LEVERAGING INDUSTRIAL REUSE FOR MUTUAL BENEFIT

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OCTOBER 22, 2024
2:00 ET | 11:00 PT

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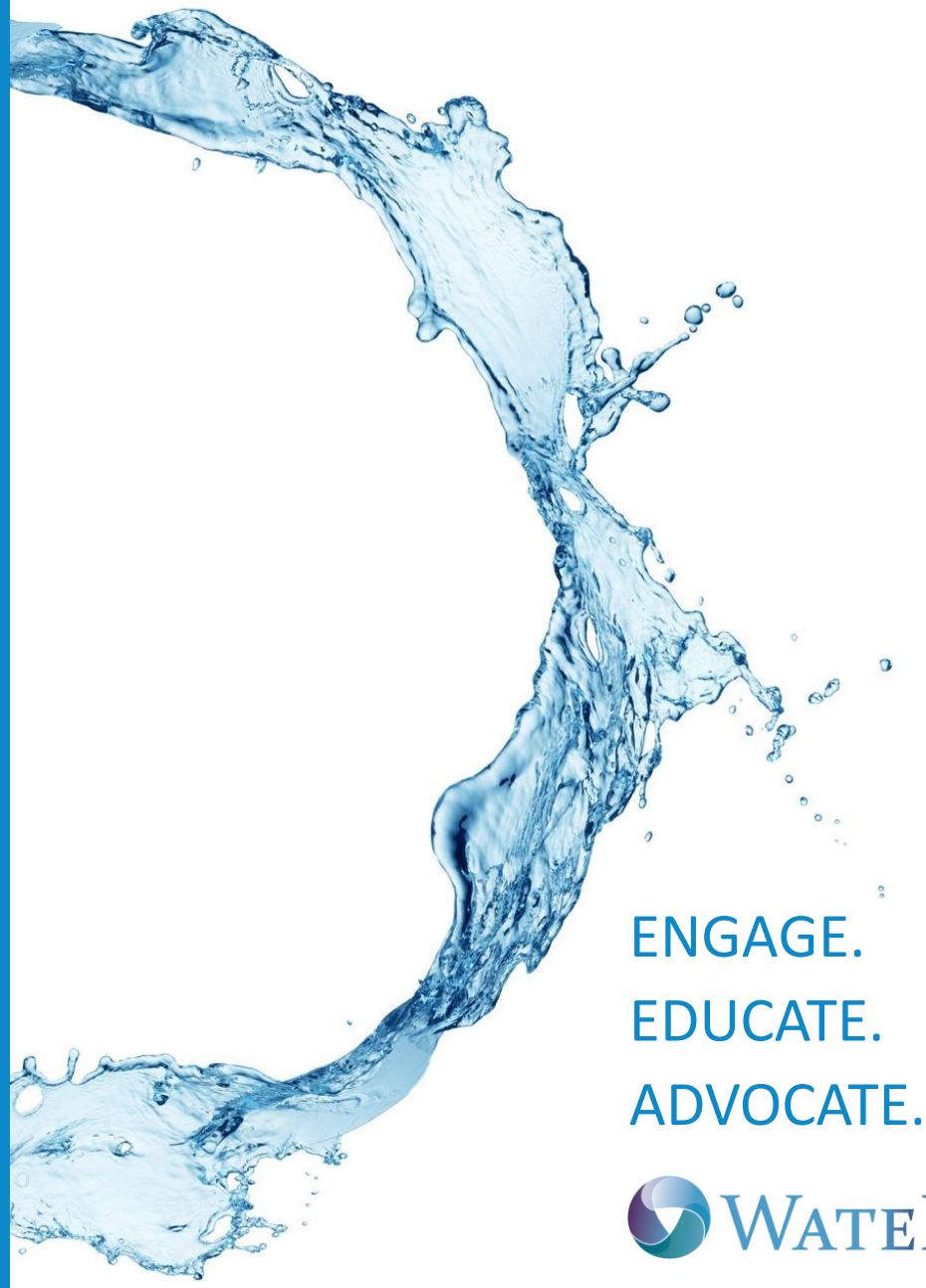
WATEREUSE ASSOCIATION WEBCAST SERIES



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EDUCATE.
ADVOCATE.

WATEREUSE

A Few Notes Before We Start…

- Today's webcast is scheduled for 60 minutes.
- A PDF of this presentation will be shared afterwards via email.
- Please type questions for the presenters into the Q&A box located at the bottom of your screen.
- There is one (1) Professional Development Hour (PDH) available for this webcast. Please email the PDH form to webcasts@watereuse.org.

TURNING *the* TIDE TOWARD WATER REUSE

WATEREUSE 2025 SYMPOSIUM

Celebrating 40 Years

MARCH 16-19
JW MARRIOT TAMPA
WATER STREET

IN COLLABORATION WITH THE WATER RESEARCH FOUNDATION

Registration Open

https://watereuse.org/news-events/conferences/symposium-2025/

Today's Presenters

Moderator:

Noor Fahoum, EIT
Wastewater Engineer II
Arcadis

Malin Dartnell, PE
Principal Industrial Water Engineer
Arcadis

Katie Umberg
Water Planning Expert
Arcadis

Malin Dartnell, PE
Principal Industrial Water Engineer
Arcadis

Agenda – Leveraging Reuse for Mutual Benefit

Pt 1 - The Industry Perspective
Malin Dartnell

- **Setting the stage –**
  - What makes industrial reuse unique?
  - What is the scale of the opportunity for industrial reuse?
  - Industrial reuse is probably more important now than ever
- **For the industrial user -**
  - Benefits to Industry of Reuse
  - Discussion of how water is used by industry
  - Considerations for Industry Considering **On-Site** Industrial Reuse
  - Considerations for Industrial Users Considering Engagement with a Utility

Pt 2 - The Utility Perspective
Katie Umberg

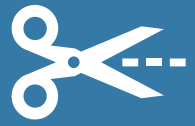
- **Setting the stage -**
  - Benefits of industrial reuse for utilities
  - Evaluating the ability to serve a water-intensive industrial user
  - Beyond the technical evaluation
- **Putting it into practice -**
  - Examples of utility, community, and state measures to encourage industrial reuse
  - Examples of public/private collaboration
- **Key takeaways**

Water Reuse in Industry Offers a Unique Opportunity

Industrial utilities are often the largest users (cooling towers, boilers, etc.)

Industrial utilities can often use nonpotable water

Public perception may be less of a challenge than for DPR



Often can be segregated from potable water systems relatively easily

Many industrial users have made corporate sustainability commitments

Industries are looking for opportunities to meet their corporate sustainability commitments

bp

Our aim 17 is becoming water positive by 2035
In 2023 we introduced efficiencies at Linge, our bpx energy facilities and Eagle Ford Shale in the U.S. These efficiencies included new water treatment and recycling systems and the use of brackish rather than fresh water.

RALPH LAUREN CORPORATION

We are committed to reducing water consumption across our value chain. We strive to conserve water throughout our operations, and support our suppliers to improve their water use efficiency and responsibly manage wastewater. We also engage in programs aimed at helping improve community access to this essential resource.

PEPSICO

We have a vision to become net water positive — an ambition borne from our longstanding belief that access to water is a human right and our acknowledgement of its criticality to our business.

Microsoft | Corporate Social Responsibility

Improving water access and availability
Microsoft is committing to be net water positive for our direct operations by 2030.

Net-zero at Silicon Valley Campus
The new Microsoft campus is on track to become the first net-zero water building.

amazon | Sustainability

Water Stewardship
At AWS, we know that water is a precious resource. We are committed to being water positive by 2030 and making more water available to the communities where we operate. Our efforts to conserve and reuse water are happening across our on-site operations and in communities where we operate by working with nonprofit and public partners to support water availability.

Does Industrial Water Reuse Offer a Significant Opportunity?

2015:

All Water Use in the US
(~322 Billion Gallons per Day)

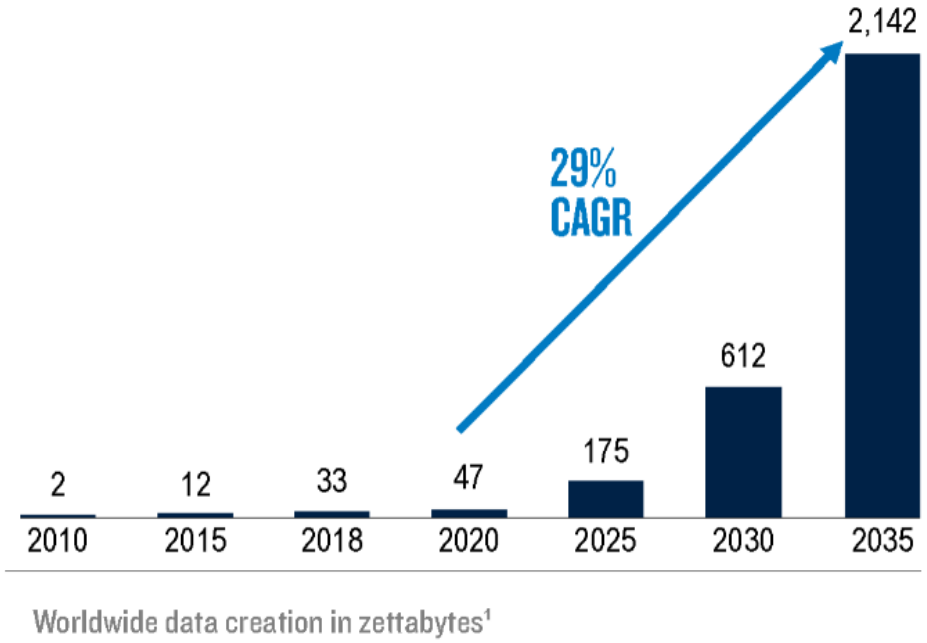
Industrial Water Use
(~19.4 Billion Gallons per Day)

Industrial Water Use for Utilities
(~3.9 Billion Gallons per Day)

Source: *Center for Sustainable Systems, University of Michigan. 2024. "U.S. Water Supply and Distribution Factsheet." Pub. No. CSS05-17.*

Industrial Water Reuse is More Important Now than Ever

Tech sector water use is skyrocketing in the U.S. driven, in large part, by the exploding data center market



Worldwide data creation in zettabytes[1]

Data Center

Direct + Indirect

Water Use

135 Billion

Gallons per Year

in the US, 2018

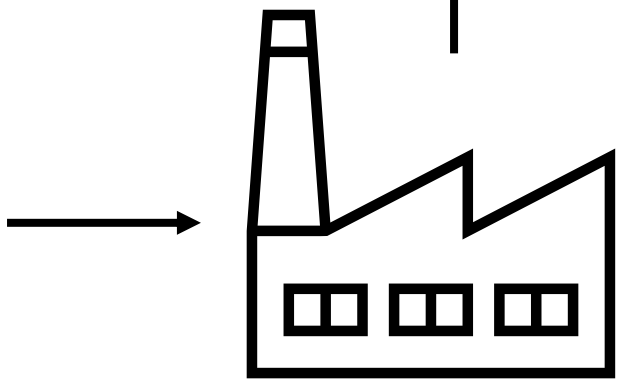
*"There appears to be **no ceiling** for how high this data center demand is going to reach,"*

- **Andy Cvengros,** JLL.

Benefits of Water Reuse for Industry

- Supports sustainability goals and contributes to a positive brand image (or prevents a negative one)
- Provides opportunity to build (or grow) in areas they wouldn't otherwise
- May be part of a water supply risk mitigation strategy - less susceptible to short- and long-term restrictions than potable
- "Purple Pipe" water typically offered at a lower rate than potable water

How is water used by industry?



Losses:
Evaporation

Sources:
Surface Water
Groundwater
Potable Water
Stormwater
"Purple Pipe" Water

Outflows:
Wastewater Discharge
Water in Product
Runoff

Uses:
Utilities
Domestic
Production
Irrigation

Utilities
- Cooling
- Boilers/steam
- HVAC
- Chilled Water
- Purified Water

Domestic
- Toilets
- Sinks
- Showers
- Kitchens

Production
- Rinsing & cleaning
- Conveyance
- Water in product

Commonly Considered Reuse Sources

	Source	Strengths	Weaknesses
Least Complex for Reuse	**"Purple Pipe" water** *Municipal reclaim water*	Most of the capital and operating cost of treatment is covered by POTW	Limited availability Some capital investment may be required (piping or additional treatment) Typically higher TDS
↓	**In-plant/Point-of-Use Reclaim** *such as reverse osmosis reject, cooling tower blowdown, process rinsewater*	Generally less complex to treat than other mixed wastewaters Often lower CAPEX cost	Often contain high concentrations of scaling compounds High seasonality component associated with cooling Possible production interruption
In order of increasing complexity	**Industrial wastewater** *segregated from domestic waste*	With appropriate segregation, can be less complex to treat than other mixed wastewaters	
↓	**Storm/rainwater** *Water that reaches the site through precipitation or run-on*	Typically relatively high quality (clean) water source Offers opportunity to reuse a stream that otherwise would likely runoff	Requires large collection area (i.e. roof or parking lot) and large storage reservoir Some treatment required Drought vulnerability Water rights laws sometimes prohibit use
Most Complex for Reuse	**Combined industrial/domestic wastewater** *"end of pipe"*	Typically large volumes available – largest opportunity for reuse No segregation piping required	Generally the most complex wastewater to treat for reuse, requiring biological, physical, and chemical treatment

Considerations for Industry Considering **On-Site** Industrial Reuse

Common Pitfalls and Challenges

- Cost and operational complexity
- Water quality
- Wastewater discharge permit limitations
- Segregation of existing piping systems
- Less consistency in flow and quality than purple pipe

Keys to Success

- Track your water use – if you can't measure it, you can't manage it
- Pair the user with the source
- Go as far upstream in the plant as you can
- Find the simplest composition waste stream to reuse

Considerations for Industrial Users Considering Engagement with a Utility

	Challenge	Approach
	Difference in decision-making timelines	Set expectations early with internal and external stakeholders
	Information around water needs (quality, quantity, change over time)	Monitor your water use Understand your water quality specifications Develop high quality water balance (considering peak, average, and long term) to assess feasibility and demand
	Communication	Consider engaging someone who understands water utility management and decision-making Think outside the box – how might you partner with or support a utility to accomplish shared goals?

Katie Umberg
Water Planning Expert

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Topics

- Benefits of industrial reuse for utilities
- Evaluating the ability to serve a water-intensive industrial user
- Beyond the technical evaluation
- Examples of utility, community, and state measures to encourage industrial reuse
- Examples of public/private collaboration
- Key takeaways

Some Benefits of Industrial Reuse for Utilities

- Frees up potable water
- Water supply that expands as demand / flow increases
- Implementation for industrial users may be less difficult than other reuse types
- Utility revenue
- Potential funding mechanism for new infrastructure

Considering Serving a Large Industrial User?

- Project future demands, flows
- Evaluate the availability and sustainability of available water resources
- Evaluate your ability to accommodate annual totals
- Evaluate your ability to accommodate the highs, lows, and variability

Beyond the Technical Evaluation

- Prepare for conversations
- Proactively talk to city planners, economic development, and local leaders
- Start conversations with existing or potential industrial users

Show Me the Money! Encouraging On-site Reuse

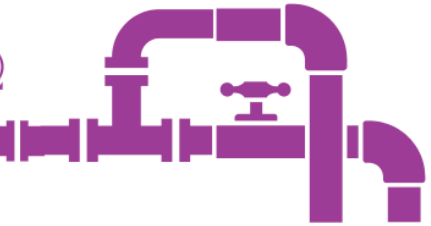
Water Savings Incentive Program (WSIP)

- Reimbursement of up to 50% of project costs while funding lasts
- Based on the amount of water saved: up to $0.60 per 1,000 gallons saved per year
- Example projects include changing an industrial process to capture & reuse process wastewater, or using condensation for cooling towers

GO PURPLE incentives for users implementing onsite water reuse

- Capacity charge adjustments
- Utility-funded expedited building permit review
- PACE financing study
- Incentives for piloting innovative solutions

Show Me the Money! Connecting to Utility Infrastructure



GO PURPLE incentives for users connecting to the utility's centralized reclaimed water system

- Utility-funded expedited building permit review
- PACE financing study
- Cost sharing for pipes required for connection
- Up to $100,000 rebate and 75% reimbursement for converting from potable to reclaimed water based on the water saved

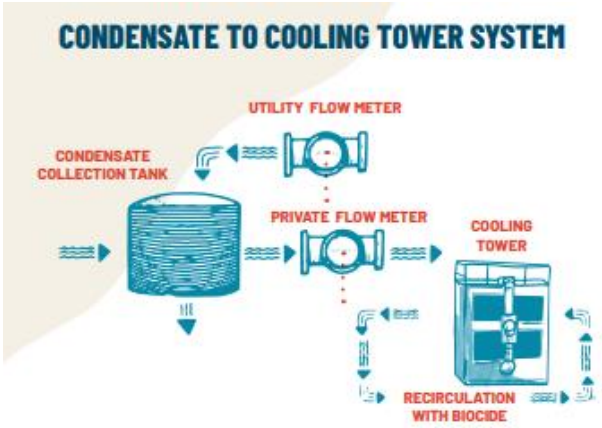
Make it Easy

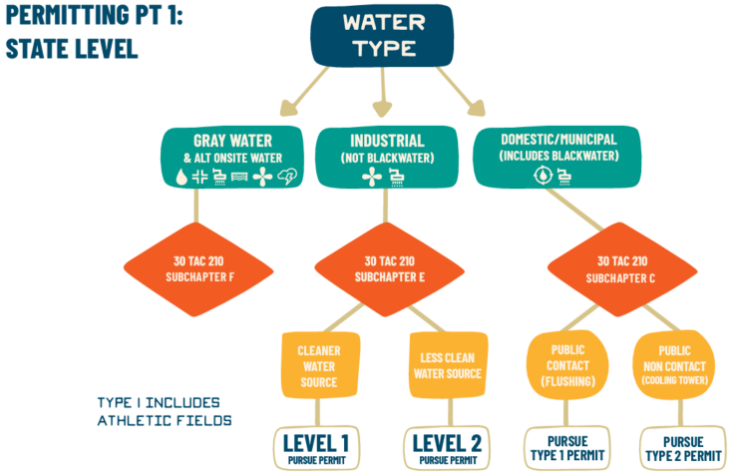
PHX WATERSMART
CONSERVATION CATALYST

Cooling Tower Efficiency Program

- On-site evaluation of cooling system setup and operations
- Detailed report of retrofit opportunities and funding
- Actionable items

- Guidance on potential solutions and project planning and operation
- Financing and permitting opportunities
- Case studies



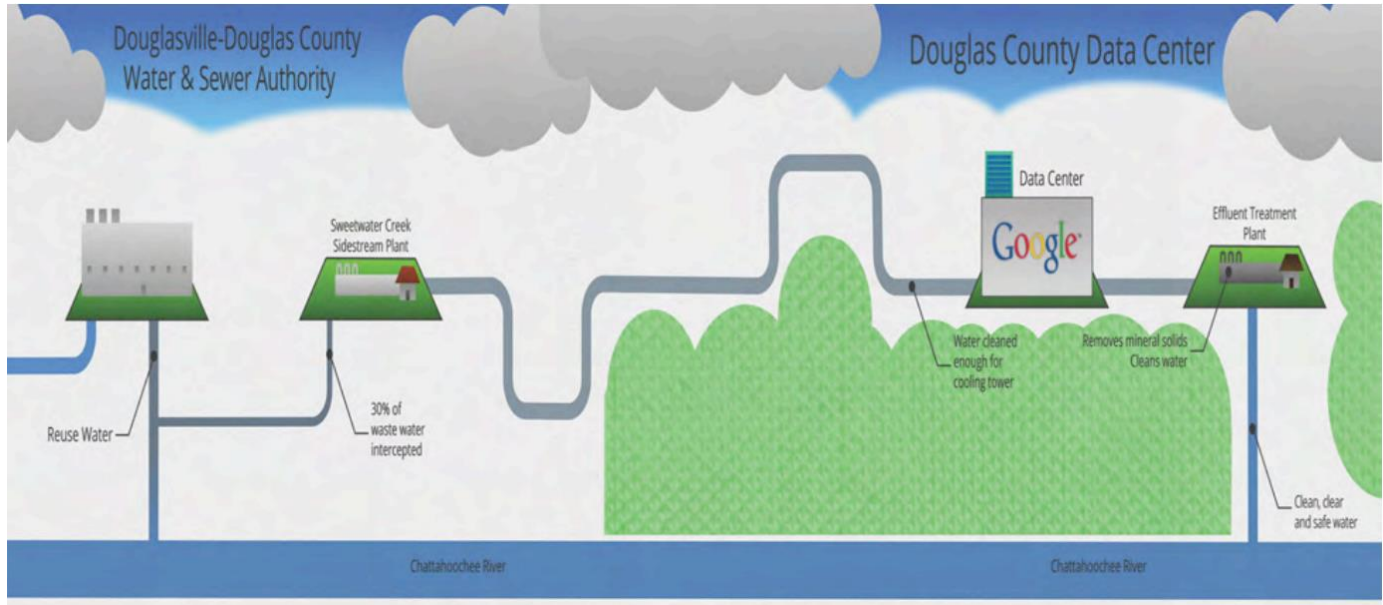


Collaborate – Leverage Effluent as a Supply

The Register®

Google cools data center with bathtubs, dishwashers

- Google originally used potable water for their data center
- Talked to the Douglasville-Douglas County Water and Sewer Authority about using grey water for cooling
- Pull from wastewater treatment plant effluent line and treat on site (sewer mining)



Google cools data center with bathtubs, dishwashers • The Register

Collaborate – Expand Utility Infrastructure

BOISE dev

You Asked: About Facebook Kuna's power, water, tax incentives, employees, roads — and urban renewal

February 18, 2022

Meta Facebook to get tax breaks, looks at water treatment in Kuna, ID (boisedev.com)

- Kuna, Idaho looking to grow
- "Far-flung industrial park" attractive to data centers
- As part of agreement with Meta, Meta agreed to construct a $50 million sewer plant, and then turn it over to the City of Kuna utility to operate
- Plant will exceed Meta needs to support additional growth in the area

Collaborate – Large-Scale Project

switch

Regional Water Improvement Pipeline Project Commences Bringing Jobs, Economic Growth and Environmental Sustainability

Regional Water Improvement Pipeline Project Commences Bringing Jobs, Economic Growth and Environmental Sustainability (switch.com)

- 16-mile pipeline from Truckee Meadows Water Reclamation Facility to the Truckee Reno Industrial Center
- Will delivering 4,000 acre-feet of treated effluent per year to the industrial park
- Industries will connect to the large purple pipes
- Regional public-private partnership that includes:
  - State of Nevada
  - City of Reno, City of Sparks, Washoe County, and Storey County
  - Truckee Meadows Water Authority
  - Master Developer of TRI Center, Switch, and other technology companies

Key Takeaways and Recommendations

- Industrial reuse is more important than ever
- There are benefits for both industry & utilities
- Collaboration is key!
  - It’s time for new ways of thinking and operating!
  - Start discussions early
  - Ensure all stakeholders are included
  - Don’t try to fit a square peg in a round hole

Audience Q & A

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