WELCOME
TO THE SEPTEMBER EDITION
OF THE 2017
M&R SEMINAR SERIES

BEFORE WE BEGIN

- SAFETY PRECAUTIONS
  - PLEASE FOLLOW EXIT SIGN IN CASE OF EMERGENCY EVALUATION
  - AUTOMATED EXTERNAL DEFIBRILLATOR (AED) LOCATED OUTSIDE
- PLEASE SILENCE CELL PHONES
- QUESTION AND ANSWER SESSION WILL FOLLOW PRESENTATION
- PLEASE FILL EVALUATION FORM
- SEMINAR SLIDES WILL BE POSTED ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ Reports ⇒ M&R Data and Reports ⇒ M&R Seminar Series ⇒ 2017 Seminar Series)
- STREAM VIDEO WILL BE AVAILABLE ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ MWRDGC RSS Feeds)

Amit Pramanik, Ph.D., BCEEM

Dr. Pramanik is currently Water Environment & Reuse Foundation's (WE&RF's) Chief Innovation and Development Officer.

Dr. Pramanik has >30 years of experience in environmental engineering in the USA and overseas on projects funded by municipalities, industry, multi-lateral agencies, and other organizations. He worked with various companies and water/wastewater treatment facilities prior to joining the not-for-profit Water Environment Research Foundation (WERF) in 1997. Dr. Pramanik served as WERF's Director of Research, with oversight and responsibility for WERF's diverse portfolio of research and coordination with collaborative partner organizations. He manages a diverse portfolio of research and innovation projects, some with national or global implications, and works with world renowned technical experts and partner organizations on these topics.

In 2016, WERF merged with the Water Reuse Research Foundation, and the newly merged organization is now known as the Water Environment & Reuse Foundation (WE&RF). WE&RF's charge is to advance the concept of One Water through research and innovation in reuse and resource recovery, demonstrating the value of all water.

WE&RF's Role in Assisting Utilities to Become the Utility of the Future

Amit Pramanik
Water Environment & Reuse Foundation

Chicago, IL
Friday, September 29, 2017

Content

- About WE&RF and our Water industry
- LIFT and how WE&RF can Help
- The Utility of the Future and "One Water"
- Where are we headed and some examples
  - East Bay MUD, CA
  - Hampton Roads Sanitation District, VA
  - DC Water, DC
- Closing / Questions

About WE&RF

WERF
Water Environment Research Foundation

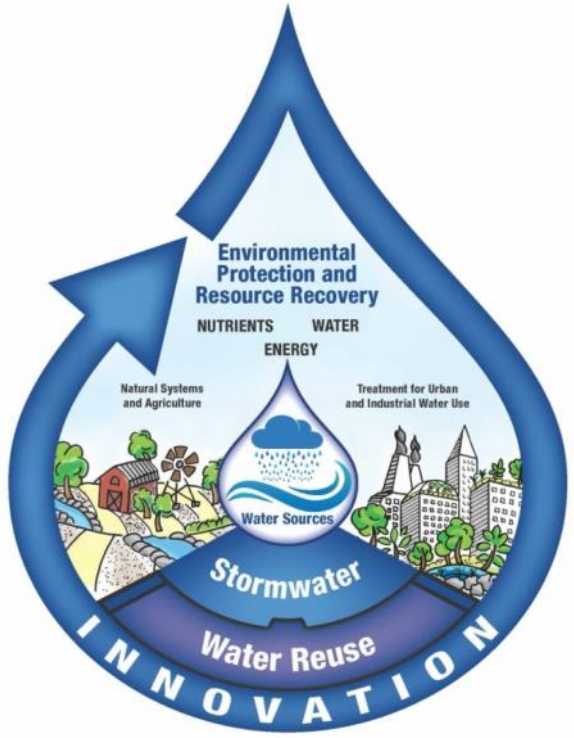
Established 1989

WATEREUSE

Established 1993

WATER ENVIRONMENT & REUSE FOUNDATION
WE&RF

Merged July 2016



CORE PROGRAM ELEMENTS

- Applied research in water and environment
- Accelerating innovation and adoption of technology
- Transferring knowledge
- Setting an industry research agenda

Providing exceptional water research to advance science and technology

WATER ENVIRONMENT & REUSE FOUNDATION
WE&RF

Water Environment & Reuse Foundation

Established 2016

Alexandria, VA – www.werf.org

Mission: Catalyze innovation through actionable research in water and the environment

Focus:
- Applied research in water and the environment
- Accelerating innovation and adoption of technology
- Transferring knowledge
- Setting an industry research agenda

Issue Areas:
- Compounds of Emerging Concern/Trace Organics
- Energy Production and Efficiency
- Integrated Water Management
- Intelligent Water Systems
- Linkages in Water Quality
- Resource Recovery
- Reuse and Desalination
- Treatment Intensification

Projects: Approximately 100 current valued at $35M

Research Value: $200M

Subscribers: 350

Employees: 30

Notable Activities:
- Leadership Innovation Forum for Technology (LIFT)
- Annual Research Conference
- DPR Research Initiative
- Paul L. Busch Award

Water Environment Research Foundation

Formed in 1989 | Alexandria, VA

Focus:
- Wastewater
- Resource Recovery
- Stormwater

Issue Areas: Climate Change, Conveyance Systems, Energy, Nutrient Removal, Integrated Water, Resource Recovery, Sensors, and Stormwater

Projects: More than 200 valued at $50M initiated in the past 10 years

Research Value: $138M

Subscribers: 270

Employees: 25

Notable Activities:
- Leadership Innovation Forum for Technology (LIFT)
- Paul L. Busch Award

WateReuse Research Foundation

Formed in 1993 | Alexandria, VA

Focus:
- Nonpotable Reuse (urban, industrial and agricultural)
- Potable Reuse
- Desalination

Projects: 150 projects valued at $30M initiated in the past 10 years

Research Value: $76M

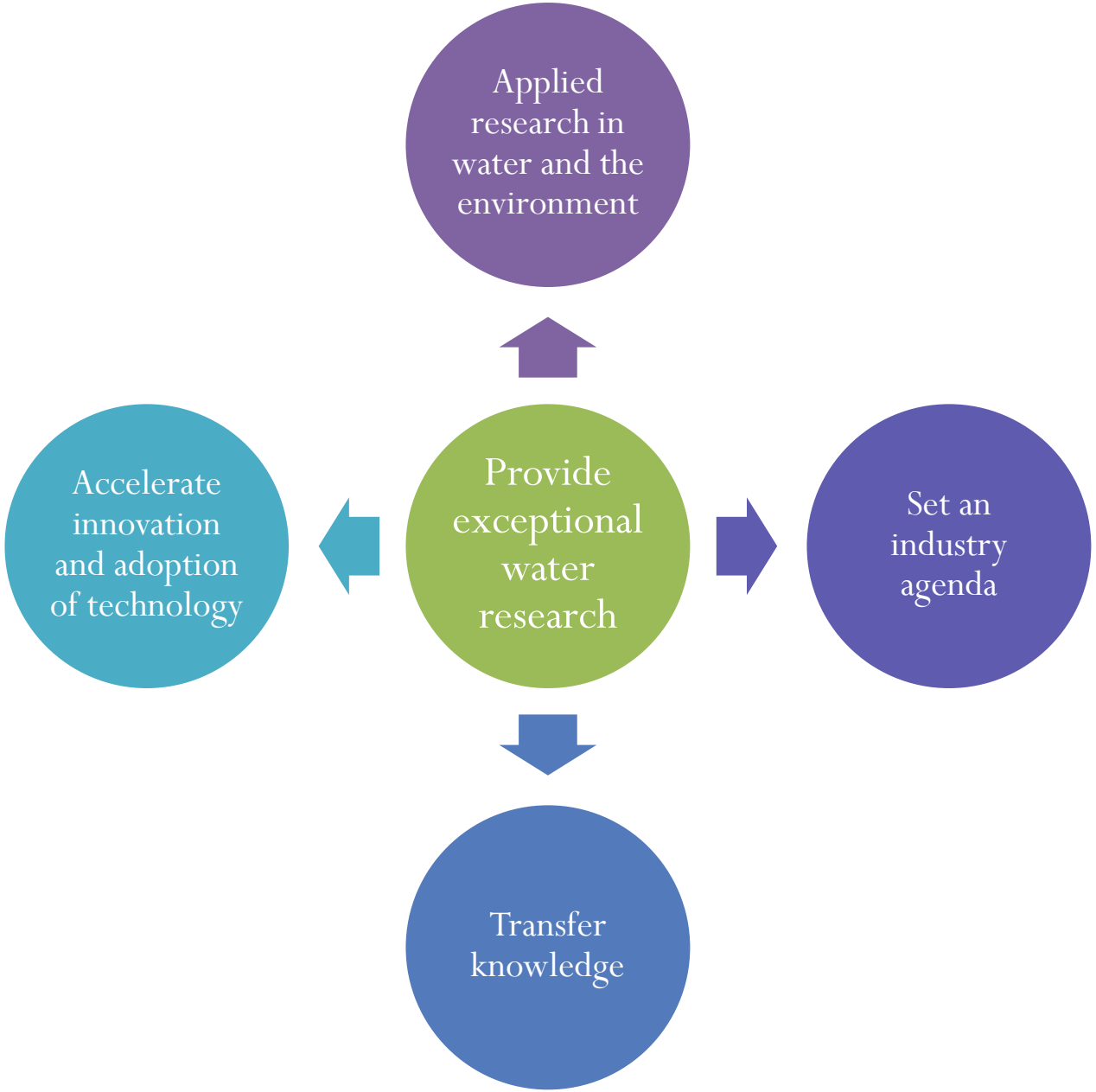
Subscribers: 97

Employees: 5

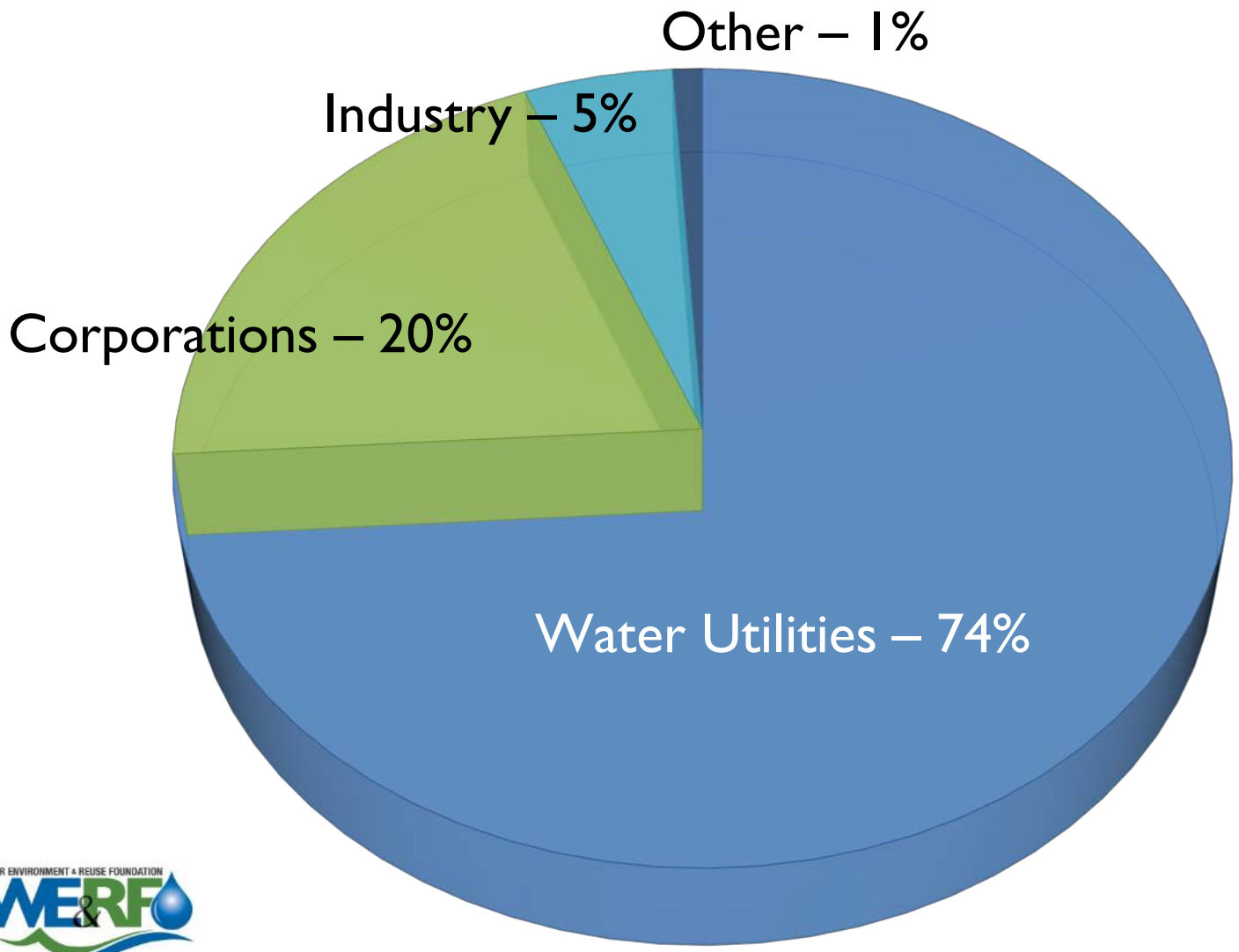
Notable Activities:
- DPR Research Initiative
- Annual Research Conference

What does WE&RF do?

- Portfolio of high quality research valued at more than $200 million
- 4-to-1 return on investment ($1 invested generating $4 in matching funds and in-kind contributions)
- Average annual investment of $5 million in new research



WE&RF Subscribers



MWRD Chicago, IL

- **28 Years** Founding Subscriber (since 1990)
- Collaborative partner on many projects – providing both financial & intellectual resources
- Staff actively engaged in WE&RF Research and Innovation (LIFT) programs – serve(d) on Board of Directors, Research Council, Issue Area Teams (IATs), PSCs, PACs, etc.

Thank You!

Strategic Collaborators & Partners

USA

- Federal and State agencies
- Water Industry associations and research foundations
- Water Sector Utilities and agencies
- Multi-lateral agencies

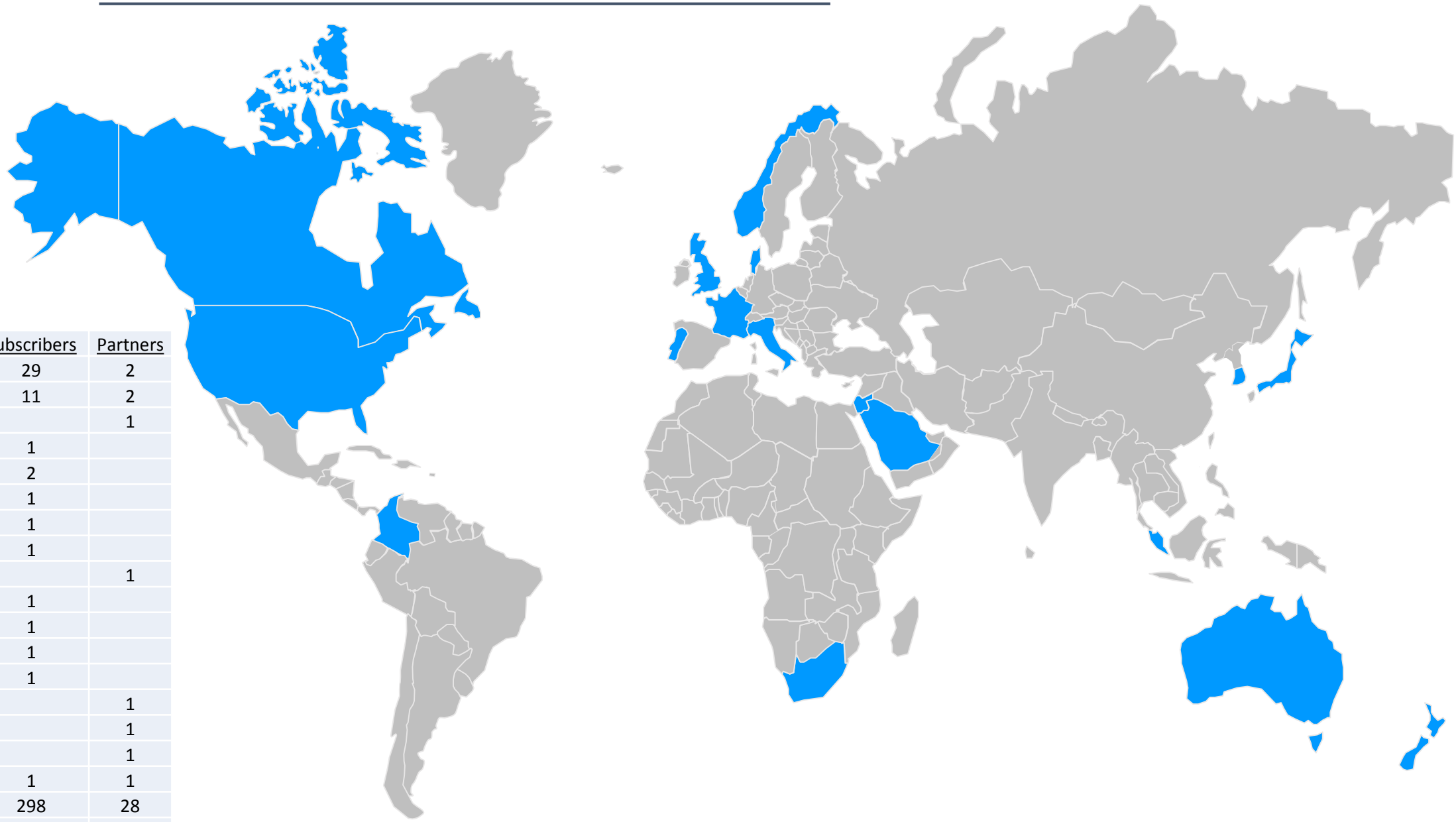
International

- WRC of South Africa (MOU signed 2015, First International LIFT HUB – Sep 2017)
- Singapore PUB
- WSAA (Australia)
- Korea Water Partnership
- WaterTAP (Canada)
- GWRC
- Water Sector Utilities and Agencies

Enhance collaborative peer to peer networking
Increase ROI – intellectual and financial

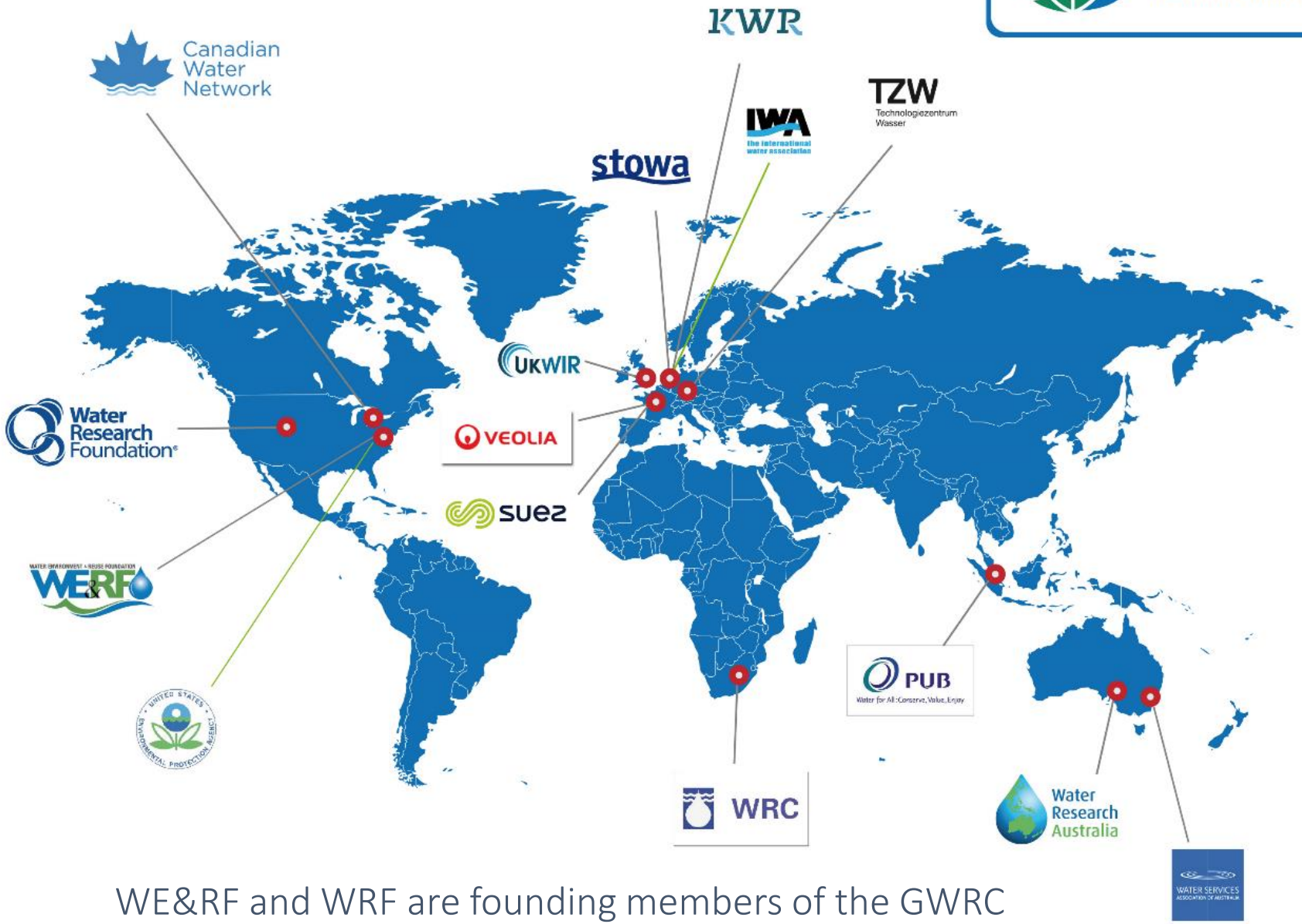
Collaboration – Innovation – Results

WE&RF Subscribers and Partners – Global



	Subscribers	Partners
Australia	29	2
Canada	11	2
Colombia		1
Denmark	1	
France	2	
Israel	1	
Italy	1	
Japan	1	
Netherlands		1
Norway	1	
New Zealand	1	
Portugal	1	
Saudi Arabia	1	
Singapore		1
South Africa		1
South Korea		1
United Kingdom	1	1
USA	298	28
Total	348	38

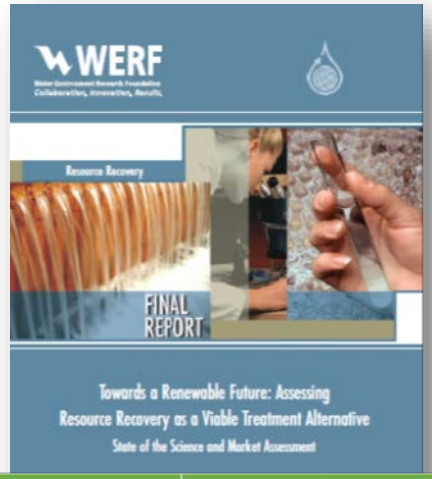
Global Water Research Coalition



WE&RF and WRF are founding members of the GWRC
Our CEO, Melissa Meeker, is on the GWRC Board

Growing WE&RF – one good example on integration and leverage: WE&RF's Nutrient & Resource Recovery Research

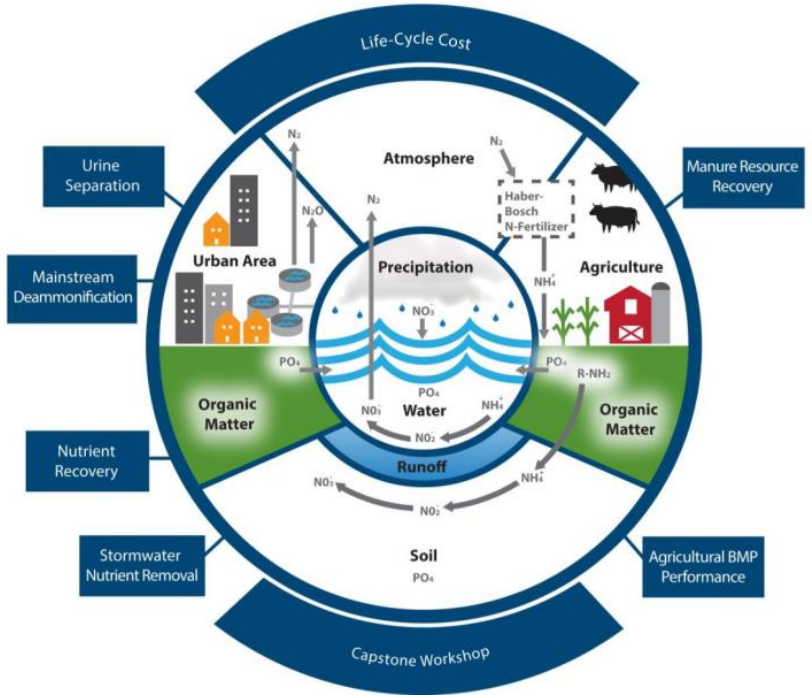
Resource Recovery Challenge



Project	Principal Investigator(s)	Status
NTRY1R12 *Resource Recovery as Viable Treatment Alternative* ***(aka – P-recovery research)*** (Goals 1, 2)	**Ron Latimer (Hazen & Sawyer)**, Wendell Khunjar (Hazen & Sawyer), Sam Jeyanayagam (CH2M)	Complete
NTRY3R13 *Recovering Carbon and Other Commodities from Wastewater* (Goals 1, 5)	**Wendell Khunjar (Hazen & Sawyer)**, Kevin Gilmore (Bucknell Univ.), Sam Jeyanayagam (CH2M)	Complete
NTRY4R14 *Recovering High Value Carbon Products from Wastestreams* (Goal 5)	**Kam Law (Greeley & Hansen)**, Kartik Chandran (Columbia Univ.), Wendell Khunjar (Hazen & Sawyer), Chris Wilson (HRSD)	Ongoing
NTRY5R14 *Producing Value Added Bioplastic from Methane Gas* (Goal 5)	**Molly Morse (Mango Materials)**, Ganesh Rajagopalan (Kennedy/Jenks)	Complete
NTRY6R14 *Production of Bioisoprene* (Goal 5)	**Nicole Buan (Univ. of Nebraska-Lincoln)**, Karrie Weber (Univ. of Nebraska-Lincoln)	Ongoing
NTRY7R15 *High Quality Biosolids* (Goal 6)	**Trudy Johnston (Material Matters)**, Chris Peot (DC Water)	Ongoing
NTRY8R15 *Plasmids and Rare Earth Elements* (Goal 5)	**Kevin Gilmore (Bucknell Univ.)**, Sam Jeyanayagam (CH2M), Wendell Khunjar and Thomas Worley-Morse (Hazen & Sawyer)	Ongoing

Mostly funded by WE&RF Subscribers ($1.5M, including TCR funds, plus $3M in-kind)

National Research Center for Resource Recovery & Nutrient Management



Mostly funded by U.S. EPA (National Priorities Federal Funding) ($2.22M from EPA + $1.15M in-kind)

LIFT Technology Focus Areas:

- Biological Nutrient Removal
- Phosphorus Recovery

LIFT-TEP Deammonification Workshop
Dec 11-12, 2012 Chicago

1. Technology provider presentations
2. Networking reception
3. Deammonification education sessions
4. Facility owner information sharing on pilots/demos
5. Pilot plant tour

LIFT
Leaders Innovation Forum for Technology

WE&RF Subscribers through shared knowledge, risks and costs, e.g., TCRs

Growing WE&RF – ROI examples (leveraging funding): TCRs and Partnerships

- WE&RF led-research typically provides 4-to-1 return-on-investment (ROI) (every $1 invested generates $4 in matching funds & in-kind contributions). Partnerships, Collaborations, and Alliances help leverage our resources to produce more research. Examples include:
  - *"Design and Implementation of Peracetic Acid for Municipal Water and Wastewater Related Processes"* – >$200,000 in TCR funding from 12+ Utility Subscribers and NACWA
  - *"Balancing Flocs and Granules for Activated Sludge Process Intensification"* – Unsolicited Research project with >$1.75 million in-kind and cash contributions from 10 Subscribers from around the world, for <$120,000 in WE&RF funding
  - *"LIFT Utility Assessment and Improvement Methodology"* – >$900,000 in TCR funding from >12 Utility Subscribers to map business processes to enhance utility management
  - *"Workforce Skills of the Future"* – WE&RF is providing AUS $45,000 towards a global study on the skills needed for the Utility of the Future, with the Water Services Association of Australia (WSAA) providing AUS $70,000
  - *"Compendium of Sensors and Monitors and Their Use in the Global Water Industry"* – WE&RF led GWRC research project (~$980,000) with 8 funding partners contributing $200,000
  - WE&RF is collaborating with the National Science Foundation (NSF) to provide $160,000 for three new Treatment Intensification research projects with NSF providing $845,000 in additional funds

Collaborative Research Funding Partnerships - 2017

- US DOE – $1.5M for demo of “Genifuel” project
- WRC – First international LIFT HUB (South Africa)
- NSF – co-digestion workshop
- CA State Water Resources Control Board - $4.5M grant for recycled water research

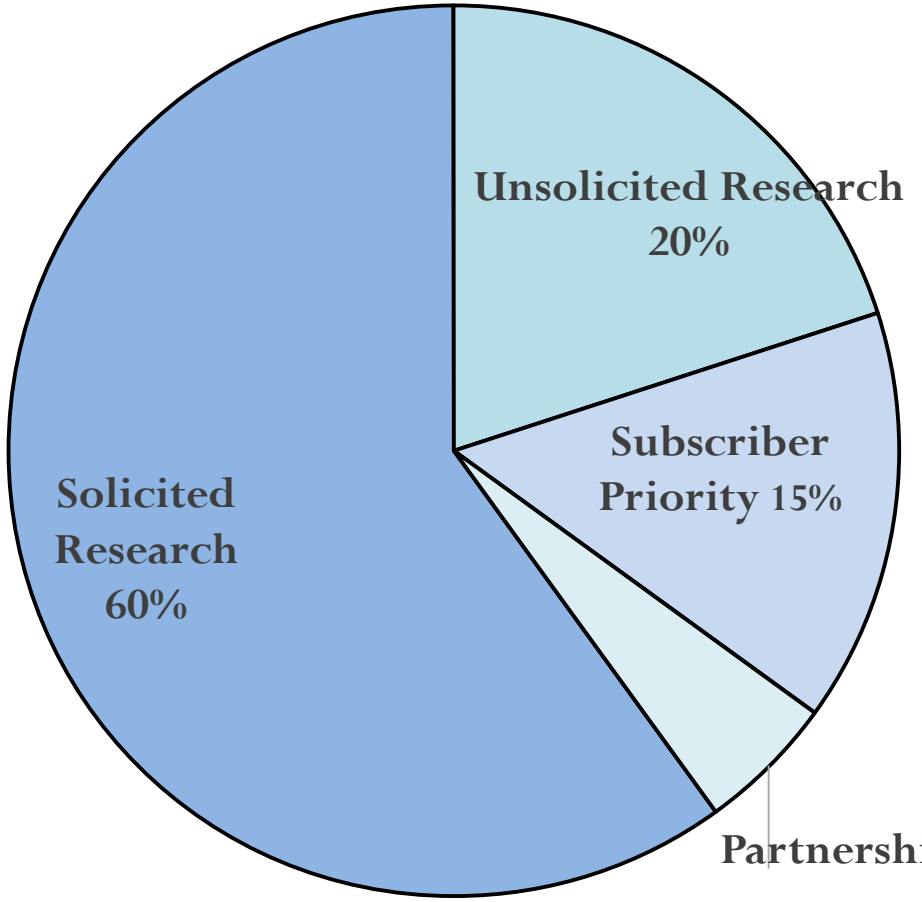
Additional Funding Partners:

- MetroVancouver
- Xylem
- Pentair
- GWRC and members
- WSAA (Australia)
- Singapore PUB
- Water Research Foundation

Various Research Programs

Solicited Research	• Primary program representing 60% of research budget • Addresses high-priority, multi-year research needs identified by Subscribers
Unsolicited Research	• Represents 20% of research budget • Seeks to fund innovative research which will significantly advance knowledge and scientific understanding that could provide fundamentally transformative results
Subscriber Priority	• Represents 15% of research budget • Provides Subscribers and opportunity to develop projects that address the need for applied research that would benefit the broader water community
Research Partnership	• Accounts for 5% of research budget • Collaboration with government agencies and nonprofit organizations to conduct research on broad-based issues consistent with WE&RF research agenda
Tailored Collaborative Research (TCR)	• Does not require WE&RF financial contribution • Leverages WE&RF research management expertise to serve Subscribers or teams of utilities with project management and guidance in raising project funding

WE&RF Research Programs and Funding

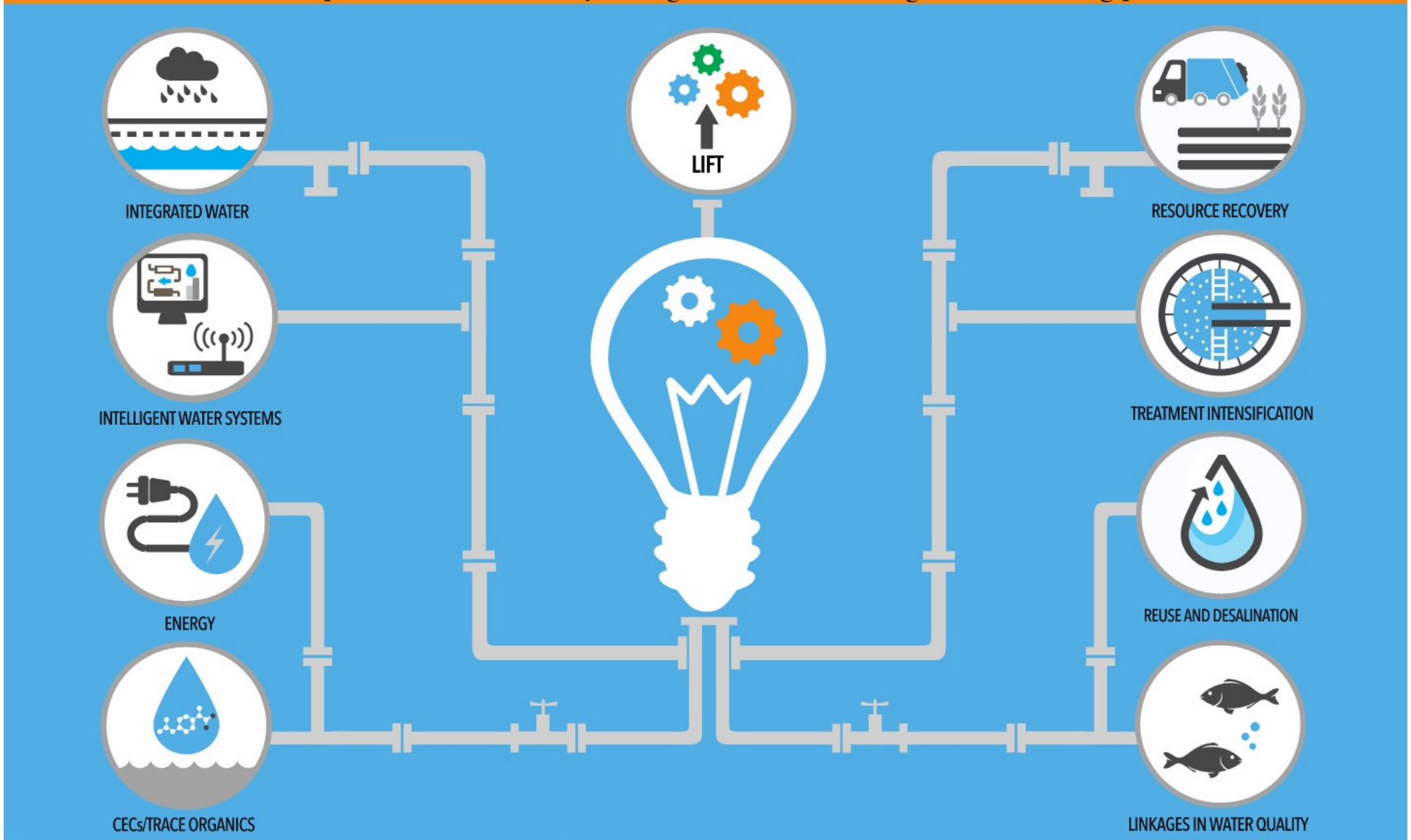


Solicited Research – specific RFPs; targeted areas
Unsolicited Research – annual RFP; any area
Subscriber Priority – annual RFP; any area; requires matching funds
Research Partnership – board-advised fund for collaborations; rolling deadline
Tailored Collaborative – no dedicated budget; rolling deadline; WE&RF provides fundraising support and management

See all opportunities: http://www.werf.org/a/o/Funding.aspx

WE&RF RESEARCH PORTFOLIO

Interim portfolio (2017), may change >2018 after long-term visioning process



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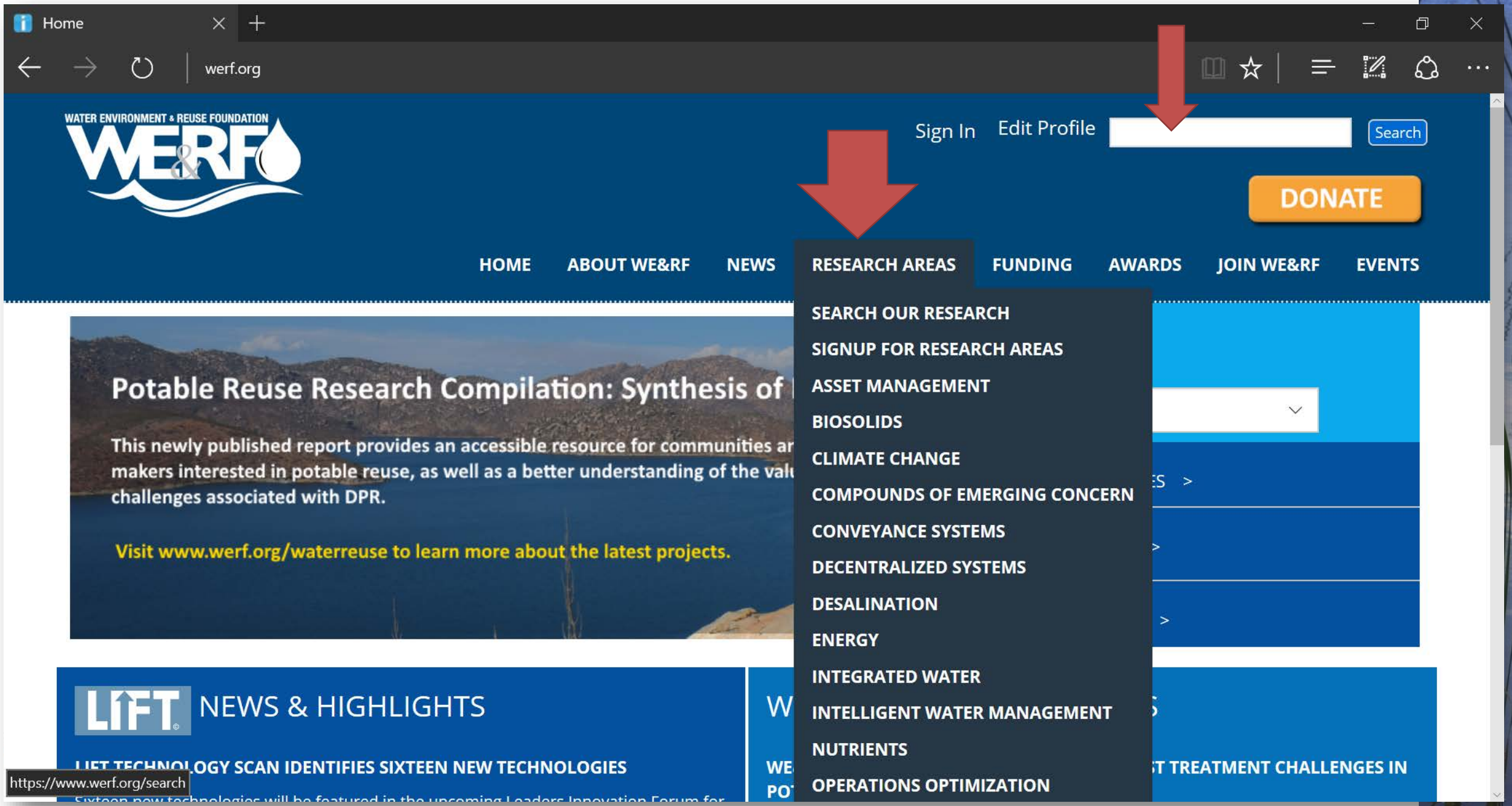
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SIGNUP FOR RESEARCH AREAS
ASSET MANAGEMENT
BIOSOLIDS
CLIMATE CHANGE
COMPOUNDS OF EMERGING CONCERN
CONVEYANCE SYSTEMS
DECENTRALIZED SYSTEMS
DESALINATION
ENERGY
INTEGRATED WATER
INTELLIGENT WATER MANAGEMENT
NUTRIENTS
OPERATIONS OPTIMIZATION
Potable Reuse Research Compilation: Synthesis of
This newly published report provides an accessible resource for communities ar
makers interested in potable reuse, as well as a better understanding of the valu
challenges associated with DPR.
Visit www.werf.org/waterreuse to learn more about the latest projects.
LIFT NEWS & HIGHLIGHTS
LIFT TECHNOLOGY SCAN IDENTIFIES SIXTEEN NEW TECHNOLOGIES
https://www.werf.org/search

What is LIFT?

WEF/WE&RF initiative to accelerate innovation and help move new water technologies into practice

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the water quality people®

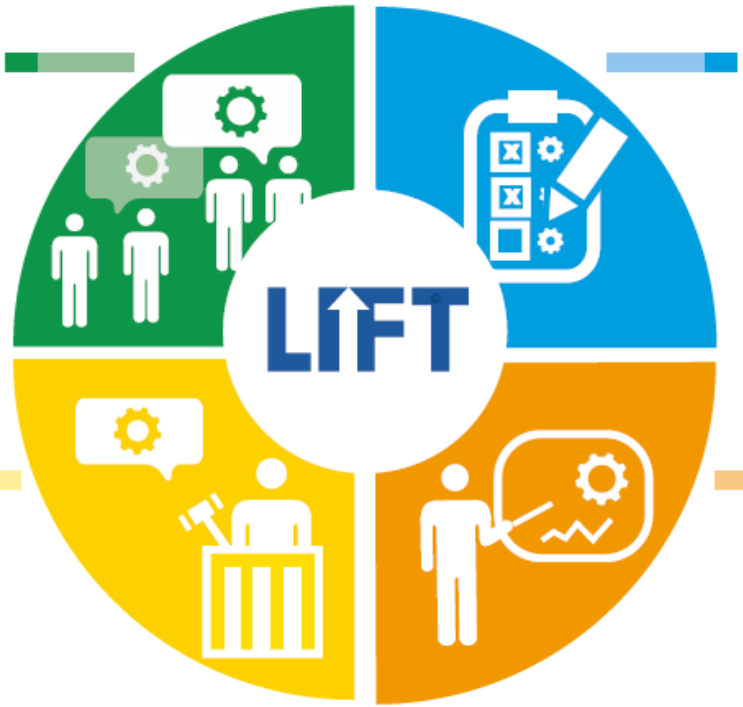
WATER ENVIRONMENT & REUSE FOUNDATION
WE&RF

LIFT
Leaders Innovation Forum for Technology

LIFT'S TECHNOLOGICAL, SOCIAL, AND REGULATORY/POLICY ASPECTS

INFORMAL FORUM
Provides outlet for R&D managers to share experiences, activities, and interests

TECHNOLOGY EVALUATION
Identifies, screens, evaluates, and demonstrates new technologies



PEOPLE & POLICY
Informs policy to remove barriers and facilitate technology adoption

COMMUNICATION
Provides training, education, and outreach related to new technologies

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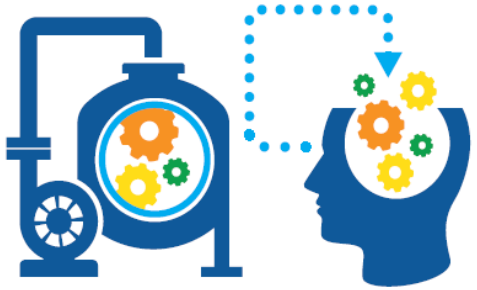
LIFT 101

Technology Survey

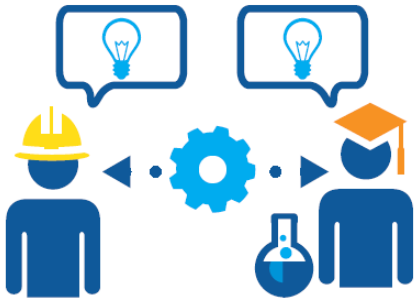
Technology Scans

LIFT Link

FAST Water Network



SEE IT



University-Utility Partnership

Utility Peer Network

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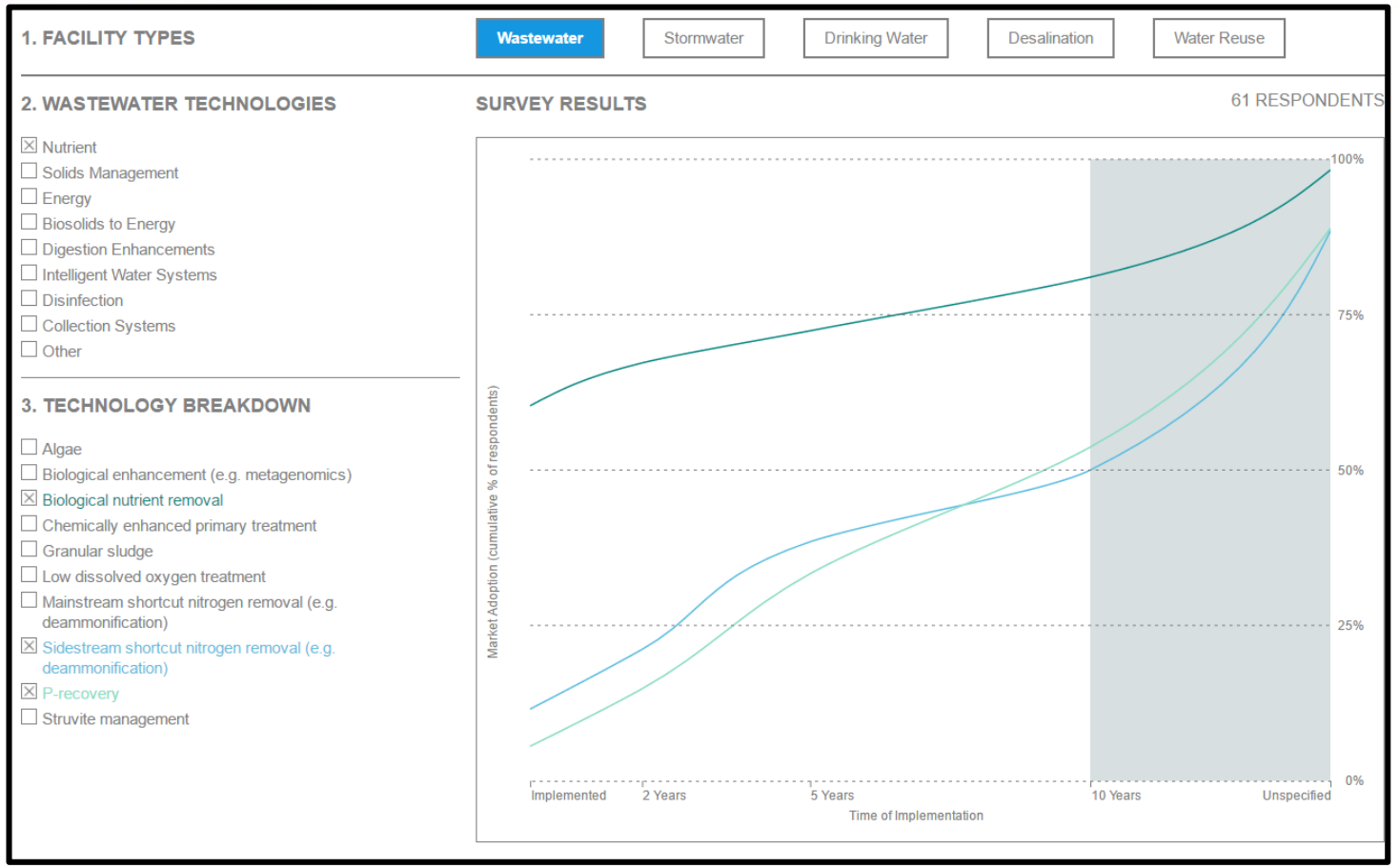
2017 Water Technology Survey

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

****Just Released****

- Deeper understanding of industry direction and peer's activities
- 90 responses received to date regarding 100+ types of technology
- Survey to stay open through 2017, please invite utilities to participate



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Technology Scans

LIFT© Technology Scans 3-Step Process


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111 Technologies
103 Companies
BIOFORCETECH Corporation
CLEARWATER CONTROLS
Anaergia
BASWOOD
WesTech
Wavve
VEOLIA
CAMBI
Because it matters
HydroFLOW U.S.A.
PAVER GUIDE
Genifuel
Microvi
Tellus Utilities
agent solutions
DOOSAN
RONGINEER
TROJAN technologies
AMERICAN WATER
PICA
Pipeline Inspection and Condition Analysis (USA)Corp.
Lystek
CLEAR COVE
CLEAN ENERGY. CLEAN WATER.
inCTRL SOLUTIONS
suez
arisdyne systems
BIOSOL
Opti
PRIME SOLUTION
Saltworks
Optimatics
PLAN SMARTER
NEPTUNE DIAGNOSTICS
Royal HaskoningDHV
Enhancing Society Together
BIO MICROBICS
aquisense technologies
NuReSys
OXYMEM
SMART AERATION
PASTEURIZATION
TECHNOLOGY GROU
NOP ENERGY
OVIVO
RainGrid
DYNAFLOW, INC.
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PARJANA
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Advanced Biological Services
Environmental Pollution Prevention and Control
ABS, Inc
AYYEKA
cnp
RENEWABLE NUTRIENTS
ScFi
SMARTER ENVIRONMENTAL TECHNOLOGIES
HACH
UCONN
UNIVERSITY OF CONNECTICUT
Emefcy
invest-e
evoqua
WATER TECHNOLOGIES
algae systems
World water works
Clean Water and Energy from Wastewater
BioCHEM TECHNOLOGY, INC.
Nutrient Recovery & Upcycling
ElectroCell Technologies
HAZEN AND SAWYER
Environmental Engineers & Scientists
IN-PIPE TECHNOLOGY
novozymes
centrisys
CENTRIFUGE SYSTEMS
AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company
SciCORP
SCICORP INTERNATIONAL CORP.
CLEARAS
WATER RECOVERY
TerraSolve, LLC
C&B EQUIPMENT
OSTARA
BKT
Water & Energy
STARBURST INNOVATION
Vorsana
RADIAL COUNTERFLOW SOLUTIONS
BLUEWATER
SATELLITE, INC
emnet
KORE
INFRASTRUCTURE
SCHREIBER
Pure Ingenuity
PAQUES
PERLEMAX
FORWARD
WATER TECHNOLOGIES
InfoSense, Inc
epic cleantec
MANGO MATERIALS
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EDI
BLUEWATER BIO
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2017 LIFT Scan Webinar Series

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

Topic	Technologies	Date
Early-Stage Technologies	Milli-electrode Array, PaverGuide, Cold Plasma, SAF-MBR	October 10th

Other topics include: Water Reuse/Disinfection,Intelligent Water Systems, P-Recovery, Nutrients, Collection Systems, Odor Control, and Decentralized Systems

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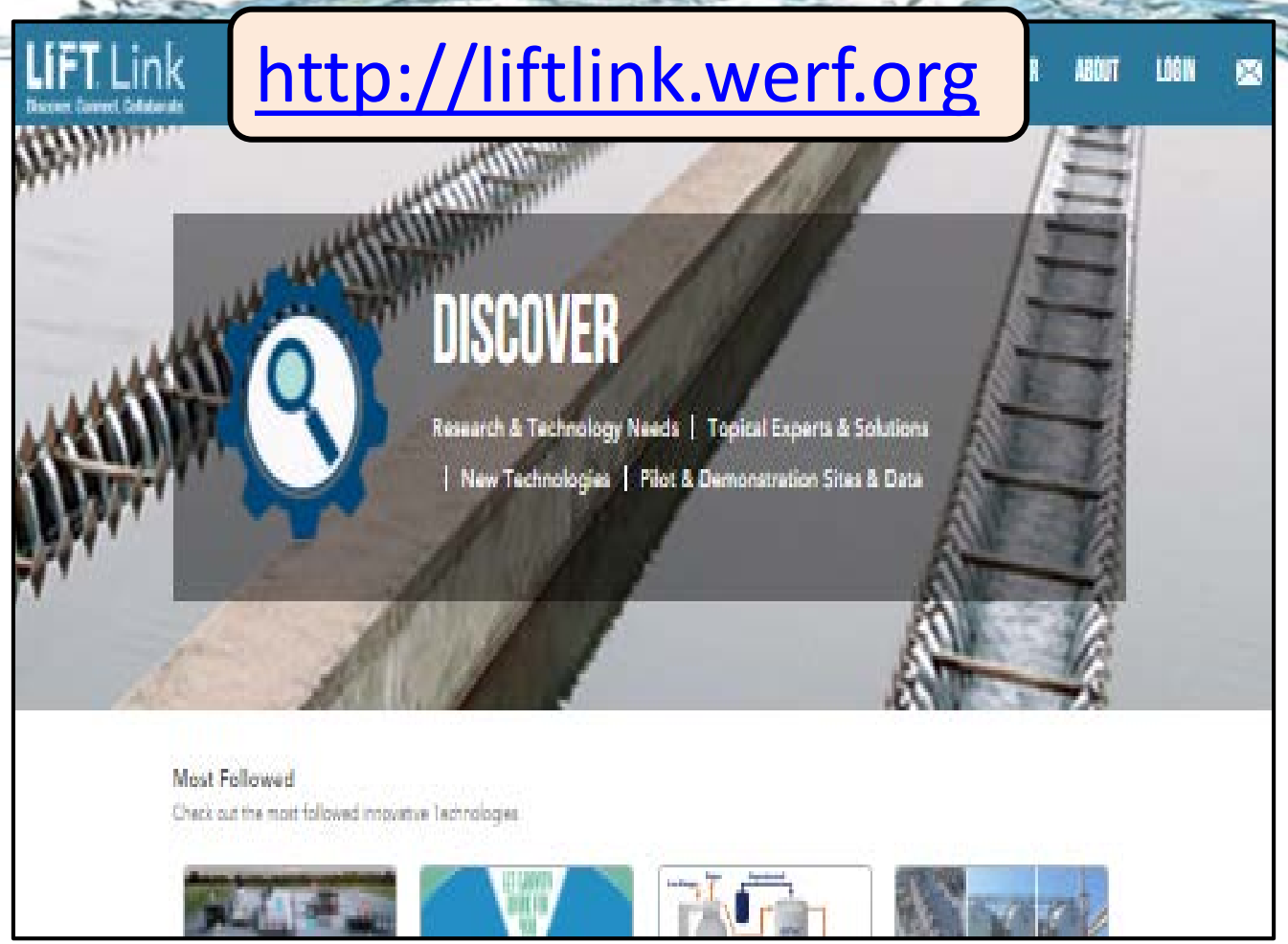
LIFT Link

Discover

Collaborate

Connect



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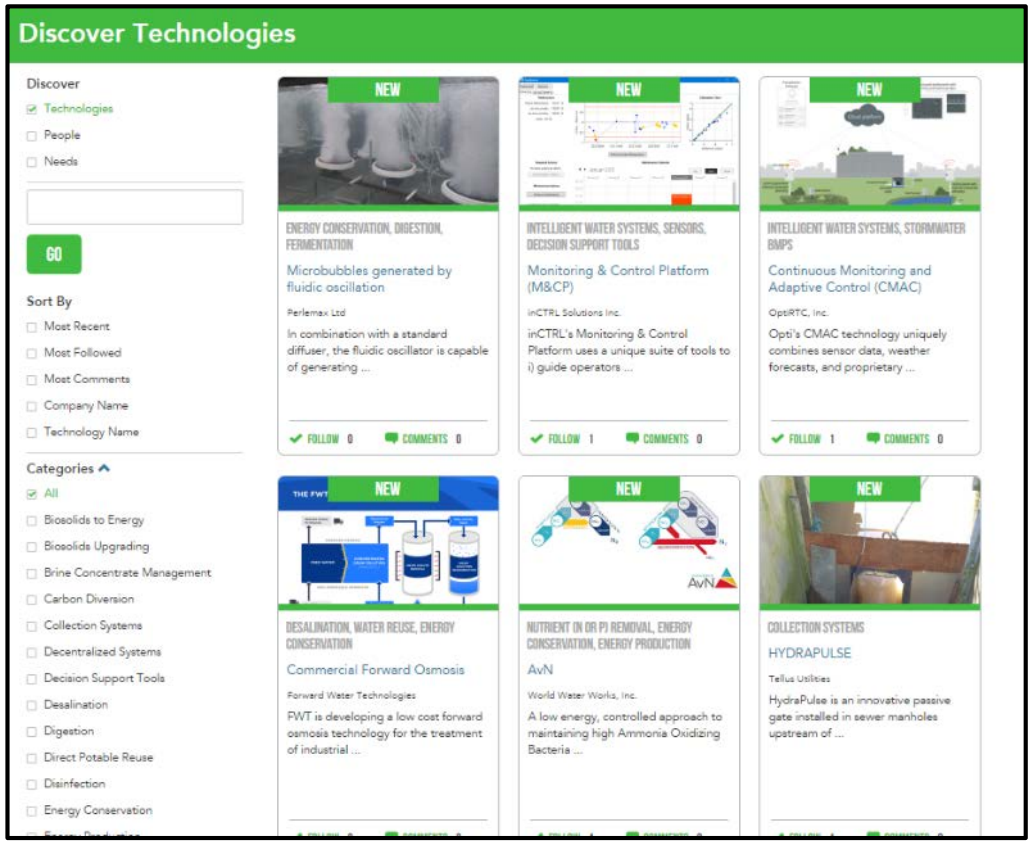
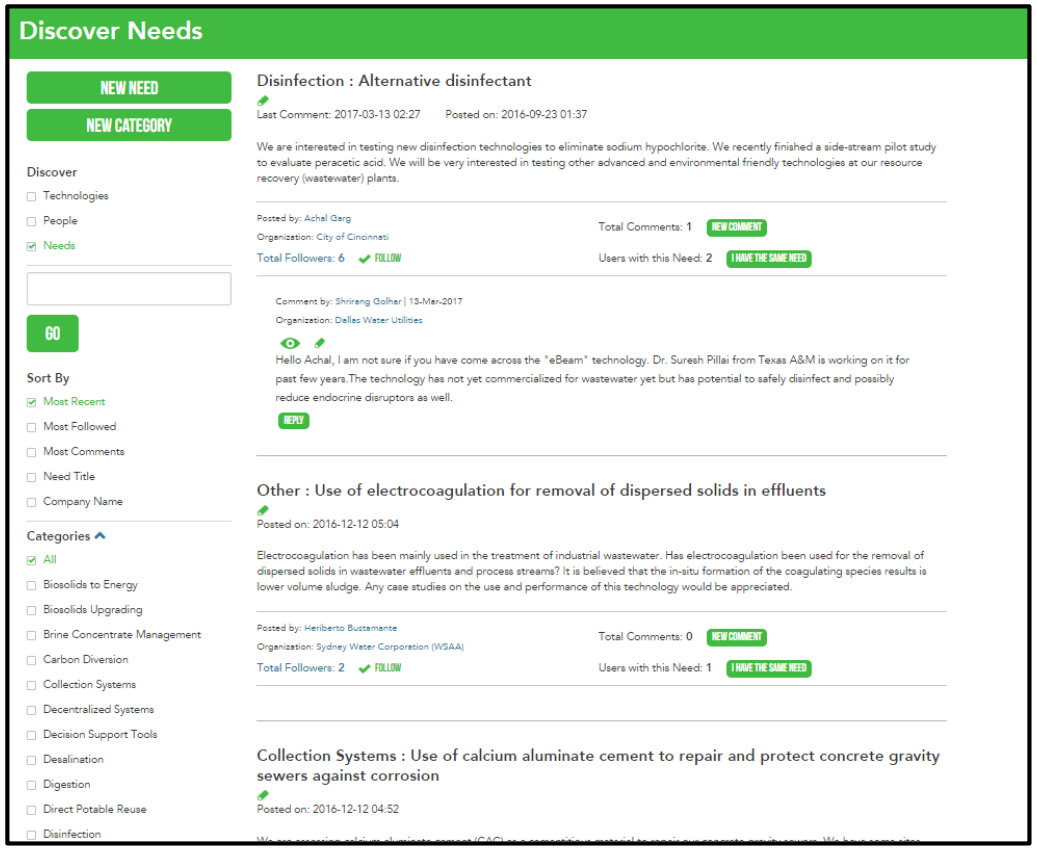
Discover Innovation

Discover Technologies



Discover Needs



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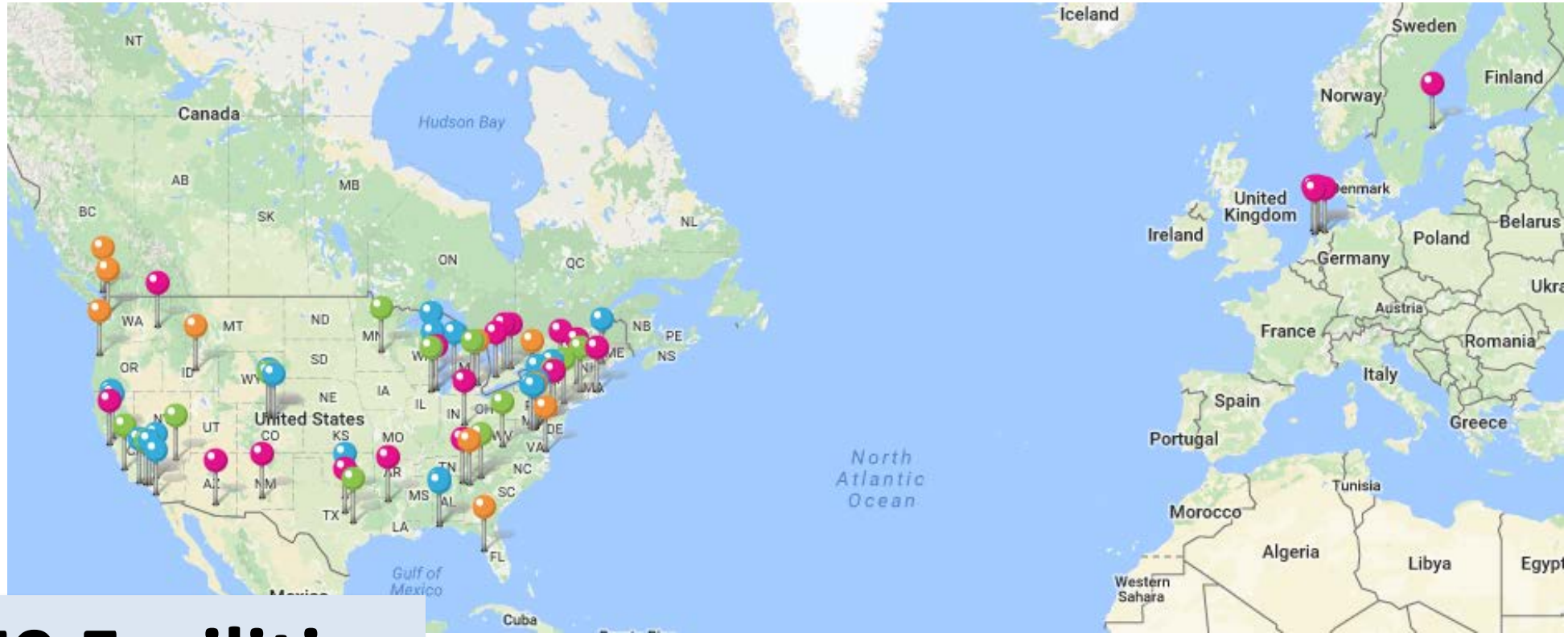
FAST Water National Test Bed Network

- Steering Committee

www.werf.org/testbednetwork

- Planning Partners

FAST Water Directory



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

70 Facilities

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www.werf.org/testbeddirectory

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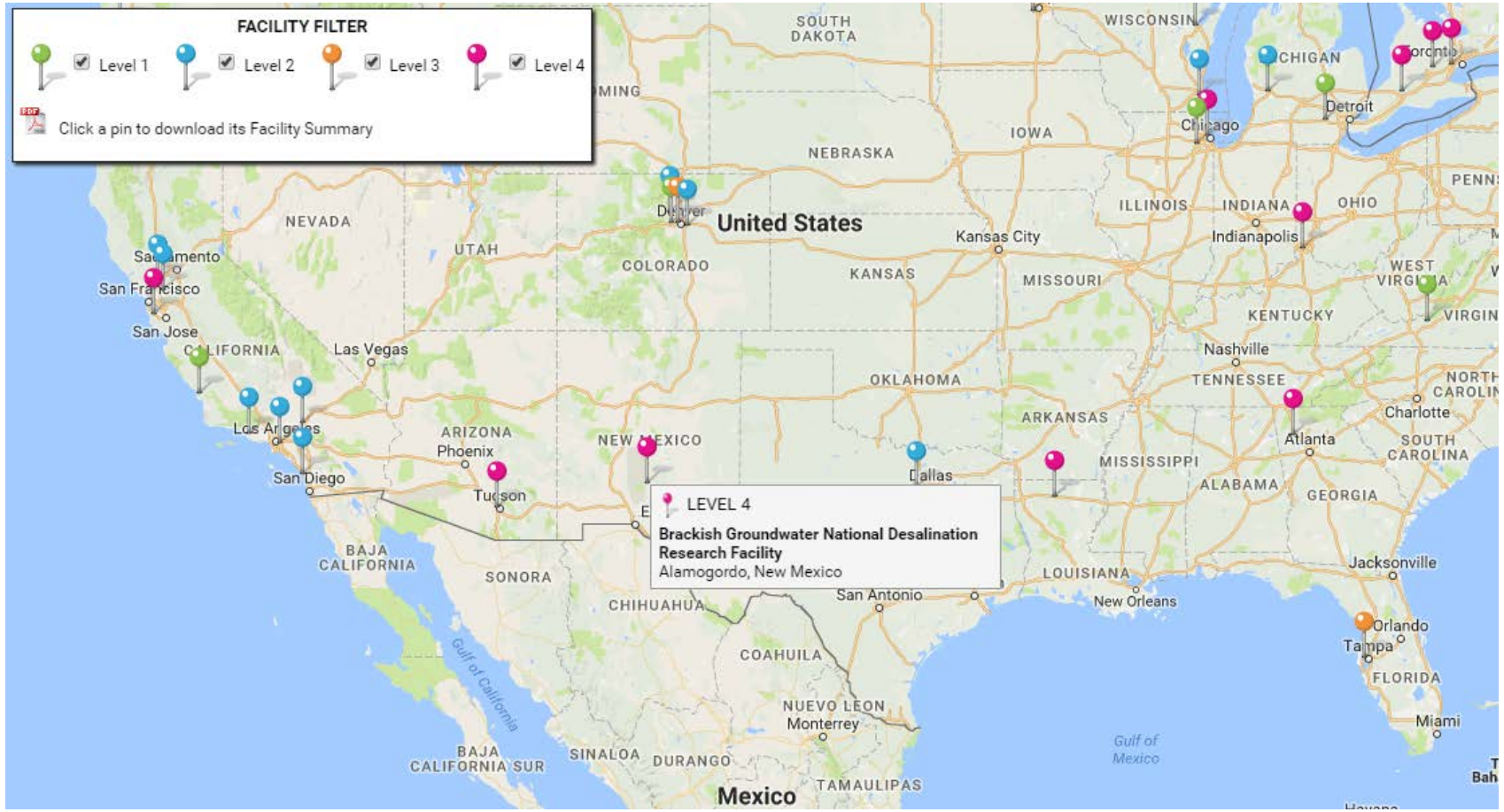
Facility Details



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Collaboration. Innovation. Results.

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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.
	The BGNDRF staff operate and maintain the facility. The Water Treatment Group in the Denver Reclamation office provide desalination technic[illegible] assistance upon request. The

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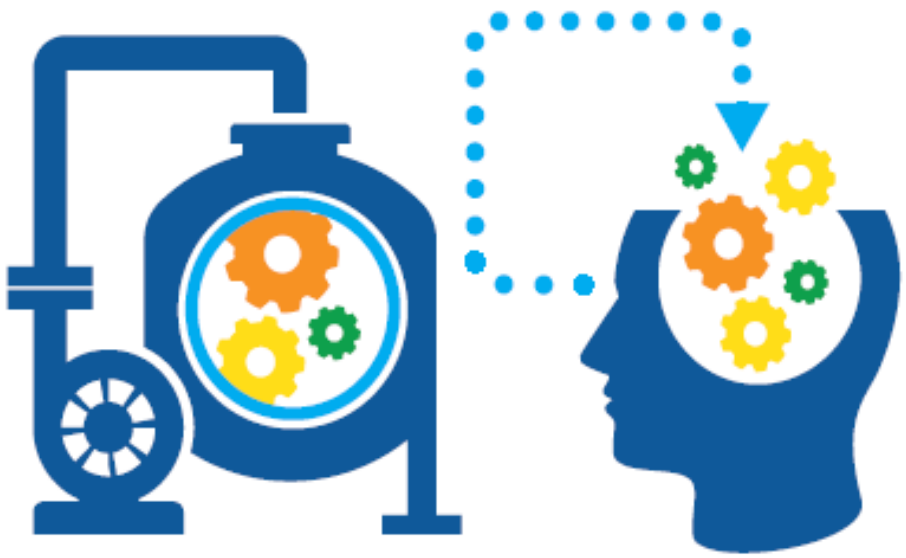

- Scholarship Exchange Experience for Innovation and Technology
- WE&RF, NACWA, WEF Partnership
- $30,000 in Travel Scholarship Funds
- 11 Utilities Awarded in 2017
- 2018 Program Open: Apply by Dec 15

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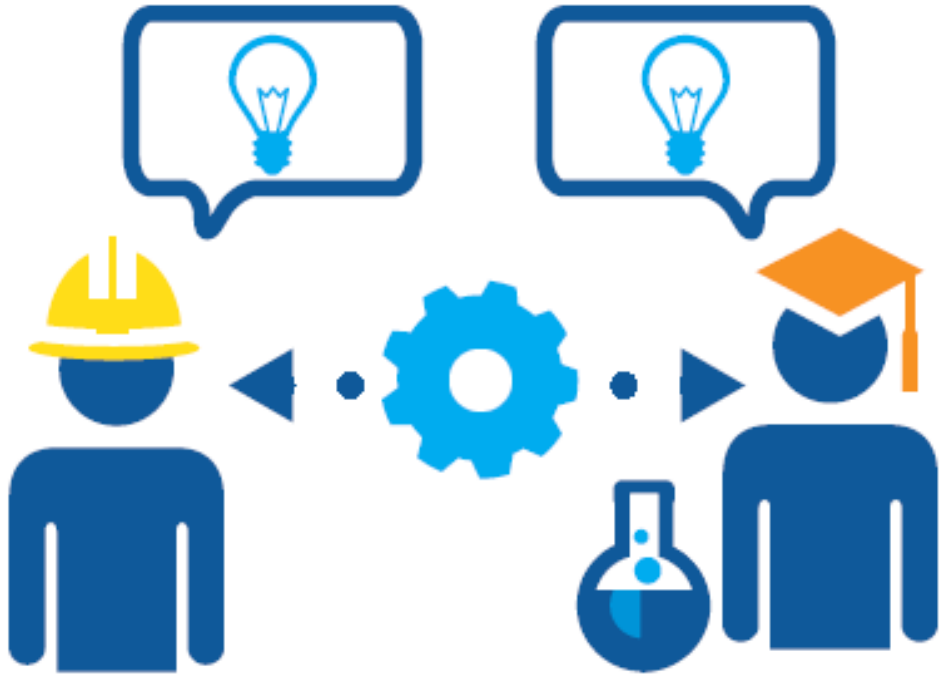
University-Utility Partnerships Program

Benefits:

- Practical Experience for Students
- Low-Cost, Targeted R&D for Utilities
- Patent Opportunities
- Workforce Training, Talent Identification

Activities:

- How-To Guidance Manual
- Case Studies
- Workshops / Web Meetings
- Matchmaking



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Utility Peer Innovation 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 Documents
  - Collaborative Demonstration Projects

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Utility Technology Focus Groups

1. Biological Nutrient Removal
2. P-Recovery
3. Digestion Enhancements
4. Biosolids to Energy
5. Energy from Wastewater
6. Collection Systems
7. Green Infrastructure
8. Small Facilities
9. Odor Control
10. Disinfection
11. Water Reuse
12. Intelligent Water Systems

New in 2017

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Collaborations for RDD&D

Utilities

Universities

Consultants

NGOs

Others

Federal Agencies

Financers

Technology Providers

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Example Collaboration – Hydrothermal Processing Technology

Phase 0- $230k

- proof-of-concept at PNNL
- 10 utilities

Phase 1- $2.5M (50/50 DOE cost-share)

- validation, planning, and FEED (front-end engineering and design)
- 18 utilities, 1 refinery, 1 utility

Phase 2 (planned)- $15M (50/50 DOE cost-share)

- construction and piloting of a 3 dry ton/day facility at Central Contra Costa (CA)

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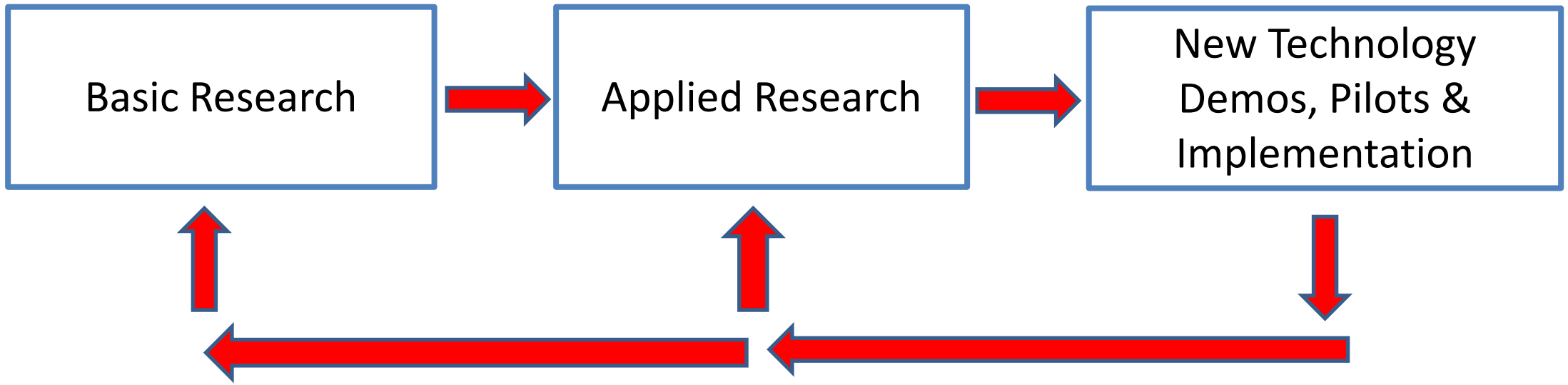
Integration of WE&RF Research & Innovation Programs



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LIFT Hubs and Affiliates

- Facilitate an international network for new technology identification, demonstration, and deployment.
- Advance innovative technology in their region.
- Benefit from LIFT resources, tools, and global cooperation.

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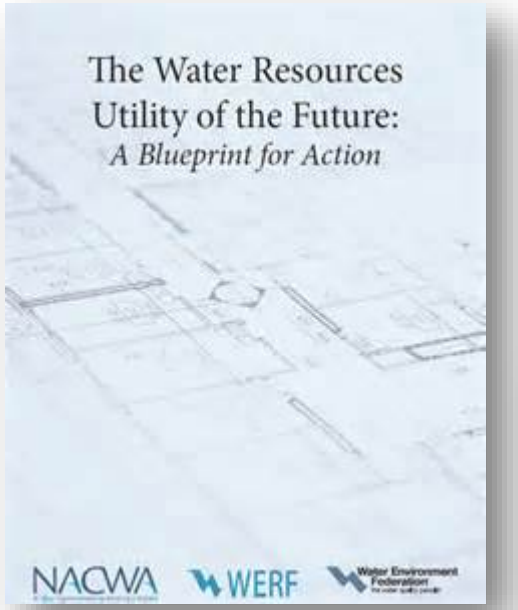
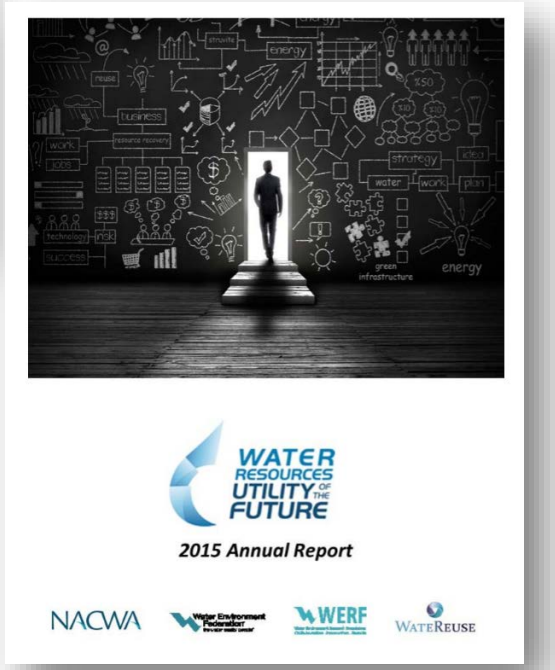
“Utility of the Future”





PAST

collect wastewater, move it quickly downstream, treat it to acceptable standards, and dispose of waste without harming the environment

FUTURE

manage resources to generate value for the utility and its customers, improve environmental quality with the least cost to the community, and contribute to the local economy

WATER ENVIRONMENT & REUSE FOUNDATION
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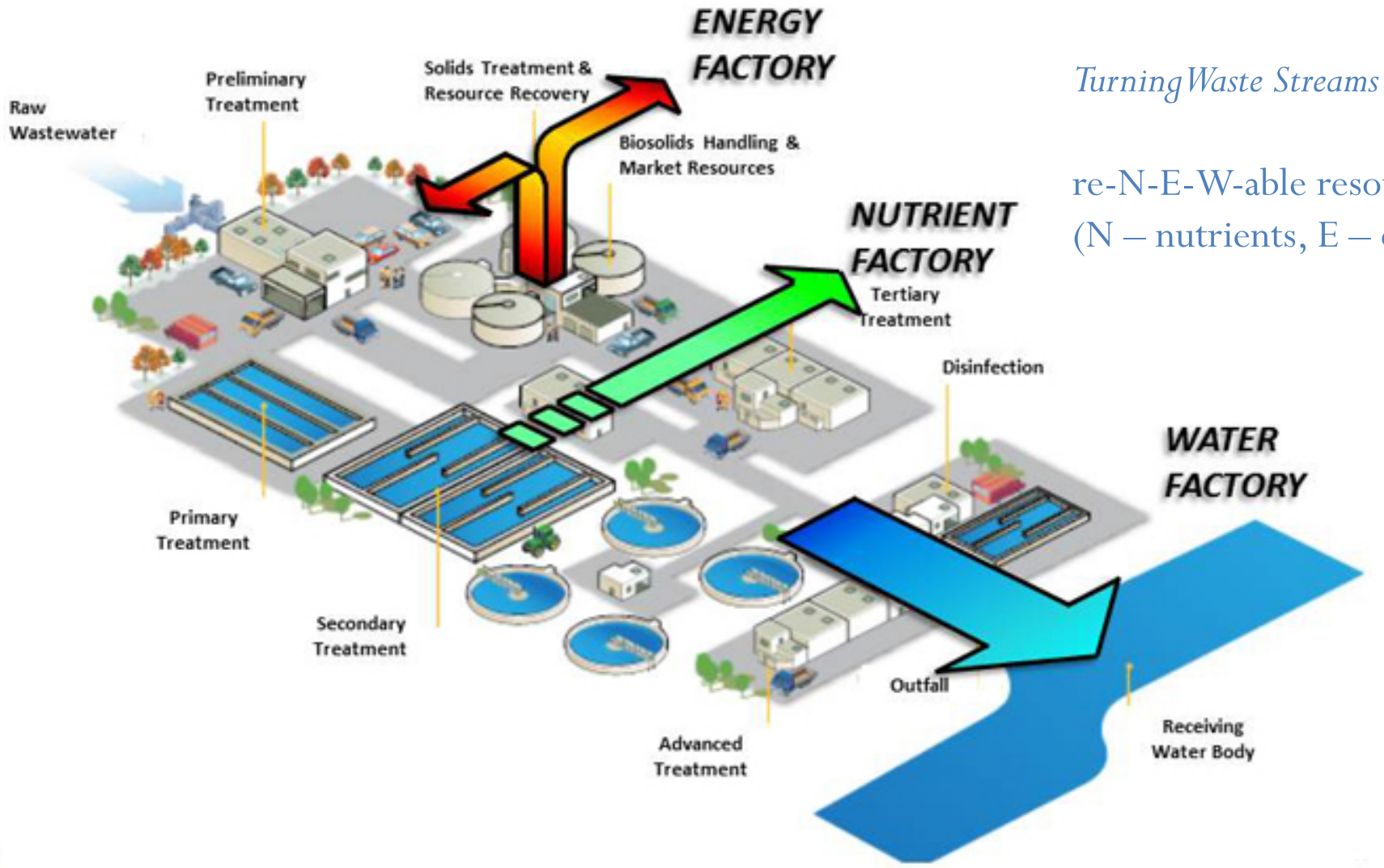
The Utility of the Future:
Recovering Resources



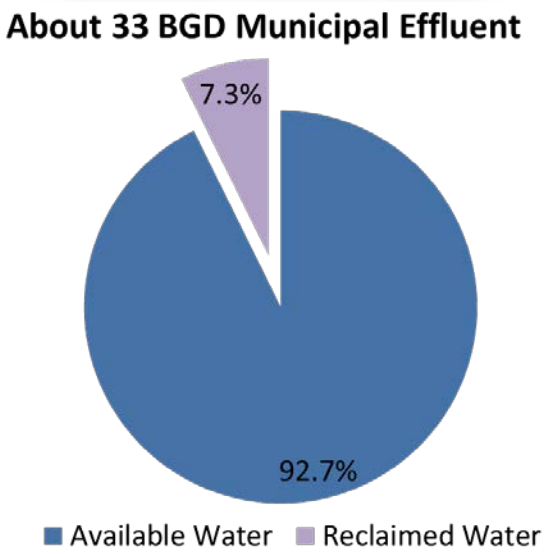
WRRF – Water Resource Recovery Facility

Turning Waste Streams to Value Streams

re-N-E-W-able resource extraction
(N – nutrients, E – energy, W – water)

Resource Recovery – Water Reuse: Global Progress

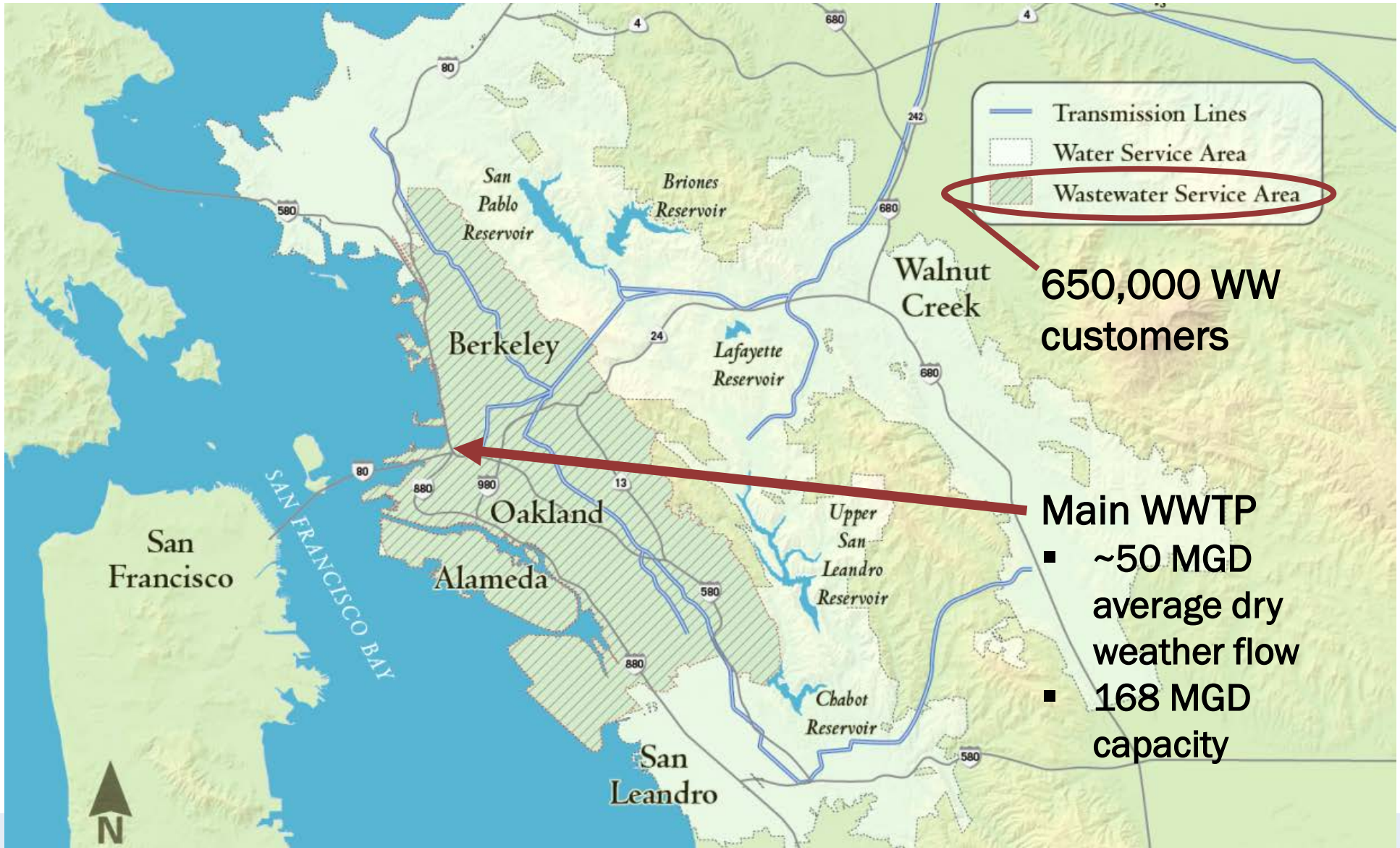
- Israel reuses over 70% of its wastewater
- Singapore reuses 30% with plans to double that by end of 2060
- Australia reuses 8%, has a national goal of 30%
- U.S. reuses about 7% and growing
  - Agriculture
  - Business and Industry
  - Community
  - Drinking – Indirect and Direct Potable Reuse



https://www.werf.org/c/KnowledgeAreas/WaterReuse/ProductsToolsnonWERF/Global_Connections_Map_Reuse_101.aspx

Resource Recovery – Kobe, Japan – CNG Fleet

EBMUD Background
Service Area



EBMUD Background
Excess Digestion Capacity

- 11 in-service anaerobic digesters (1.8 MG each)
- Canneries facility was designed to serve: 20
- Remaining canneries: 0

R2 Program Overview
Trucked Waste

- Began accepting trucked waste in 2002
- 4,000 trucks/month
- 20 million gallons/month non-hazardous liquids
- Trucked wastes received 24-7, 365 days/year

2002 Septage Receiving $1M

2004 Solid-Liquid Receiving $7M

2014 Blend Tank Receiving $13M

R2 Program Overview
Renewable Energy Generation

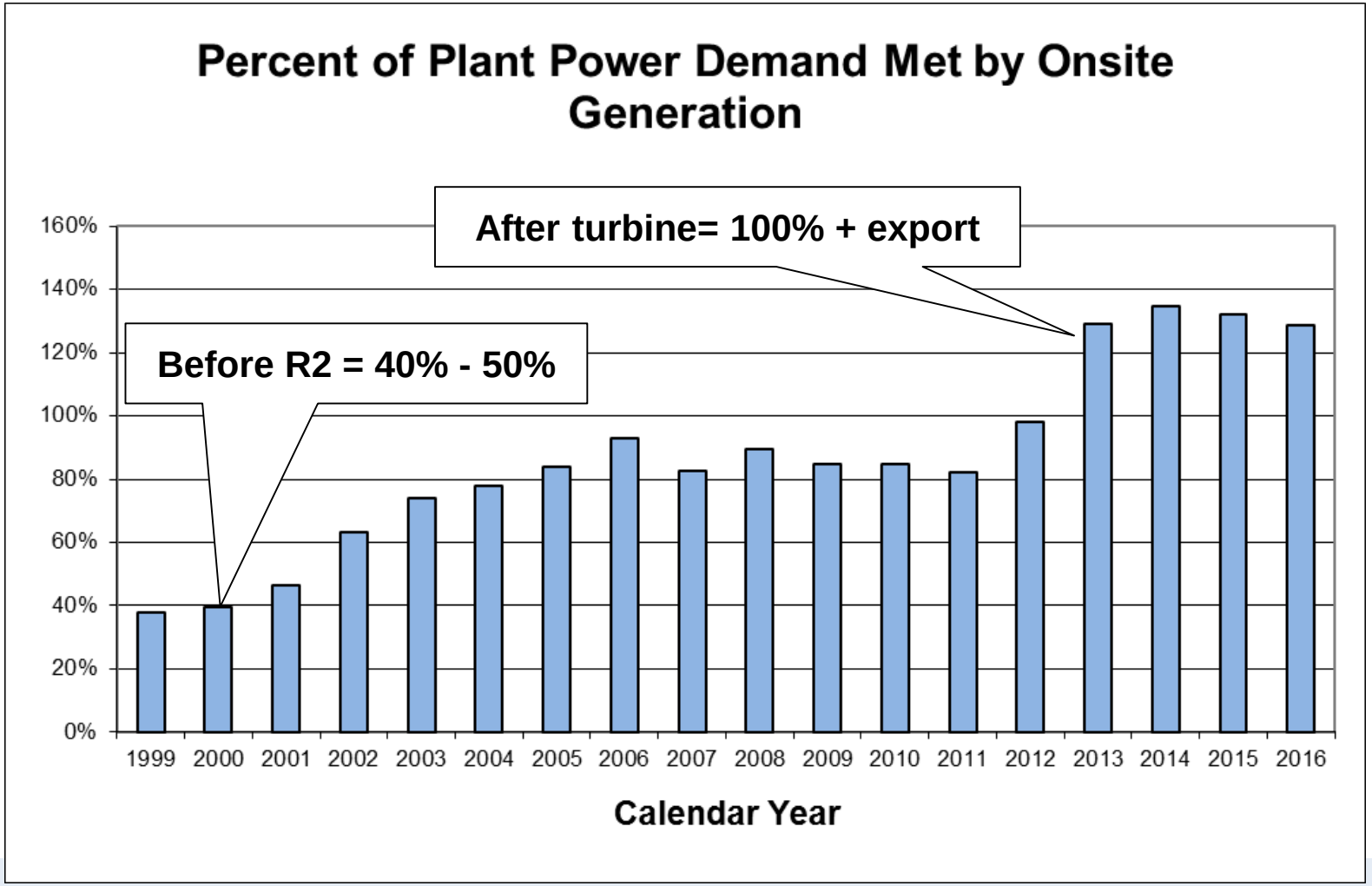
- Savings of ~$2M on plant power costs
- Electricity export revenue of ~$1M/year
- First wastewater treatment plant in N. America to produce more electricity than plant demand

1985 Three 2.2 MW engines

2013 4.5 MW Turbine $13M

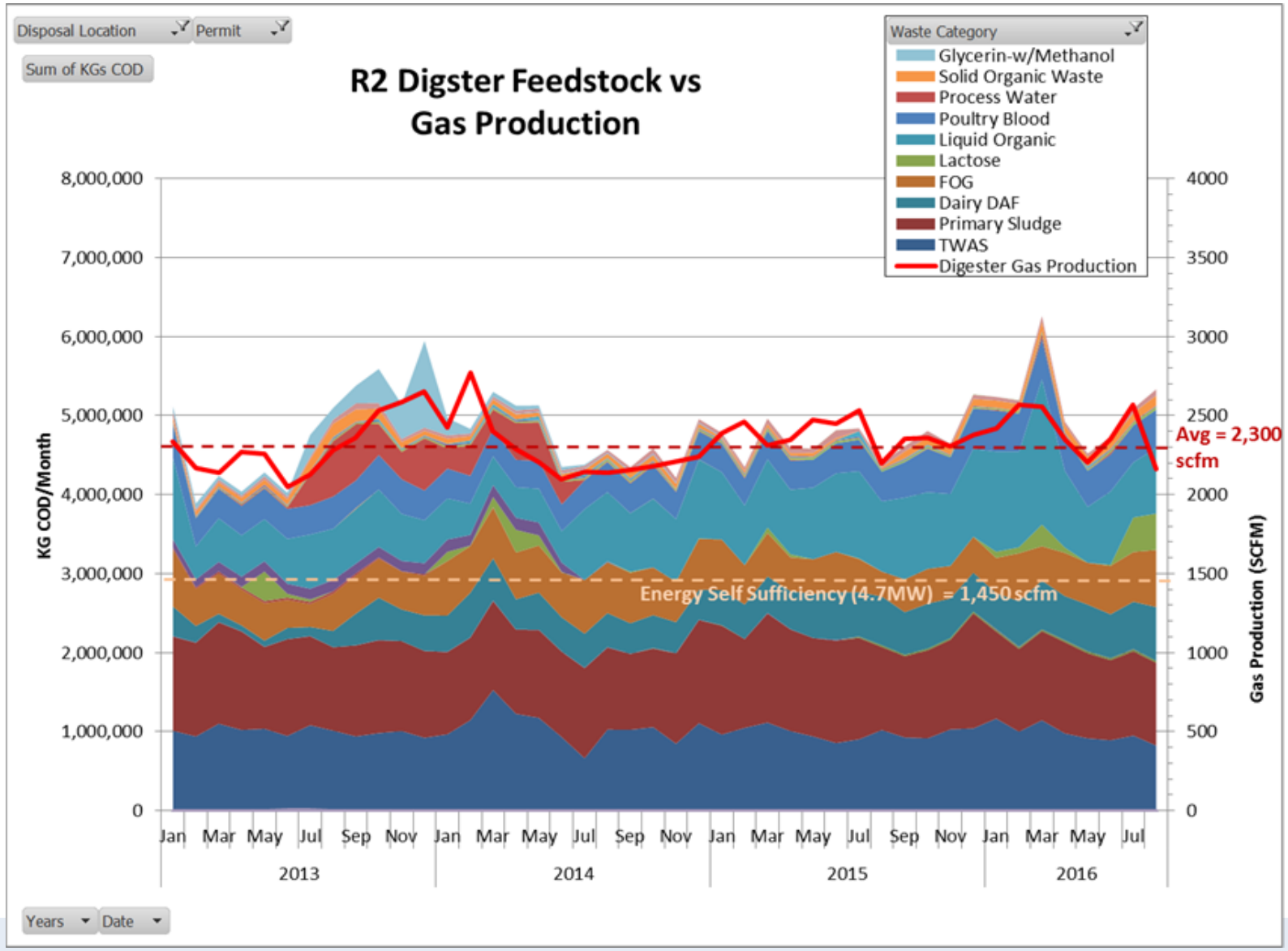
R2 Program Overview
Renewable Energy Generation

% of WWTP demand met by onsite generation



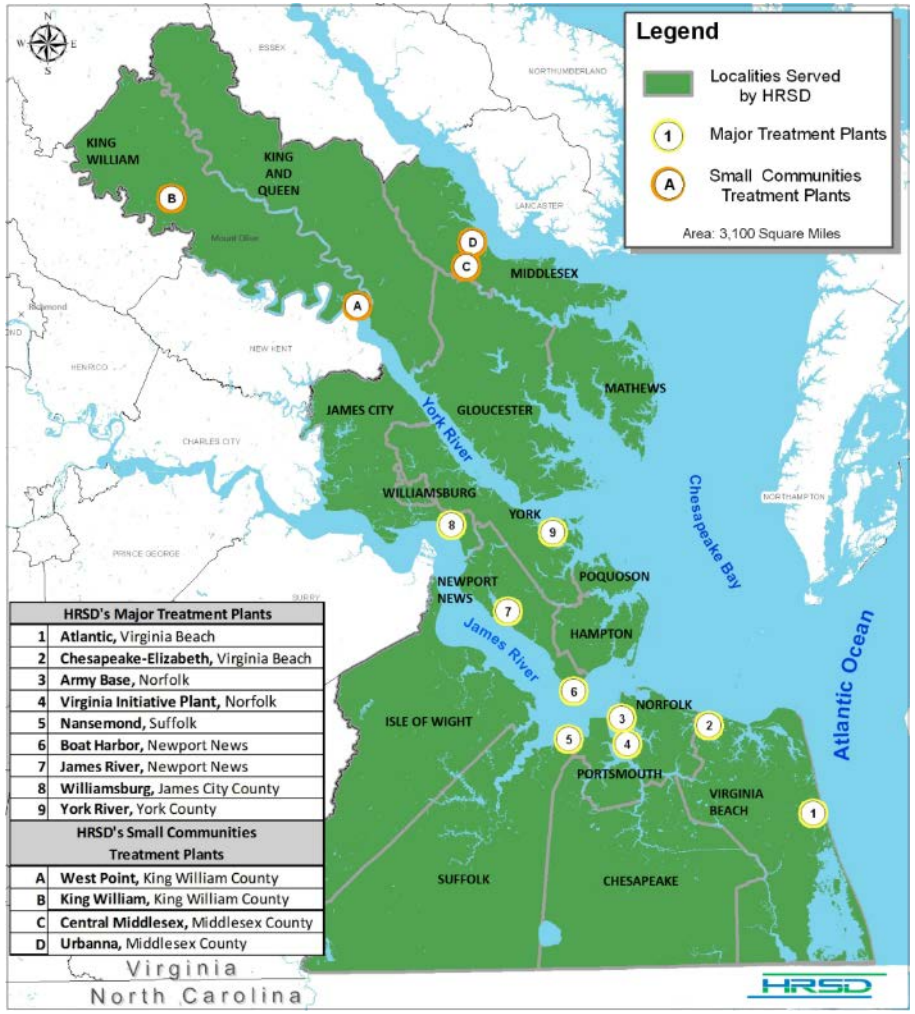
Biogas Production

High Strength Waste Contribution



~2/3 of biogas from R2 wastes

Hampton Roads Sanitation District (HRSD), VA Treatment Plants



HRSD's Major Treatment Plants	
1	**Atlantic,** Virginia Beach
2	**Chesapeake-Elizabeth,** Virginia Beach
3	**Army Base,** Norfolk
4	**Virginia Initiative Plant,** Norfolk
5	**Nansemond,** Suffolk
6	**Boat Harbor,** Newport News
7	**James River,** Newport News
8	**Williamsburg,** James City County
9	**York River,** York County
HRSD's Small Communities Treatment Plants	
A	**West Point,** King William County
B	**King William,** King William County
C	**Central Middlesex,** Middlesex County
D	**Urbanna,** Middlesex County

Atlantic (54 mgd)

Virginia Initiative Plant (40 mgd)

Nansemond (30 mgd)

Boat Harbor (25 mgd)

Army Base (18 mgd)

Chesapeake Elizabeth (24 mgd)

Williamsburg (22.5 mgd)

James River (20 mgd)

York River (15 mgd)

West Point (.6 mgd)

Central Middlesex (.025 mgd)

Urbanna (.1 mgd)

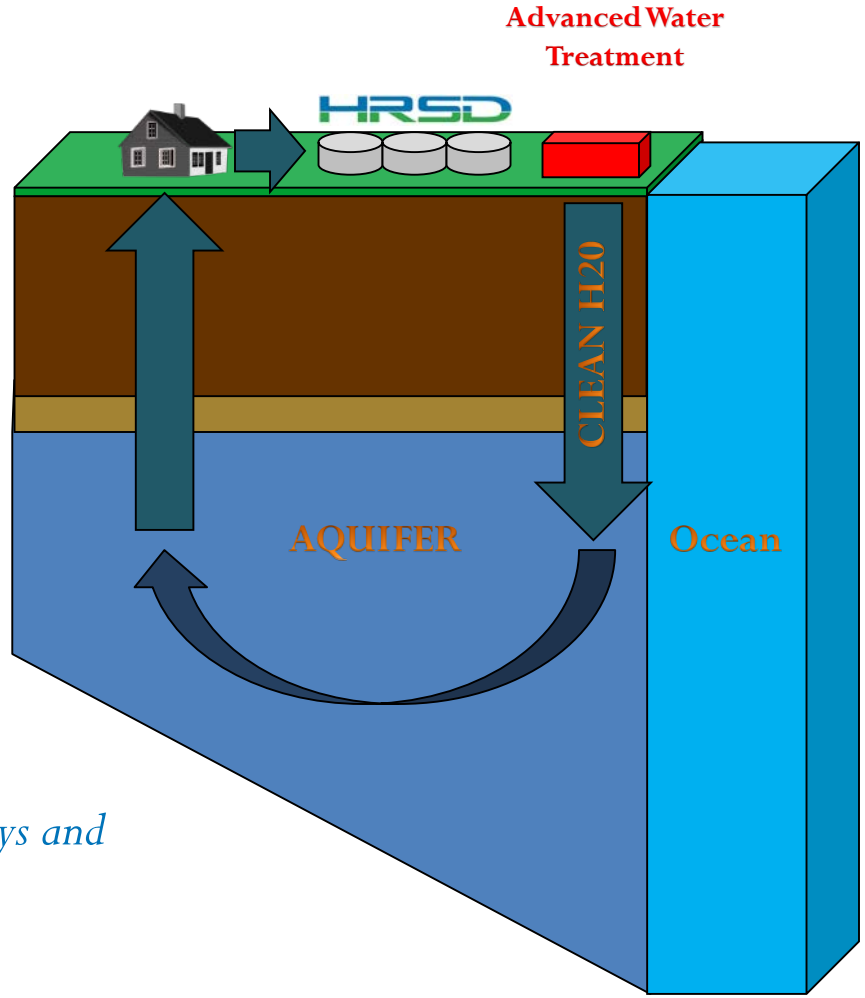
King William (.05 mgd)

Water Issues Challenging Virginia and Hampton Roads

- Restoration of the Chesapeake Bay
  - Harmful Algal Blooms
  - Localized bacteria impairments
  - Urban stormwater retrofits (cost and complexity)
- Adaptation to sea level rise
  - Recurrent flooding
- Depletion of groundwater resources
  - Including protection from saltwater contamination
- Wet weather sewer overflows
  - Compliance with Federal enforcement action

swift Sustainable Water Initiative for Tomorrow

- Treat water to meet drinking water standards and replenish the aquifer with clean water to:
  - Provide regulatory stability for wastewater treatment
  - Reduce nutrient discharges to the Bay
  - Reduce the rate of land subsidence
  - Provide a sustainable supply of groundwater
  - Protect the groundwater from saltwater contamination



Future generations will inherit clean waterways and

be able to keep them clean.

thenifin@hrsd.com
http://www.swiftva.com

WATER ENVIRONMENT & REUSE FOUNDATION WE&RF

The Virginian-Pilot

UPTO $148

Can your sinks and toilets fight sea-level rise?

Virginia GOP asks state to cancel "loyalty oath"

Daily Press

SUNDAY, OCTOBER 11, 2015

GROUNDWATER DRAIN: A BIG-DOLLAR DILEMMA

PENINSULA CITIES IN ECONOMIC DOLDRUMS

Facing sluggish job growth, defense cuts, region fares poorly in national rankings

Groundwater water level decreases

HRSD doesn't want to waste wastewater

By Dave Mayfield
The Virginian-Pilot

SEAFORD

Ted Henifin crouched next to a floor drain at the Hampton Roads Sanitation District's York County treatment plant. Into his palm ran a soft stream of clear water – clean enough, probably, to drink. But the lab results aren't back to confirm that. So, Henifin will hold off before he sips. Waiting isn't exactly Henifin's style these days. He has dived into a project to prove that HRSD can turn what Hampton Roads flushes down

recycled

The sanitation district wants to launch a $1 billion, decadelong project that would refill the region's aquifers with treated wastewater.

See WASTE, PAGE 10

NO WASTING WATER

Following the lead of other regions, local plant tries treating wastewater

By Dave Ress
dress@dailypress.com

SEAFORD — With a sip of specially treated wastewater, Hampton Roads Sanitation District general manager Ted Henifin put his mouth where his money is — what could be a $1 billion effort to replenish eastern Virginia's rapidly shrinking pool of groundwater.

A pilot program at the agency's York River Treatment Plant shows it is possible to clean the water Hampton Roads residents flush out of their homes and businesses so that it is safe to drink, he told a gathering of state and local officials.

Not that he expects anyone will be drinking it any time soon. The plan is to eventually inject 180 million gallons a day of treated water deep underground to begin replenishing the wedge of water-logged sand tapped by wells that serve hundreds of thousands of people and businesses.

They're currently drawing about 300 million gallons a day from those wells, resulting in groundwater levels in parts of eastern Virginia dropping 200 feet over the past century.

Online

See more photos and video at dailypress.com.

See WATER/Page 8

Top: Process engineering and research manager Chris Wilson is reflected in a window displaying the first step of the carbon-based advanced water treatment process at a conference at the York River Treatment Plant Thursday. Above: HRSD general manager Ted Henifin holds a glass of purified water during the conference at the plant.

JONATHAN GRUBER/DAILY PRESS PHOTOS

STEVE EARLEY | THE VIRGINIAN-PILOT

Ted Henifin, Hampton Roads Sanitation District general manager, vowed to take the first gulp of HRSD's treated wastewater. He made good on his promise Thursday.

Sip shape

Hampton Roads Sanitation District's treated sewage water tastes great, say officials, and could shore up the area's sea level rise and bay cleanup issues

By Dave Mayfield
The Virginian-Pilot

YORK COUNTY

Earlier this year, as the Hampton Roads Sanitation District ramped up plans to make its wastewater clean enough to drink, general manager Ted Henifin vowed he'd take the first gulp.

On Thursday at the HRSD's York County treatment plant, Henifin made good on the promise, leading dozens of employees and invited guests in downing glasses of water that came from a sewage stream fed by sinks and toilets.

"Great!" he proclaimed after his first sip. "Ahhh."

To Henifin, it was no mere stunt. It was an early demonstration of the potential for an ambitious initiative to turn what goes down Hampton Roads'

See HRSD, BACK PAGE

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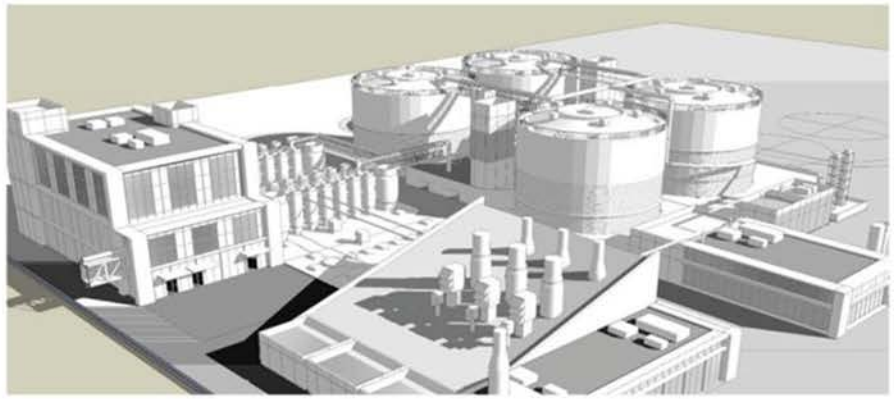
Resource Recovery

Reinventing Biosolids

at DC Water

DC's Blue Plains AWF Biosolids Facility



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dc water is life

NUTRIENTS and CARBON RECYCLING

FARMING

SILVICULTURE

RECLAMATION

URBAN RESTORATION

dc water is life

BLUE PLAINS ADVANCED WASTEWATER TREATMENT PLANT: A RESOURCE RECOVERY FACILITY

water • nutrients • carbon • energy

dcwater.com/biosolids

GREEN ENERGY BIORENEWABLES

THERMAL HYDROLYSIS PROCESS (THP) AND DIGESTION FACILITY

DC Water will be the first in North America to use thermal hydrolysis for wastewater treatment. When completed, this facility will be the largest plant of its kind in the world.

GREEN BENEFITS:

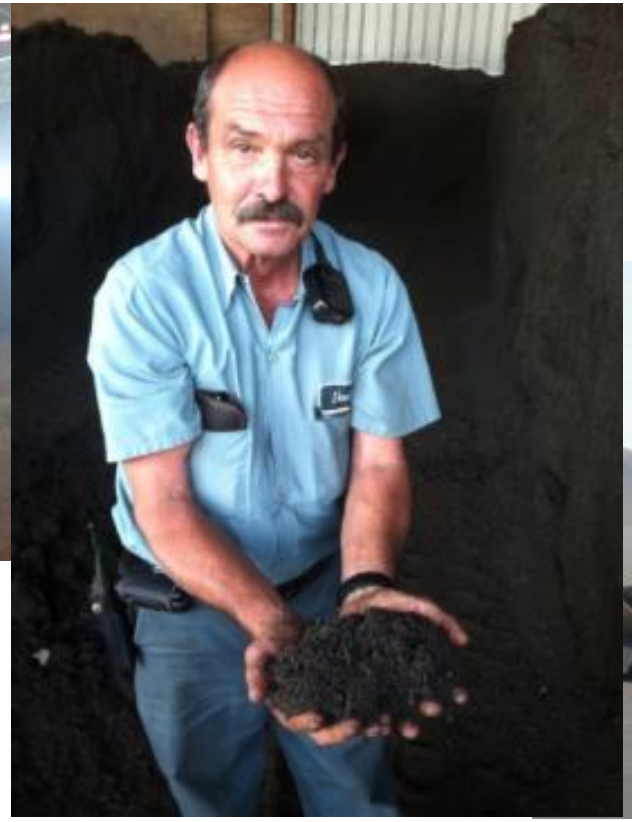
- Produce combined heat and power, generating 13 MW of electricity
- Save DC Water $10 million annually cutting grid demand by a third (DC Water is the largest consumer of electricity in the District)
- Reduce carbon emissions by approximately 50,000 metric tons of CO_2e per year.
- Reduce trucking by 1.7 million miles per year.
- Save $10 million in biosolids trucking costs
- Produce Class A biosolids to grow trees, sequester carbon and reduce runoff.

WATER ENVIRONMENT & REUSE FOUNDATION WE&RF

Past Economics of DC Water Biosolids Recycling Program

- Pay a third party ~$43/wt for full service contract (transport, land app, reporting) of Class B biosolids
- $19M/yr program cost =21% of the Blue Plains operating budget
- Delivered free to farmers
- Farmers value product at $300/acre (nutrients, lime, etc.), approximately $15/wt
- Nutrient rebate back to DC Water ($2/wt), $500K/yr designated for research and outreach.
- Value to farmers @ $15/wt, 1200 wtpd = $6,570,000/yr
- We do not extract this value

Composted biosolids: “gateway” material for urban use (Class A)

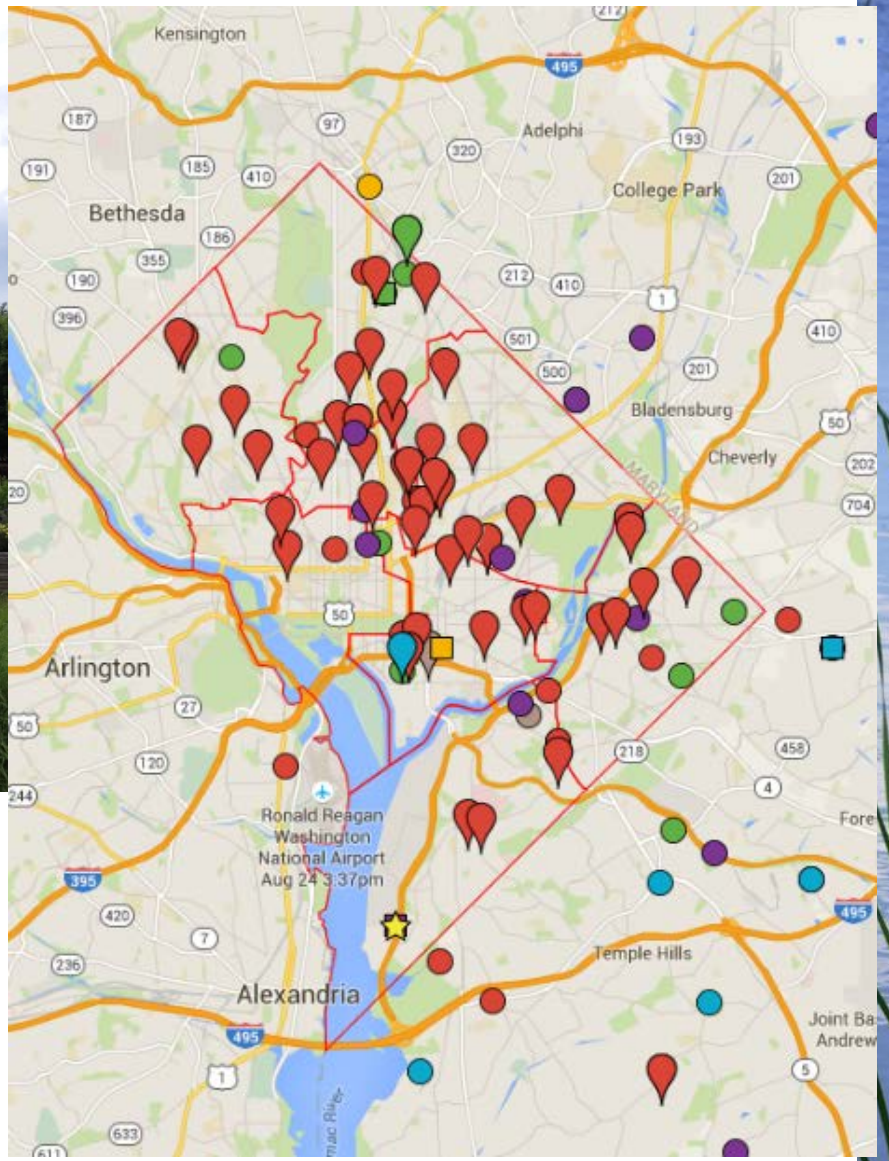


Blue Plains Garden & Compost Giveaway

Urban Gardening Community Outreach

Connecting with the DC Gardening Community

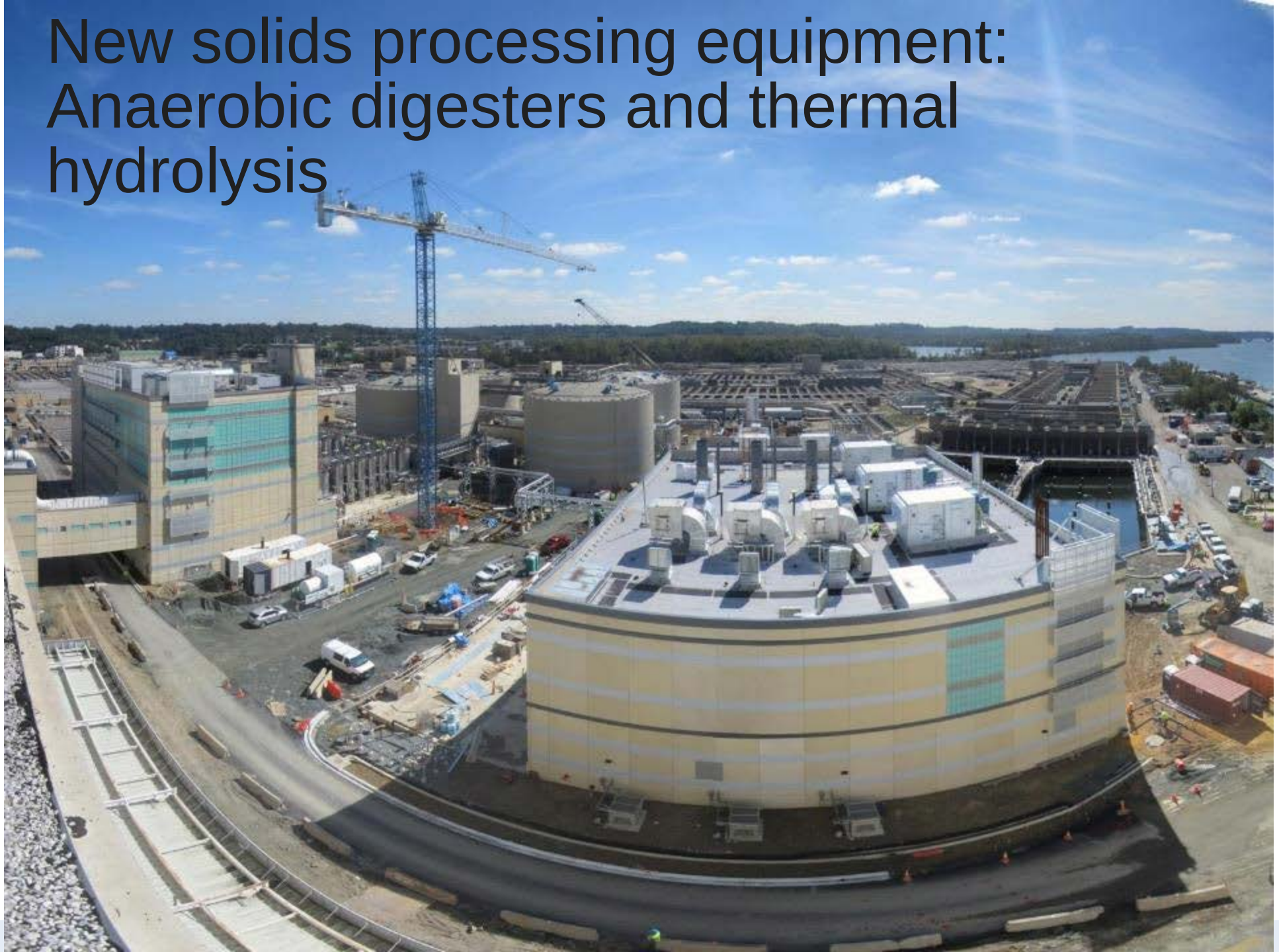
Community Gardens



70+ comm. gardens & tree plantings in all 8 wards (430+ tons)

765+ tons to employees and on-site

New solids processing equipment: Anaerobic digesters and thermal hydrolysis



BLOOM

GOOD SOIL, BETTER EARTH.

dc water is life

Positive feedback from Virginia biosolids opponents

Kama Allen ▸ **Goochlanders Against Sludge**
September 2 ·

Hello from Spotsylvania! Yesterday found our motley crew joining 55th District's Buddy Fowler on a field trip to Blue Plains WWTP in Washington DC, This is the country's largest and most forward-thinking operation in processing waste. They only produce Class A biosolids and all is currently being placed in Virginia.
The first positive thing we've seen on this journey. Many thanks!

Like · Comment · Share

2 people like this. Most Recent

Kama Allen Class B biosolids are so antiquated. Let's insist our magnificent Virginia set the pace rather than accepting yesterday's tired diatribe. Go Goochland. Work today for a better tomorrow!
Like · Reply · 1 · September 2 at 11:51pm

Kathie Walker It was an honor to be invited and I learned so much, thanks to our guides.

Like · Reply · September 12 at 9:57pm

Kathie Walker These are the newly online thermal units which heat up the sludge to three times what hospitals use to sterilize instruments. Pretty neat.
Like · Reply · 1 · September 12 at 10:00pm

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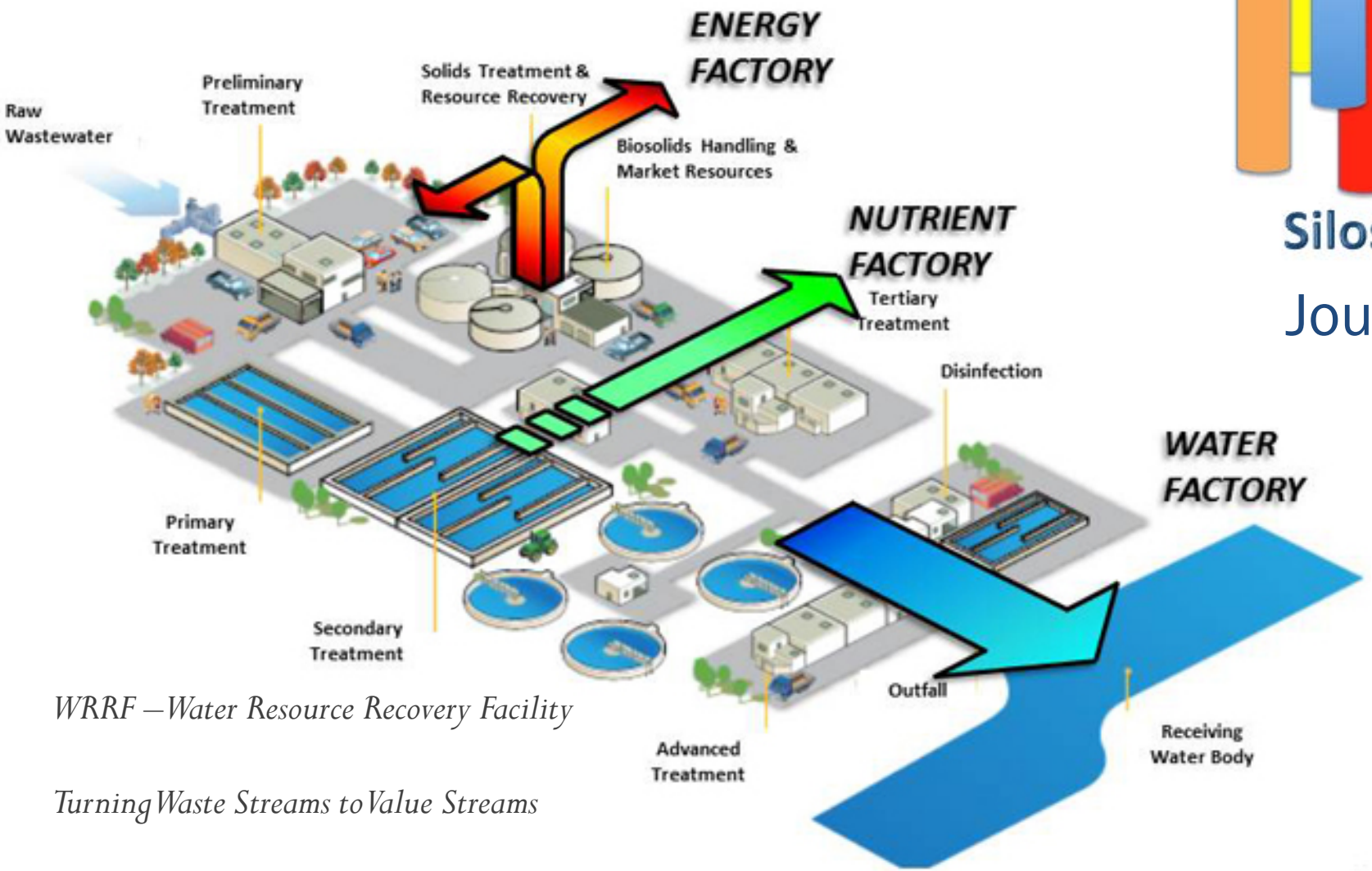
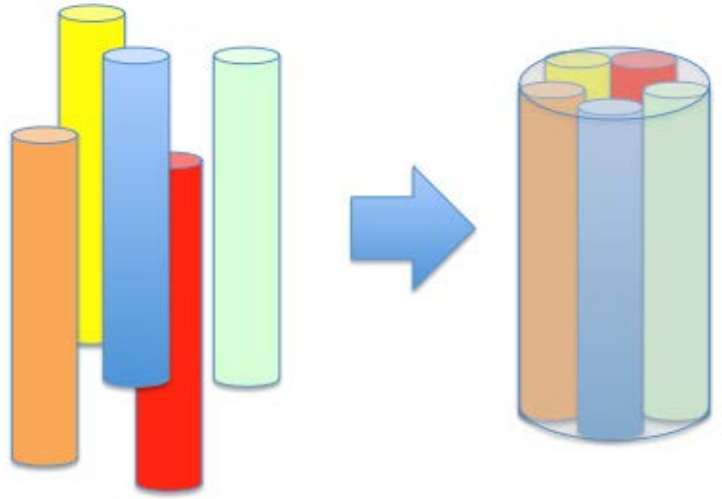
The Utility of the Future:
Recovering Resources





Silos Convergence

Journey to One Water

WRRF – Water Resource Recovery Facility

Turning Waste Streams to Value Streams

Thank you for listening! Questions?

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