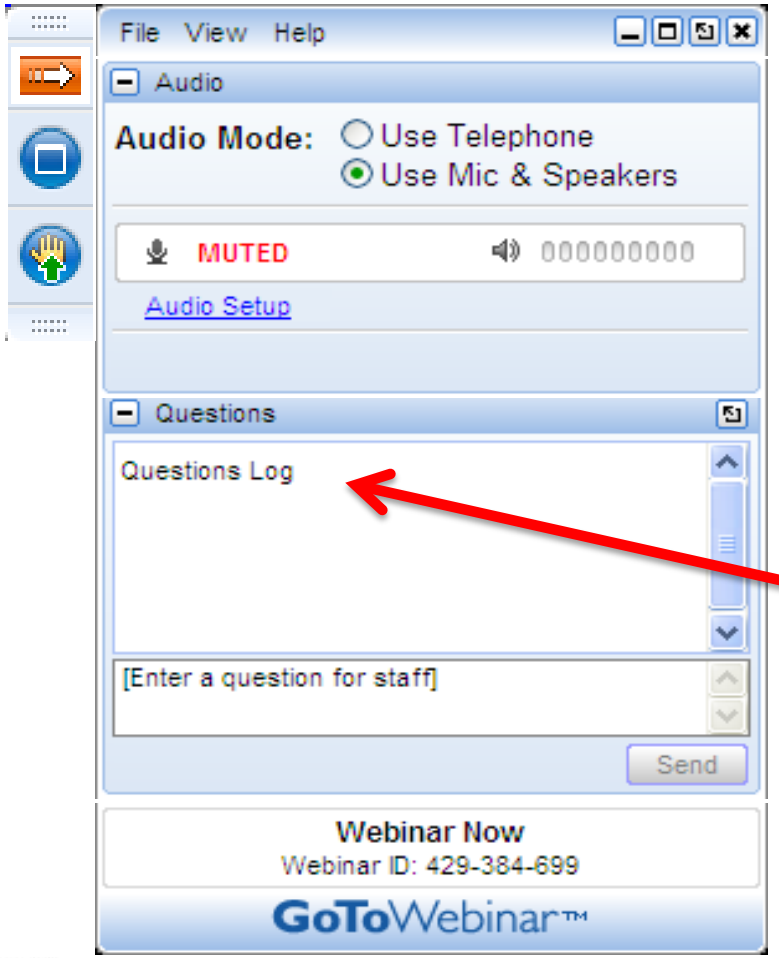
Agenda

00	Welcome and Introductions
+05	LIFT 101- Dr. Aaron Fisher, WRF
+35	LIFT: University-Utility Partnerships- Morgan Brown, WEF
+40	LIFT SEE IT: A Trip Report- Erika Bailey
+60	LIFT IWS Challenge- Fidan Karimova, WRF (on behalf of Ting Lu)
+75	Questions and Answers
+90	Adjourn

Questions for Our Speakers?



- **Submit your questions using the Questions Pane.**

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Thank You

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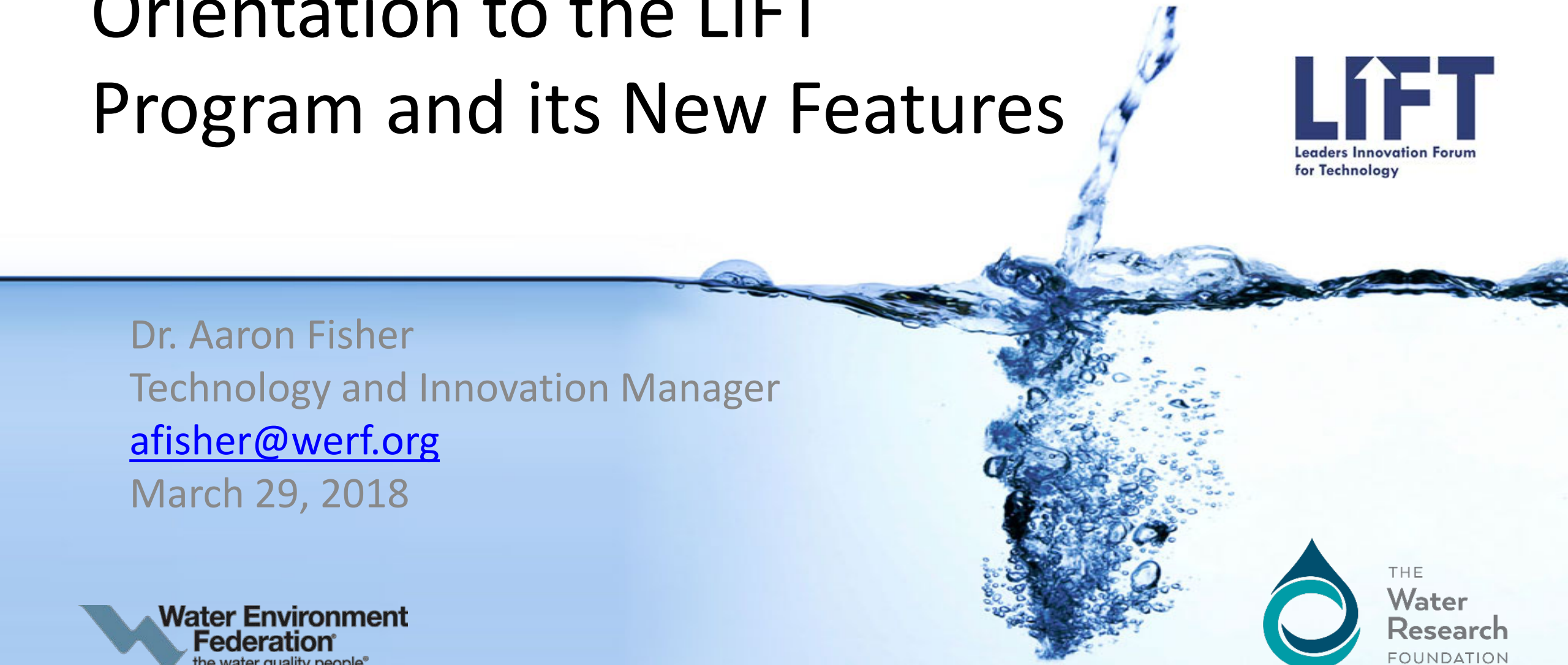
Implementing Innovation: An Orientation to the LIFT Program and its New Features



LIFT
Leaders Innovation Forum for Technology

Dr. Aaron Fisher
Technology and Innovation Manager
afisher@werf.org
March 29, 2018

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The integrated organization represents the evolution of water research issues, the overlap between water and wastewater, and efficiencies to be gained through a consolidated research program.

Learn more at www.waterrf.org and www.werf.org

$700 Million in Research

2,300 Projects

1,200 Subscribers

applied research in water and the environment

accelerate innovation and adoption of technology

transfer knowledge

set an industry research agenda

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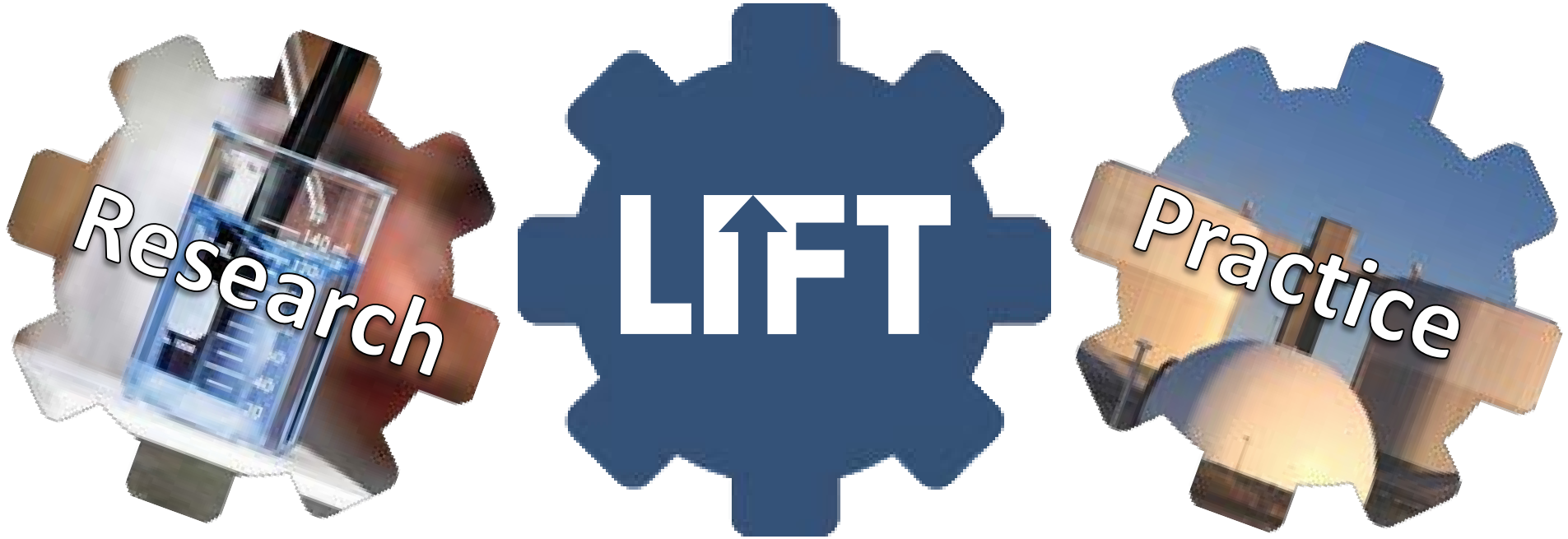
LIFT's Mission

LIFT is a WRF/WEF initiative to encourage and support innovation in water



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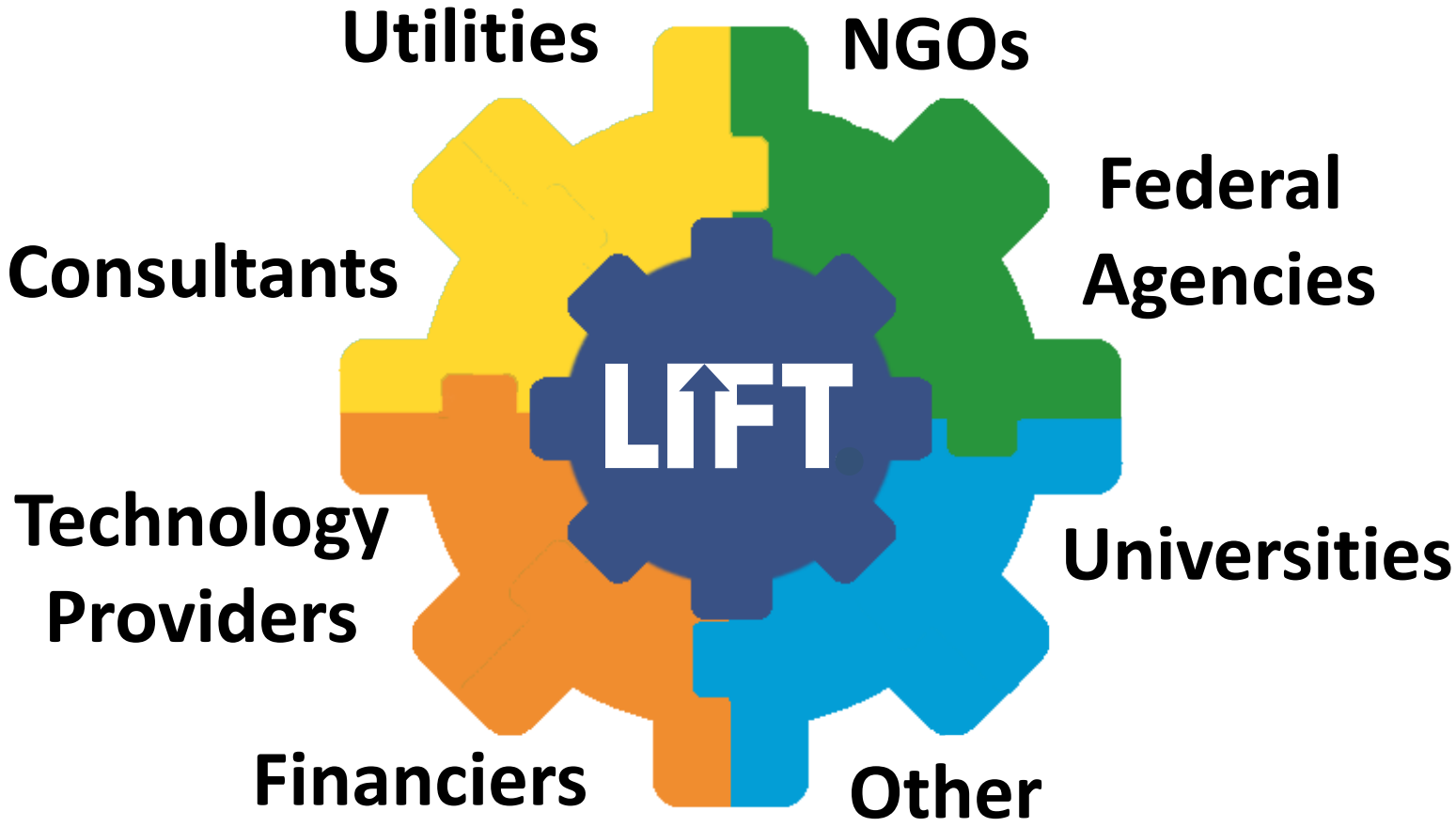
Engaging the Water Community



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LIFT 101

Utility Peer Network

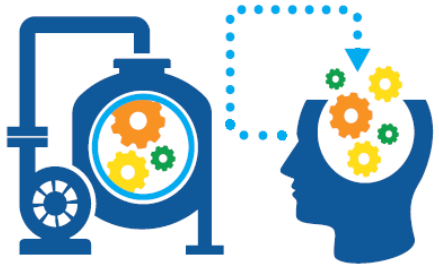
Technology Scans

LIFT Link

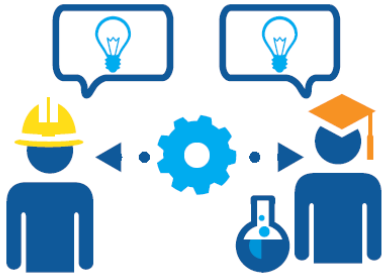
FAST Water Network

Creating the Space (Morgan Brown)

Technology Survey



SEE IT (Erika Bailey)



University-Utility Partnership (Morgan Brown)

Hubs, Partners, and Affiliates

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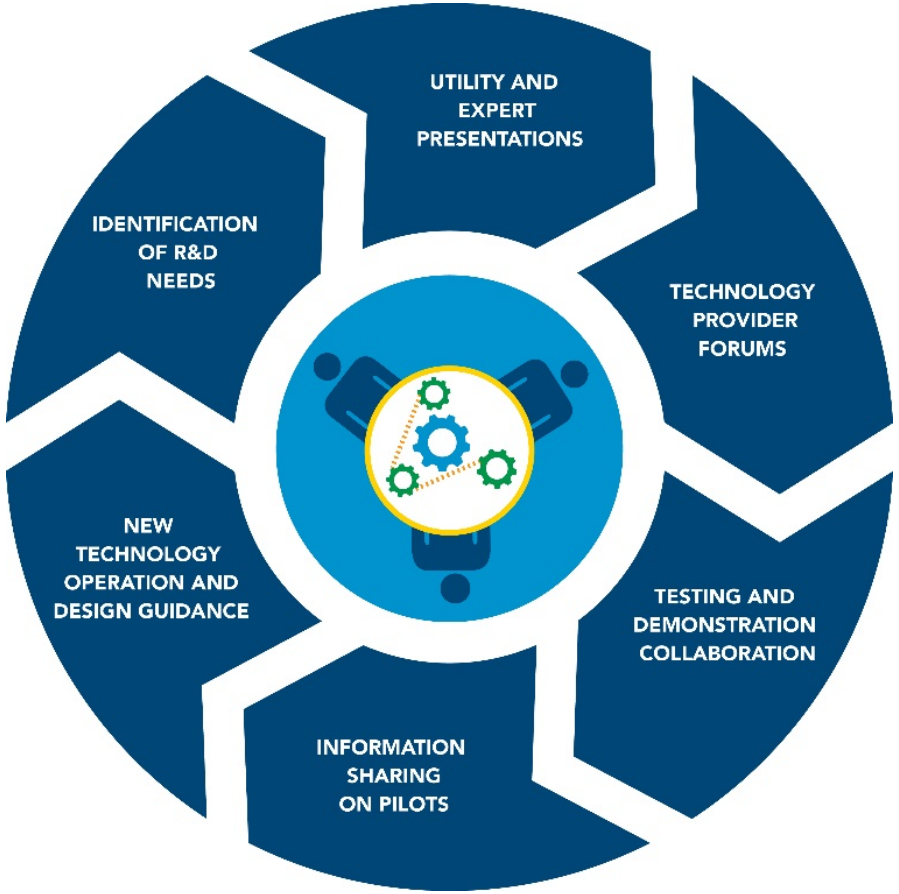
Utility Peer Network

- Utility Working Group and Focus Groups
  - Over 400 utility & industry participants
- Web & In-Person Meetings
- Activities:
  - Peer Information Exchange
  - Expert Presentations on Technologies
  - State of the Art Technology Guidance Reports
  - Collaborative Research and Demos



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Utility Technology Focus Groups

Utility and facility personnel only discussion groups that each meet 3-4 times per year. The LIFT Working Group consists of all 12 focus group members and meets quarterly

- Biological Nutrient Removal
- Biosolids to Energy
- Collection Systems
- Digestion Enhancements
- Disinfection
- Energy from Wastewater
- Green Infrastructure
- Intelligent Water Systems
- Odor Control
- P-Recovery
- Small Facilities
- Water Reuse

New groups coming in 2018 on drinking water

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http://www.werf.org/lift/Focus_Areas/lift/LIFT_Tech_Focus_Areas.aspx

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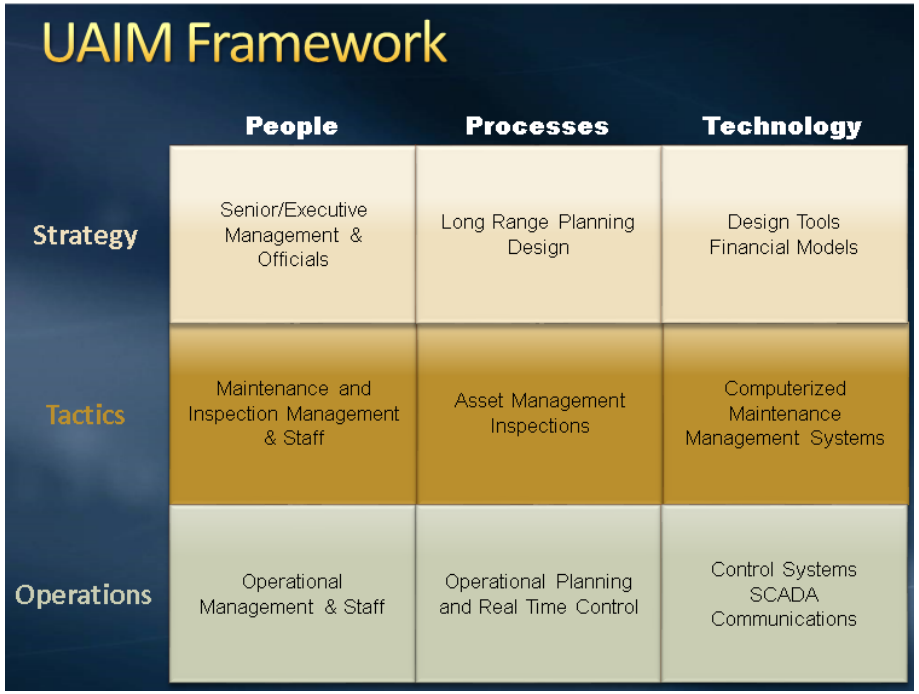
LIFT for Management

Purpose:

To develop a business reference model and information clearinghouse for the water industry that is complimentary to the existing foundational programs on Utility Management.



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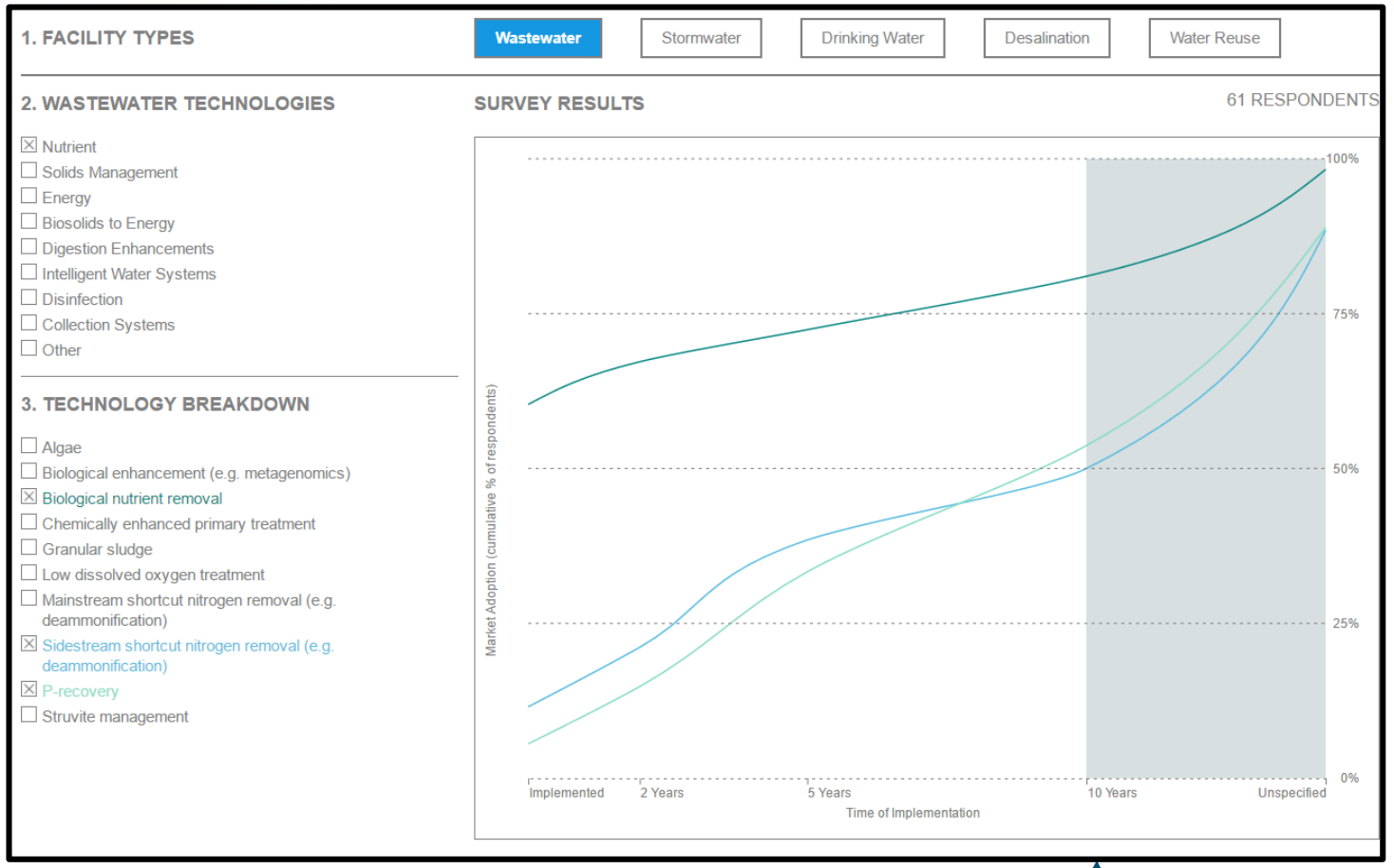
Water Technology Survey

http://www.werf.org/lift/visualizationtool

- Deeper understanding of industry direction and peer's activities
- 90 responses received to date regarding 100+ types of technology
- Survey will be reissued in two years to update visualization



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Technology Scans Process

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LIFT

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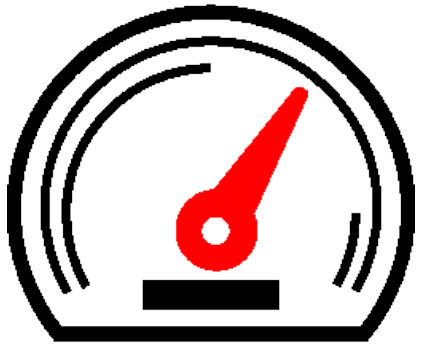
122 Technologies
114 Companies

Technology Scans

Looking for innovative technologies that bring:






Expert panel of consultants, operators, regulators, and academics provides feedback on these criteria

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2018 LIFT Scan Webinar Series

http://www.werf.org/lift/techscanpresentations

Topic	Technologies	Date
Sensors I	NPXPress (American Water), Seivers (SUEZ), SENTRY-AD (Island Water)	April 3rd
Sensors II	LiquID (ZAPS Technologies), Compass (Lutra), Colifast	April 17th
Hydrolysis *1.5 hour webinar*	SolidStream + THP (Cambi), TurboTec (SusTec), PONDUS (CNP), Biological Hydrolysis (SUEZ)	May 1st

Other topics include: Water AI, Beyond Activated Sludge, Decentralized Systems, Aeration, Nutrient Recovery, Early-Stage Technologies, MABR

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LIFT Link

Discover

Collaborate

Connect

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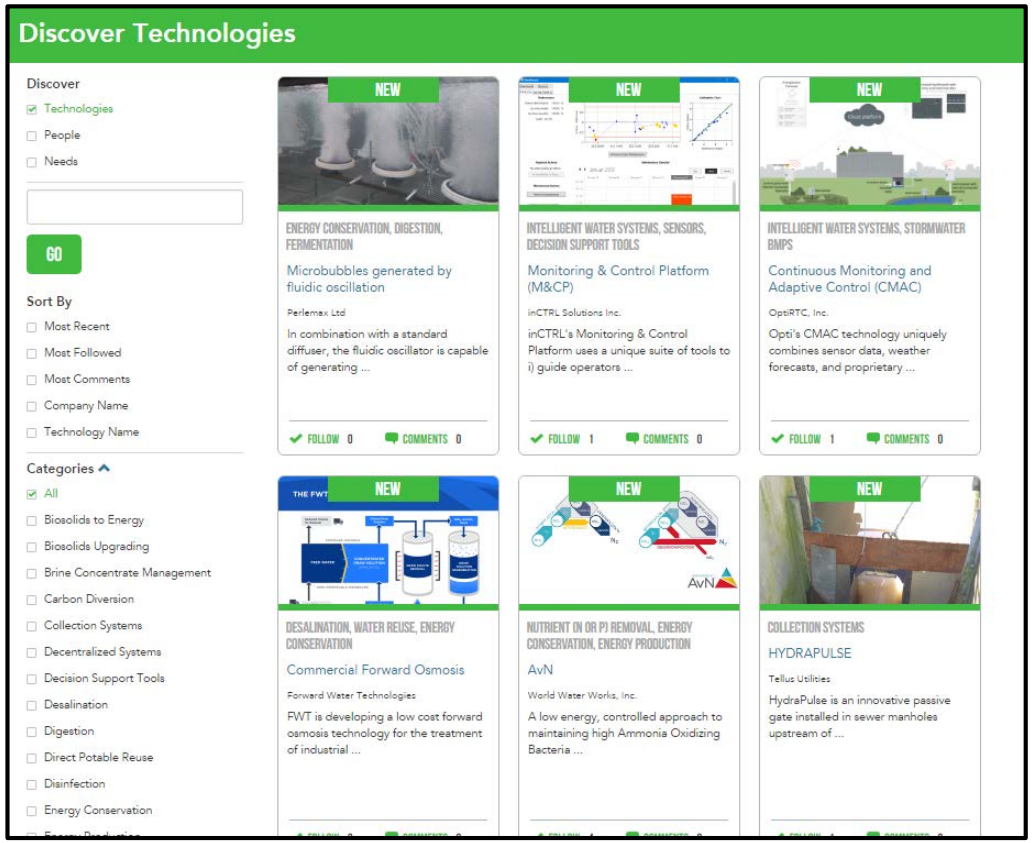
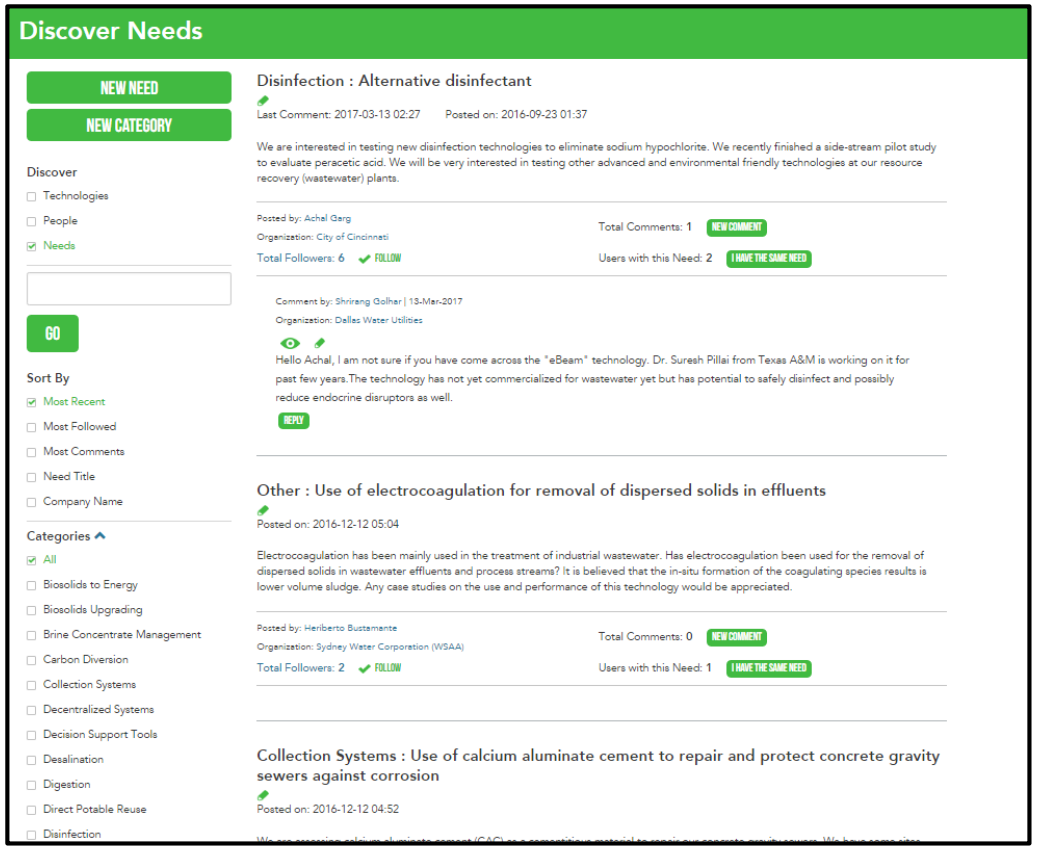
Discover Innovation

Discover Technologies



Discover Needs



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FAST WATER

Facilities Accelerating Science & Technology

www.werf.org/fastwaternetwork

FAST WATER

Facilities Accelerating Science & Technology

The FAST Water Network (Facilities Accelerating Science & Technology) by LIFT - formerly the National Water Resource Recovery test Bed Network - assists those developing and piloting technologies for the water sector. It works to connect researchers, new technology providers, and other innovators in the water resource recovery industry with test facilities appropriate for their needs. It also aims to manage risk and accelerate the adoption of innovation by engaging the broader water community.

The FAST Water Network was developed as a result of recommendations from stakeholder meetings and discussions organized by the National Science Foundation (NSF), the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), the Water Environment & Reuse Foundation (WE&RF), the Water Environment Foundation (WEF).

The FAST Water Network aims to amplify work being done at Test Bed Facilities, by addressing three barriers: (1) connecting the right partners for testing, (2) ensuring applicability of test results beyond a small geographic region, or a highly specific facility layout, and (3) acceptance of the testing data to generate market demand. The FAST Water Network does not manage these facilities, but serves as a neutral party helping to coordinate their work and efforts to limit redundancy and wasted effort.

Funding Opportunities

Numerous sources offer funding for piloting and demonstrating water technologies. Please visit our Funding Opportunities page for more information.

We are always open to assistance in this effort. If you are interested in engaging with the network and are not sure, how please contact Dr. Aaron Fisher: afisher@werf.org.

Find a Test Bed Facility

Learn about Innovations & Connect with Innovators

LIFTLink

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National Test Bed Network: FAST Water

- Steering Committee

www.werf.org/fastwaternetwork

- Planning Partners

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Barriers to Modernizing

Underinvestment

Technology Deployment and Validation Challenges

Conservative Risk-Averse Industry

Regulatory Barriers

Social and Behavioral Challenges

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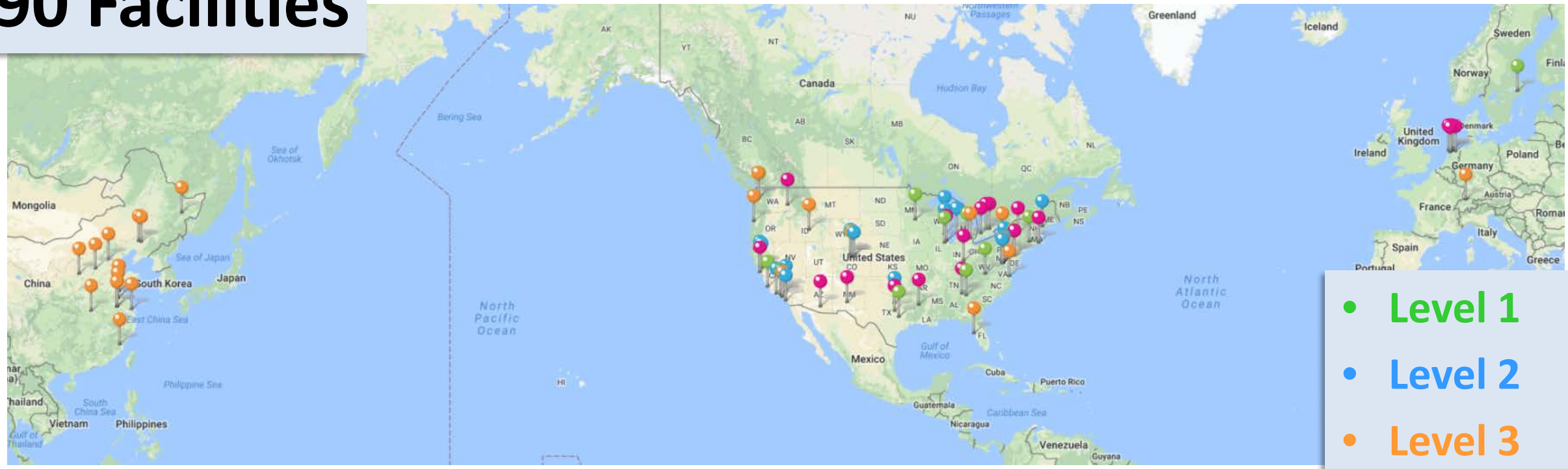
FAST Water Directory

90 Facilities



- Level 1
- Level 2
- Level 3
- Level 4

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www.werf.org/testbeddirectory

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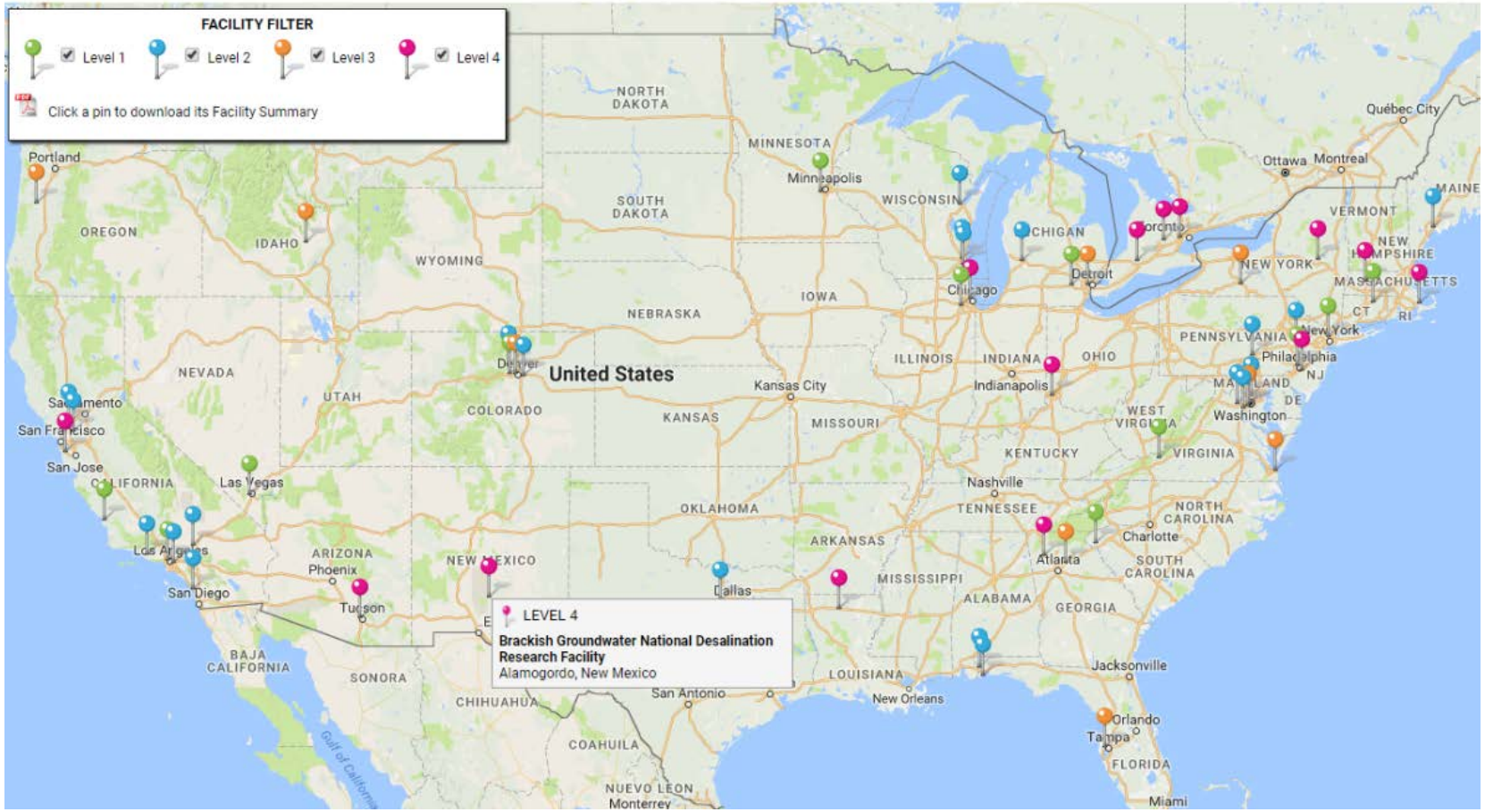
Facility Details



FAST WATER
Facilities Accelerating Science & Technology

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Brackish Groundwater National Desalination Research Facility

Bureau of Reclamation

Type of Facility	Level 4: A staffed facility dedicated solely to R&D/piloting of new technologies (can be housed at a functioning WRRF)
Facility Contact	Randy Shaw, PE Facility Manager (575) 443-6553 rshaw@usbr.gov http://www.usbr.gov/research/AWT/BGNDRF/index.html
Facility Address	500 LaVelle Road Alamogordo, NM 88310 United States
Facility Partners	
Description of Test Facility	The Brackish Groundwater National Desalination Research Facility (BGNDRF) is a 43 acre complex comprised of a central research building, outdoor test pads, 5-acre agricultural research area, renewable energy test areas and 4 brackish water wells including a storage and source water delivery system. Research, development and demonstration work are conducted by a variety of organizations including universities, private sector companies, entrepreneurs, and government agencies. Facility use fees are being waived through September 2017.
…aff	The BGNDRF staff operate and maintain the facility. The Water Treatment Group in the Denver Reclamation office provide desalination technical assistance upon request. The Water Treatment Group has a staff of 12 with 5 PhD's in Chemical and Environmental Engineering and 7 Master's D…ees. …ry may … depending on the degree of …

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www.werf.org/testbeddirectory

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Future Planned Activities

matchmaking

guidance

validation

data library

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weftec
the water quality event™

- Innovation Pavilion Sponsors
- Passport to Innovation
- LIFT Breakfast Meeting
- Committee Meetings
- WRF Booth

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WEF Initiatives for LIFT

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Morgan Brown
Manager, Technical Programs
WEF's Water Science & Engineering Center
mbrown@wef.org

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University-Utility Collaborative Partnerships

Guidance Document now available to download for free on the WEF and WRF websites!!

With Support From:

AEESP | Association of Environmental Engineering & Science Professors
1963-2013: Celebrating 50 Years of Advancing Environmental Engineering & Science

IWA the international water association

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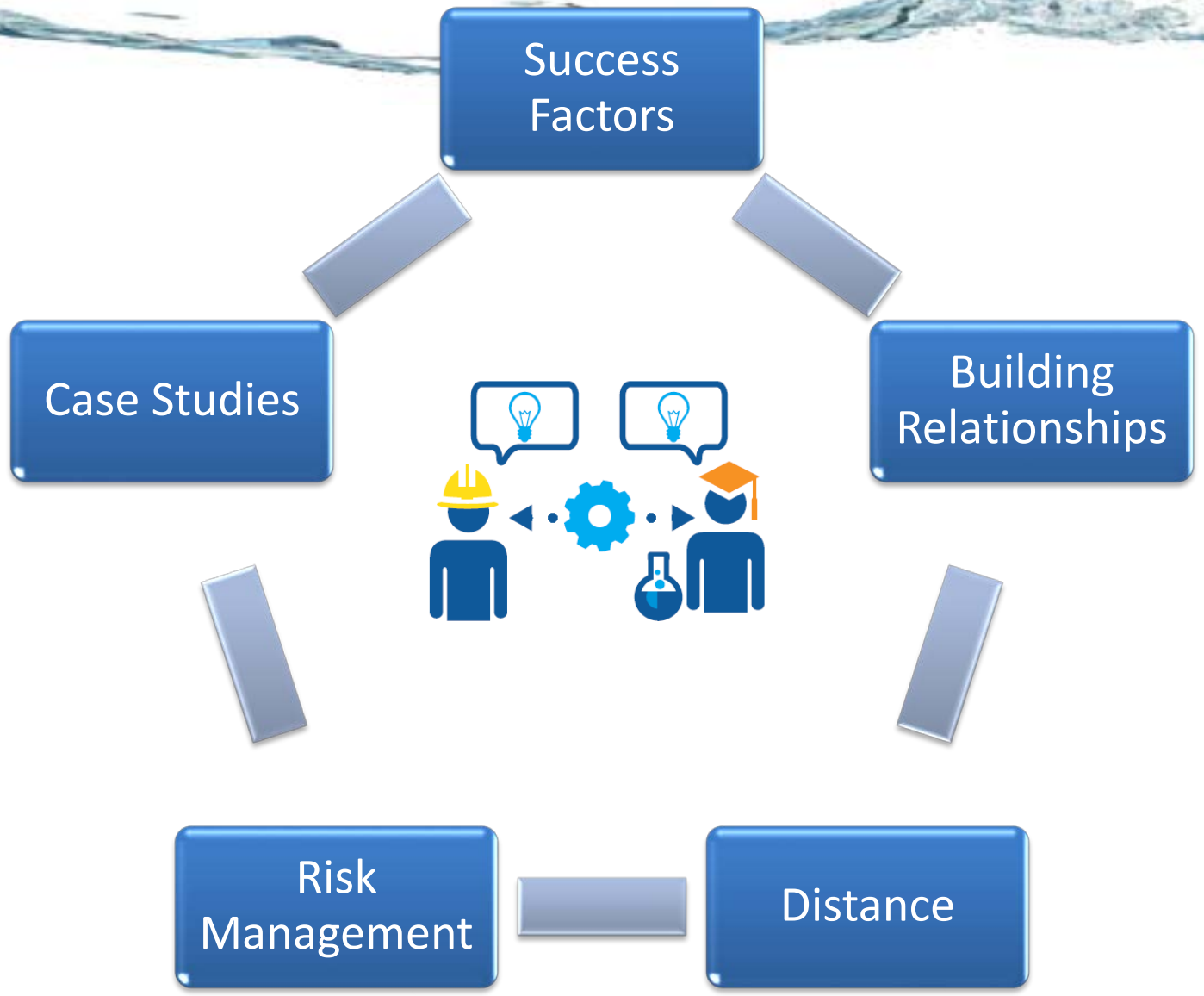
University-Utility Collaborative Partnerships: Guidance Document Topics



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Creating the Space to Innovate

Purpose: to create the regulatory space to help foster technology and approaches to innovation in the water sector.

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Creating the Space to Innovate: Experts Workshop (August 2017)

- Digestion Enhancements
- Water Reuse
- Renewable Products
- Nutrient Management
- Improved Risk Sharing

Objectives:

- Discuss technology implementation scenarios and their regulatory/policy framework
- Refine current regulatory/policy options
- Identify next steps to support innovative technology adoption through enhancement of regulatory/policy landscape

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New LIFT Effort: Water Innovation Clusters

- Transitioning from U.S. EPA to WEF
- Brings clusters together to encourage collaboration
- Includes all types of water
  - Water, Wastewater, Stormwater, Marine, Industrial, etc.

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SEPTEMBER 29 – OCTOBER 3, 2018 NEW ORLEANS

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Thank You

Morgan Brown

mbrown@wef.org

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Unsplash.com: Nithya Ramanujam

City of Raleigh Public Utilities
LIFT SEE IT Trip Highlights

Erika L. Bailey, PE
Plant Process Engineer
City of Raleigh Public Utilities

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Topics for Today's Presentation

1. What Technologies and Why?
2. Site Visits Highlights and Key Take Aways
3. Benefits of Site Visits to City's Bioenergy Recovery Project

Site Visit Drivers: Assist with Planning for City's Bioenergy Recovery Project

- Neuse River RRF
  - 60 mgd, expanding to 75 mgd
  - Centralized biosolids processing for all three RRFs
  - Enhanced nutrient removal
- Converting to advanced digestion with Thermal Hydrolysis Pretreatment (THP)
  - Includes biogas utilization
  - Includes side stream short-cut nitrogen removal

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Technologies Visited

- Part 1: Side Stream Short-Cut Nitrogen Removal Systems
  - Treating high strength filtrate from anaerobic digestion process
  - Technologies incorporating recent process enhancements
- Part 2: Biosolids Handling Processes using THP with Mesophilic Anaerobic Digestion
  - Focus on similar sized systems
  - Using newer, modular THP reactors

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LIFT SEE IT
Site Visits – Highlights

Part 1: Side Stream Short-Cut Nitrogen Removal Treatment Systems

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conDEA™ Process at Amersfoort WWTP, NL

- Continuous flow through process
- Utilizes cyclone separator to separate / retain annamox granules
- One tank design (clarifier in middle)
- One of earliest flow-through DEMON® systems
  - Installed in 2012
  - THP, WASSTRIP, and OSTARA Processes added 2015/2016

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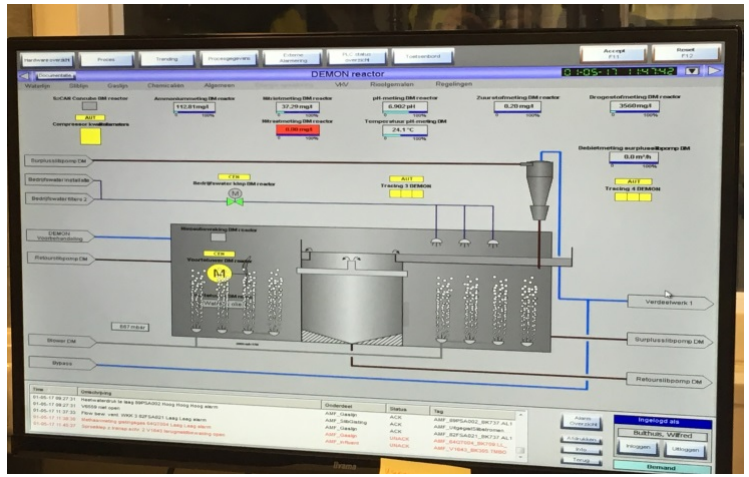
conDEA™ Process – Key Take Aways

- Flow-through process is attractive alternative to SBR
- All-in-one tank configuration is space efficient option
- Very important to manage filtrate quality!
  - Common take-away for all three systems



AnammoPAQ™ Process, Olburgen, NL

- Treats potato processing + biosolids recycle streams
- Upstream phosphorus recovery process
- Continuous flow through process
- Completely granular system
- Anammox and AOB bacteria co-exist on granules (1 - 5 mm dia.)
- No RAS; Single pass operation
- Granules retained in system through inclined plate separator in tank
- Occasional “sluicing” of excess granules

AnammoPAQ™ Process – Key Take Aways

- Simple system
- Control system individualized for each application
- Higher N loading rates, but phosphorus pretreatment achieves significant sCOD reduction

ANITA™ Mox IFAS Process in Boras, Sweden

- New treatment plant under construction
- Will treat leachate + filtrate
- Filtrate will be diluted 1:1
- Continuous flow through process
- Anammox bacteria colonized on plastic media carriers
- Majority of AOBs are in the suspended phase (Zhao et al)
- Clarifier used for solids return, waste from RAS line to maintain design liquid phase SRT

ANITA™ Mox IFAS Process – Key Take Aways

- Very similar to MBBR configuration, except for:
  - Secondary Clarifier
  - RAS / WAS Pumping
- IFAS system provides some additional process control
  - SRT control
  - Lower operating DO

LIFT SEE IT
Site Visits – Highlights

Part 2: Biosolids Handling Processes using THP with Mesophilic Anaerobic Digestion

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Visited Three Different WWTPs with Modular, B6 THP Reactors in Operation

- All plants using CAMBI B6 THP Reactors
- All plants utilizing digester gas for CHP
- Each had slightly different solids handling process configuration

Seafield WTW,
Edingburgh, UK

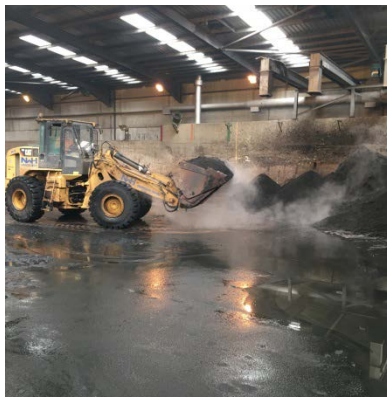
Crawley STW,
West Sussex, UK

Long Reach STW,
Kent London, UK

Seafield WTW Highlights

- Two B6-3 THP Trains
- Design Pop Equiv. of 850,000
  - + Additional 20 trucks/d of imported biosolids
- Centrifuges for Pre and Post Dewatering
- 90 - 95% energy self sufficient
- 32% final cake solids



Crawley STW Highlights

- One B6-3 THP Train (first B6)
- Treats 15 mgd indigenous biosolids + 15 mgd imported
- CEPT, so higher Primary / WAS
- BFPs for Pre and Post Dewatering
- Limited to 1 MW CHP
- 29 - 30% final cake solids

Long Reach STW Highlights

- One B6-3 THP Train
- Designed for Pop Equiv. of 900,000
  - ~80 mgd
- WAS only THP design
  - No cooling prior to digestion
- WAS only concept reduces equipment, but does not achieve Class A biosolids
- Bucher hydraulic press for final dewatering
  - Only achieving 25% currently
  - vs. 35% at other plants

Overall THP Site Visit Take-Aways

- B6 modules are space efficient. No odors noted, but vibration noted during periods of operating cycle
- System efficiency is closely monitored
  - i.e., polymer usage (lb/dry ton)
  - Gas utilization
  - Final cake solids (% TS)
- Final dewatered product is very inert
- A lot of variability in final cake characteristics
  - Seafield – More granular (centrifuge and screw conveyors)
  - Crawley – Soil like texture, more malleable (BFPs and belt conveyors)
  - Long Reach – Soil like texture, but much wetter (Bucher presses)

Benefits of LIFT SEE IT Site Visits

- Shared site visit findings with entire design team
- Utilized side stream site visits to assist with technical evaluation of systems being considered
- Valuable networking opportunity
  - Meet with process experts
  - See how utilities are successfully implementing and operating systems
  - Be aware of process challenges that need to be considered in design
- Opportunity to take a more in depth review of THP systems during design phase

Thank You to WRF, WEF, and NACWA

Visit http://www.werf.org/lift/LIFT_SEE_IT.aspx for Trip Reports for more details.

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2018 INTELLIGENT WATER SYSTEMS CHALLENGE

Fidan Karimova

Agenda

- Background and introduction
- Intelligent Water Challenge structure
- Judging criteria
- Registration
- Q&A

Supporting Organizations:

American Water Works Association

BlueTech Research – An O_2 Environmental Company

cleveland water alliance – Invest, Innovate and Accelerate

ISA Water/Wastewater Division

WaterTAP Technology Acceleration Project

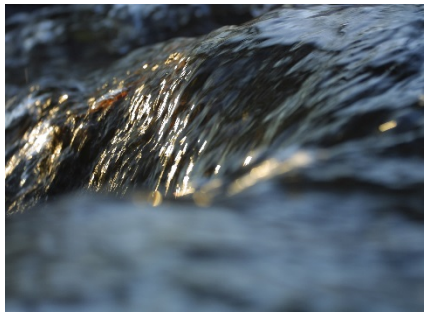
IMAGINE H_2O

The Water Council

SWAN – The Smart Water Networks Forum

Intelligent Water Systems Challenge

- Hosted through LIFT Intelligent Water Systems Workgroup
- Discussion on challenges to adopt smart water technologies



LIFT IWS Challenge Vision

- Focus on leveraging data using the best available tools to help utilities better understand the dynamics of complex systems for making better decisions.

- Give students, professionals and technology aficionados the opportunity to showcase their talents and innovation.

Benefits for Utility Participants

- Design your own challenge problems
- Using real world data (if you like to use your own data, that will be ideal)
- Work with the team members to identify solutions based on smart technologies and IoT
- Receive innovative solutions to solve your problems
- Learn more about state of the art in intelligent water technologies
- Opportunity for different staff to become engaged in IWS

Benefits for Young Professionals & Students

- Share unique, out of the box ideas on collaborative teams
- Network with innovative water professionals
- Learn through ideation, planning and implementation of Intelligent Water Systems
- Gain valuable experience working with early adopters of Intelligent Water Systems
- Apply your education to real-world data and problems
- Insider insights into utility management

Benefits for Technology Providers

- Understand utility challenges
- Get real-world data from utilities
- Work with the utilities to identify solutions through smart technologies and IoT
- Showcase your innovative solutions applied to real problems
- Quantify and qualify the value provided through IWS solutions

Challenge Goal

- The goal of this Challenge is to identify the best demonstrations of how IWS and the transformation of data into information can improve a utility's knowledge and decisions, by solving a specific problem
  - Teams will have to demonstrate the use of IWS to solve their problem statement
  - Explain why and how IWS provides value to this solution (e.g. what is it that you couldn't do before, that you can do with IWS)
  - Quantify/qualify the unique value add that an IWS solution provided compared to status quo to solve the specific problem, as defined by the team in the problem statement

Challenge Solutions

- Solutions should highlight:
  - What is the specific problem that the utility needs to be solved? What are the metrics to determine success?
  - How will IWS provide value to this solution as opposed to status quo?
  - Proposed plan to solve problem and data streams to be used
  - Implemented solution, including data analytics

Suggested Challenge Categories

- Collection Systems
- Wastewater Treatment Systems
- Drinking Water Treatment Systems
- Source Water/Watershed
- Distribution Networks
- Other

How to Participate

- 2 Different Team Formats
  - Partnered Team
  - Regular Team
- Academics, consultants, students, tech provider or utility
- Teams will consist of up to 6 individuals
- Learning opportunity for staff to get involved in Intelligent Water
- Interested participants without a team will be matched

Challenge Format

- Utility-Partnered Teams will submit their problem statement
- Regular Teams will be matched with a problem statement and data set
- Teams will be matched with Steering Committee members for progress check-ins throughout the Challenge
- 2 Submission Deadlines: Challenge Plan and Final Solution
- Top teams will present at WEFTEC for judging and awards ceremony

Challenge Structure

- February 23: Registration Opening
- February 27: Challenge Webinar
- March 23: Utility need submission (not on a team)
- April 6: Registration Deadline
- April 9 – September 3: Challenge in Progress
- September 3: Submission Deadline
- October 1: Final Presentation & Awards at *WEFTEC 2018, New Orleans, LA*

Challenge in Progress

- April 9 – September 3:
  - April 23: Challenge Plan Submission Deadline
  - April 23 – May 4: Discussion with assigned steering committee members
  - June 18 – June 22: Discussion with assigned steering committee members
  - September 3: Final solution submission

April 23: Challenge Plan Submission

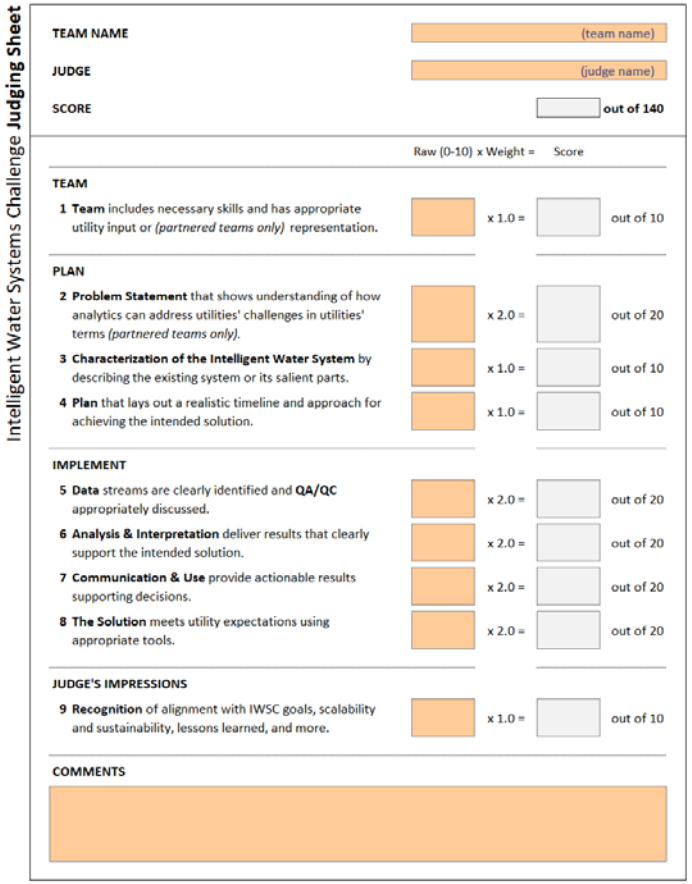
- Challenge Plans should include:
  - Problem Statement
  - Desired Outcomes
  - Methodology
  - Data Set Description
  - Proposed Implementation Plan

September 3: Submission Deadline

- Submission Package will be submitted via e-mail
- Submission Packages should include:
  - Team
  - Problem Statement
  - Characterization of Intelligent Water System
  - The Plan
  - Data
  - Analysis & Interpretation
  - Communication & Use
  - The Solution

What You'll Do – and We'll Evaluate

- Form a **Team**;
- Make a **Plan**:
  - Define the problem, understand the system, and lay out a plan;
- **Implement** your Solution:
  - Manage the data, do the analysis, communicate actionable results, and solve the problem;
- **Impress** the **Judges**!



Intelligent Water Systems Challenge **Judging Sheet**

TEAM NAME	(team name)		
JUDGE	(judge name)		
SCORE			**out of 140**
	Raw (0-10)	x Weight =	Score
TEAM			
1 Team includes necessary skills and has appropriate utility input or *(partnered teams only)* representation.		x 1.0 =	out of 10
PLAN			
2 Problem Statement that shows understanding of how analytics can address utilities' challenges in utilities' terms *(partnered teams only)*.		x 2.0 =	out of 20
3 Characterization of the Intelligent Water System by describing the existing system or its salient parts.		x 1.0 =	out of 10
4 Plan that lays out a realistic timeline and approach for achieving the intended solution.		x 1.0 =	out of 10
IMPLEMENT			
5 Data streams are clearly identified and **QA/QC** appropriately discussed.		x 2.0 =	out of 20
6 Analysis & Interpretation deliver results that clearly support the intended solution.		x 2.0 =	out of 20
7 Communication & Use provide actionable results supporting decisions.		x 2.0 =	out of 20
8 The Solution meets utility expectations using appropriate tools.		x 2.0 =	out of 20
JUDGE'S IMPRESSIONS			
9 Recognition of alignment with IWSC goals, scalability and sustainability, lessons learned, and more.		x 1.0 =	out of 10
COMMENTS			

Sponsorship

Diamond: $50,000

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Let's Solve Water

Platinum: $25,000

Sponsor Benefits:

- Logo recognition on website
- Sign at Water Research Foundation Research Symposium
- Mention in press release announcement
- Shared Platinum slide during webinar for announcement
- Shared Platinum slide during webinar pre WEFTEC
- Sign at WEF specialty conferences: Odors, Collection Systems, Residuals & Biosolids, Nutrients
- Logo in Digital representation at WEF booth at ISA WWAC (August in Bethesda)
- Mention in presentation at AWWA ACE innovation pavilion
- Platinum listing on lobby banner and public meter boards at WEFTEC
- Logo on runner up winner certificates and envelopes

Gold: $10,000

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WEF Point of Contact: Nick Christy nchristy@wef.org

Awards

Top Team Award - $25,000 cash

$10,000 Best Overall Solution

$15,000 1st Place Solution (Partnered Team)

$15,000 1st Place Solution (Regular Team)

Other prizes to be announced

Q&A

www.werf.org/lift/IWSChallenge2018

Additional Questions can be directed to:

WEF: Lisa McFadden, lmcfadden@wef.org;

WRF: Fidan Karimova, fkarimova@werf.org

LIFT
Leaders Innovation Forum for Technology

Thank You

Aaron Fisher- afisher@werf.org
Morgan Brown- mbrown@wef.org
Erika Bailey- Erika.Bailey@raleighnc.gov
Fidan Karimova- fkarimova@werf.org

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Unsplash.com: Nithya Ramanujam