

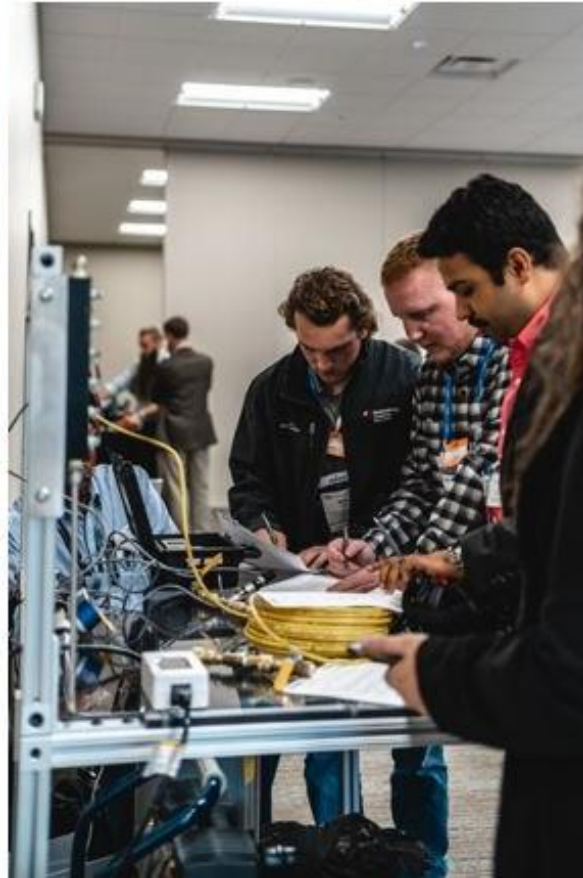


# Industrial Decarbonization Peer Exchange

August 21<sup>st</sup>, 2024

# Better Plants Bootcamps

**DOE will be offering just one more  
Energy Bootcamp and one more  
Decarbonization Bootcamp in 2024!**



## **[Decarbonization Bootcamp \(September 10-13\)](#)**

Learn to establish milestones for decarbonizing industrial systems and manufacturing processes. This training course is relevant for any manufacturer, specifically individuals who are new to GHG emissions and are working on pathways to a zero-carbon future.

## **[Energy Bootcamp \(October 28-November 1\)](#)**

Learn about energy management, process heating, steam, and industrial motor-driven systems such as compressed air, pumping, fan systems, and alternative energy options. Participants will learn how to use diagnostic equipment to identify energy savings opportunities and quantify cost savings.

# Register Now: Virtual Training

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## Wastewater Systems

August 20<sup>th</sup> 2024 – October 8<sup>th</sup> 2024

Wastewater treatment operations and processes at Water Resource Recovery Facilities (WRRFs) consume considerable energy, and their energy requirements are only increasing with stricter effluent quality standards and growing direct and indirect water recycling demands.

Participants will receive training in energy management practices for wastewater systems. Participation in this Virtual Training is free and open to all U.S. manufacturers.



[Register Here!](#)

Questions? Contact Wei Guo ([guow@ornl.gov](mailto:guow@ornl.gov))

# Upcoming: Better Climate Challenge Working Groups

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Working Groups allow Better Climate Challenge partners and allies to discuss topics around GHG emissions reductions and share their insights, strategies, and action plans with DOE technical experts. BCC partners may join more than one working group and can send multiple representatives from their organization to participate.

## Financial Analysis for Industrial Decarbonization

This working group will delve into concepts like cost analysis, marginal abatement cost curves, and carbon pricing of decarbonization projects.

*Sessions run September 19<sup>th</sup> - January 16<sup>th</sup>*

## Central Plant Decarbonization

This working group will help participants characterize their existing central plant systems and explore challenges and potential solutions specific to their system type.

## Shifting to Low-Impact Refrigerants

This working group will examine the impact of refrigerants on meeting emission reduction goals, explore solutions for refrigerant phase-out, and highlight ultra-low-impact refrigerants.



*Use the QR code to learn  
more about  
BCC working groups*

*Registration is now open!*

# AEE World: Energy Conference and Expo



- DOE's Better Plants Program is returning to AEE World this year on **September 25-27** in Nashville, TN! This year's theme is *Energy Solutions for Global Challenges*.
- Better Plants will host a luncheon on **Wednesday, September 25 (12pm – 1:30pm)** to provide program updates on new tools and resources. Stop by the Better Plants booth at the expo and stay tuned for our full speaker lineup!

## Better Plants Technical Sessions:

- Session E1 – Energy Efficiency: The Foundation of Decarbonization (*Sep 25, 2 - 4 PM*)
- Session E2 – Clean Heat: Tackling Your Scope 1 Emissions (*Sep 26, 9 - 11 AM*)
- Session E3 – Making it Happen: Project Implementation from Start to Finish (*Sep 27, 9 - 11 AM*)

# In-Plant Trainings (INPLTs) – New site dates announced!

Host Plant Name	Location	Energy System Type or Topic	Date Scheduled
Hill & Smith Group Holdings, Inc.	Owego, NY	Treasure Hunt	August 11 – 13, 2024
Dura-Line	McAlester, OK	Treasure Hunt	October 7 – 9, 2024
Gibraltar Industries	Dallas, TX	Treasure Hunt	October 13 – 16, 2024
SugarCreek Packing Co.	Cambridge City, IN	Steam	October 21 – 24, 2024
Textron, Inc.	Wichita, KS	Water Efficiency	November 12 – 14, 2024
Ozinga Brothers, Inc.	Chicago, IL	Multi-System: Compressed Air, Motors, Steam	November 12 – 15, 2024
Cleveland-Cliffs Inc.	Burns Harbor, IN	Compressed Air	TBD
Coca-Cola Beverages Northeast	East Hartford, CT	Compressed Air	TBD
Comau Inc.	Novi, MI	Treasure Hunt	TBD
Honda North America	East Liberty, OH / Russells Point, OH	Treasure Hunt	TBD
The Sherwin-Williams Company	Columbus, OH	Treasure Hunt	TBD



Please contact your TAM if you are interested in attending one of the upcoming INPLTs.

# Water Savings Network

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## *What is it?*

- Partners can work with DOE to track a water reduction goal across all or a portion of their portfolios (e.g., in water stressed regions)
- A network of Better Buildings, Better Plants partners that participate in peer exchange activities and gain recognition for their proven solutions

## *Why join?*

- Receive technical guidance from DOE and supporting organizations, including EPA.
- Be a part of a network of peers.
- Set a water goal for all or a portion of portfolios (e.g. in water-stressed regions).
- Get recognition for proven solutions.

## *What do organizations commit to?*

- Participating in water-based Better Buildings activities like tracking & reporting water data, publishing a water-related solution on the Better Buildings Solution Center, or sharing best practices and lessons learned with their peers.

# Water Savings Network

*Through 2022, partners have saved more than 16 billion gallons, which is enough water to fill more than 24,000 Olympic-sized swimming pools.*

- 75+ Partners across sectors
- 18+ Goal Achievers
- 16+ Billion in cumulative water savings
- 150+ Proven water saving solutions

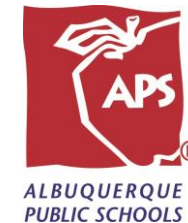
## Water Goal Achievers:

Anthem



Staples

EMPIRE STATE  
REALTY TRUST



CommonWealth  
partners



# Industrial Water Quality and Reuse

# Today's Speaker



## **Peter Fiske**

Founder and Executive Director

*National Alliance for Water Innovation (NAWI)*

# Today's Speaker



**Kiran Thirumaran**

Research Associate

*Oak Ridge National Laboratory*



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## Water Efficiency – Resource Overview

# Technical Assistance Overview

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*What TA resources are available to partners on water?*

- Technical assistance
- Better Plants Water In-plant trainings
- Software tools
- Factsheets, Presentations, Reports and Case Studies
- Diagnostic Equipment Program
- Factsheets, presentations, best practices, and other guidance

*What if I don't see the resource I need?*

- Constantly evolving resource library
- We want your feedback!

# Water In-Plant Training

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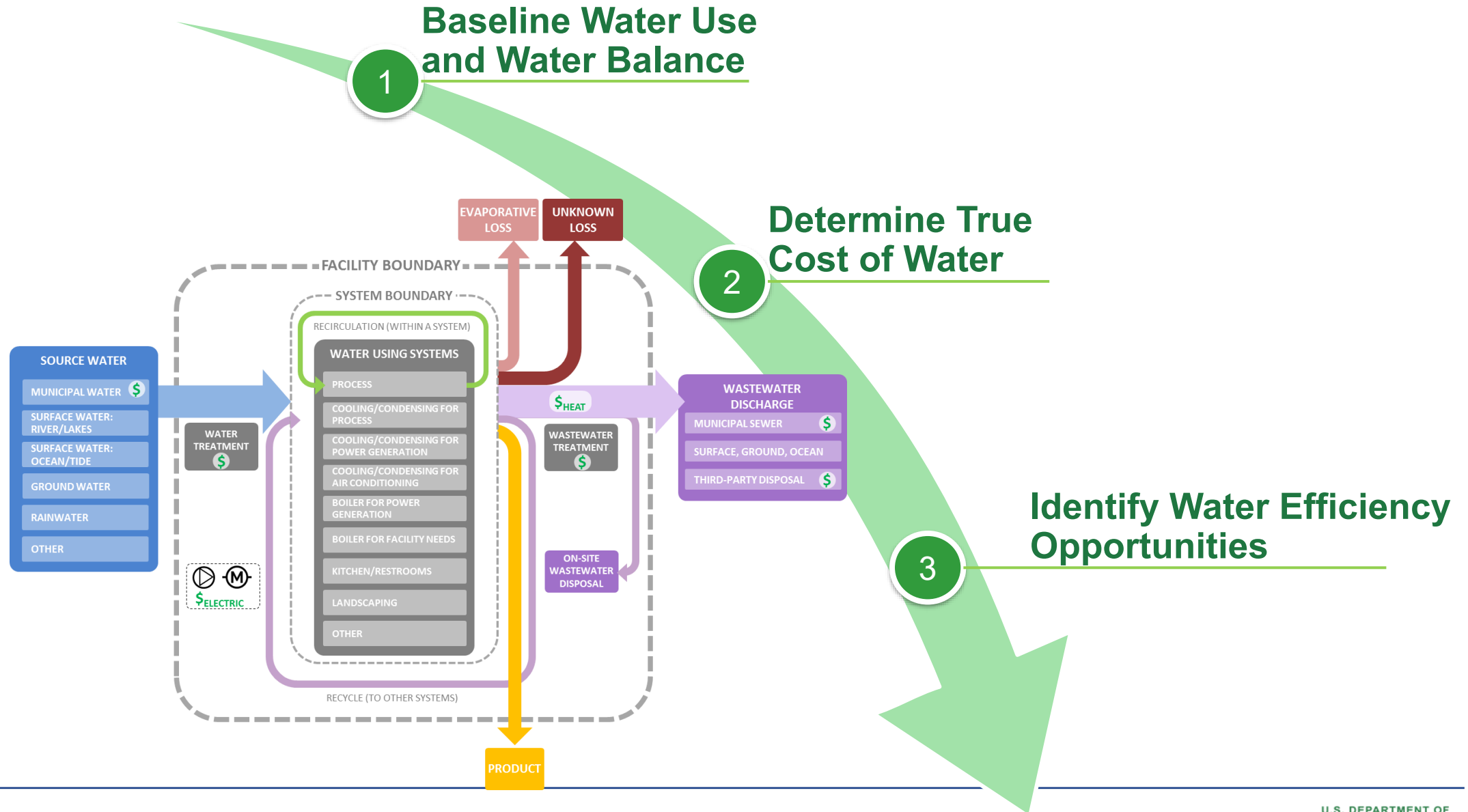
The training aims to help organization perform a facility level water assessment

A 2.5 day event (classroom *plus* field training)



Recordings from the virtual water INPLT training is available online: <https://bptraining.ornl.gov>

# 3 Steps to Water Assessment



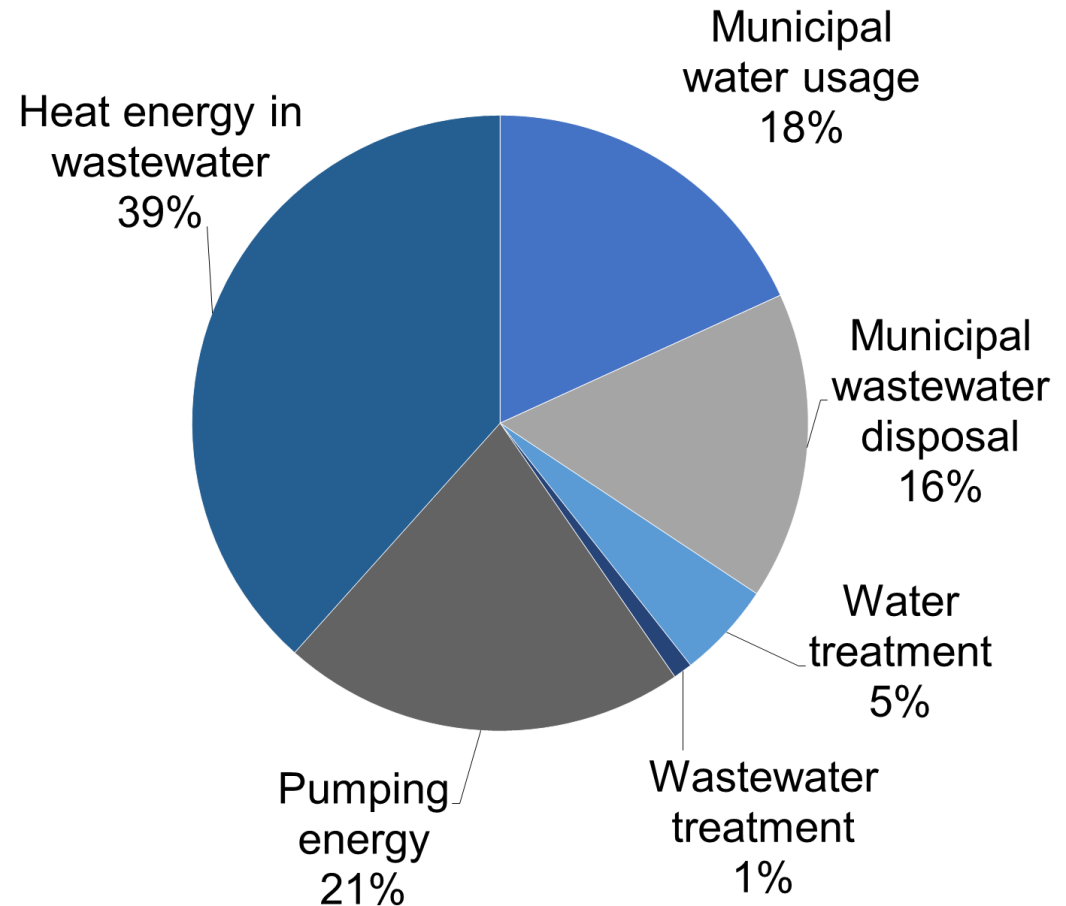


# True Cost of Water

## Water costs beyond utility

- Incoming water treatment
- Fuel: Heating
- Electricity: cooling, blowers, pumping
- Discharge water treatment

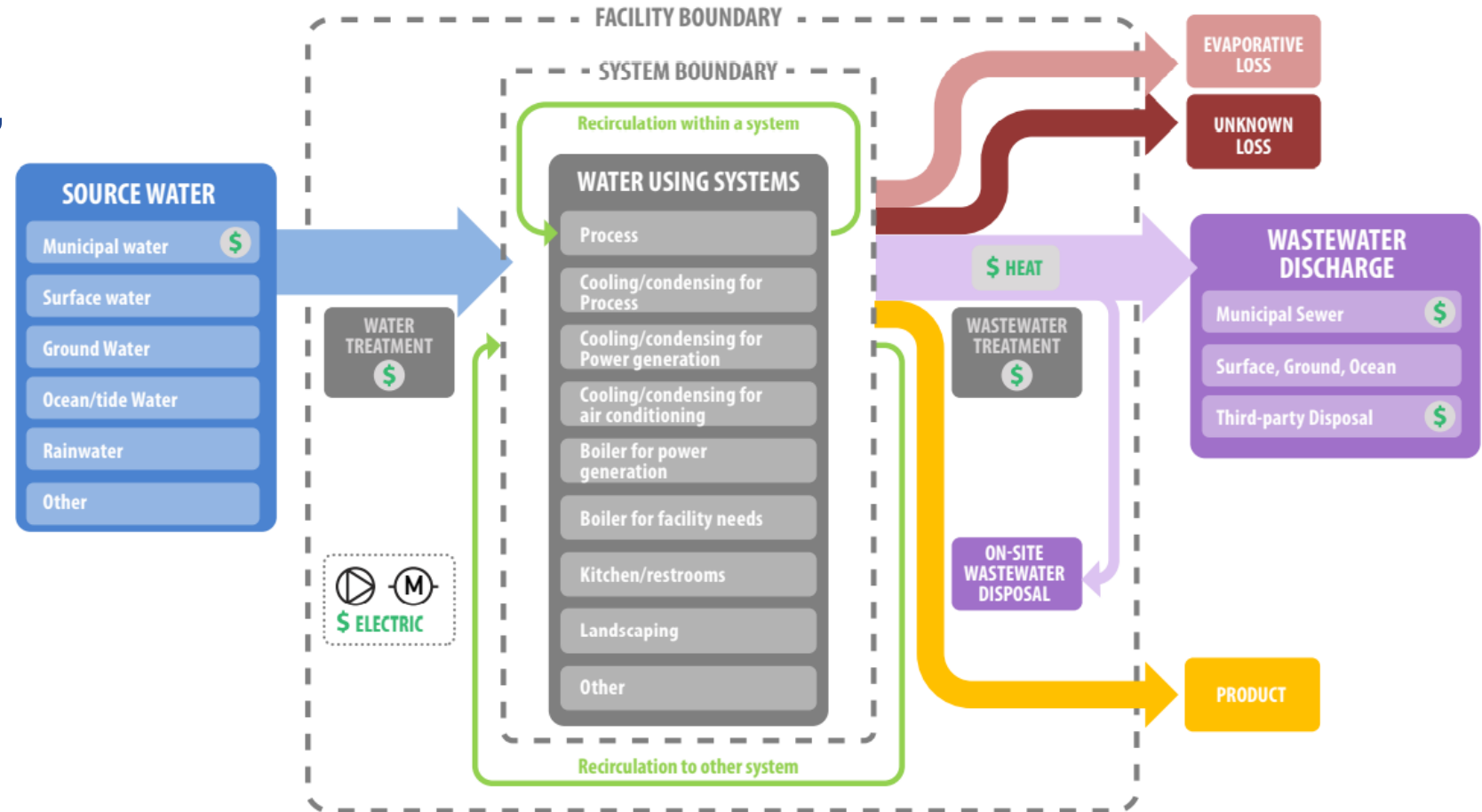
Reducing water use can reduce energy and other costs



# Plant Water Profiler Tool (PWPEX)

## What does the tool do?

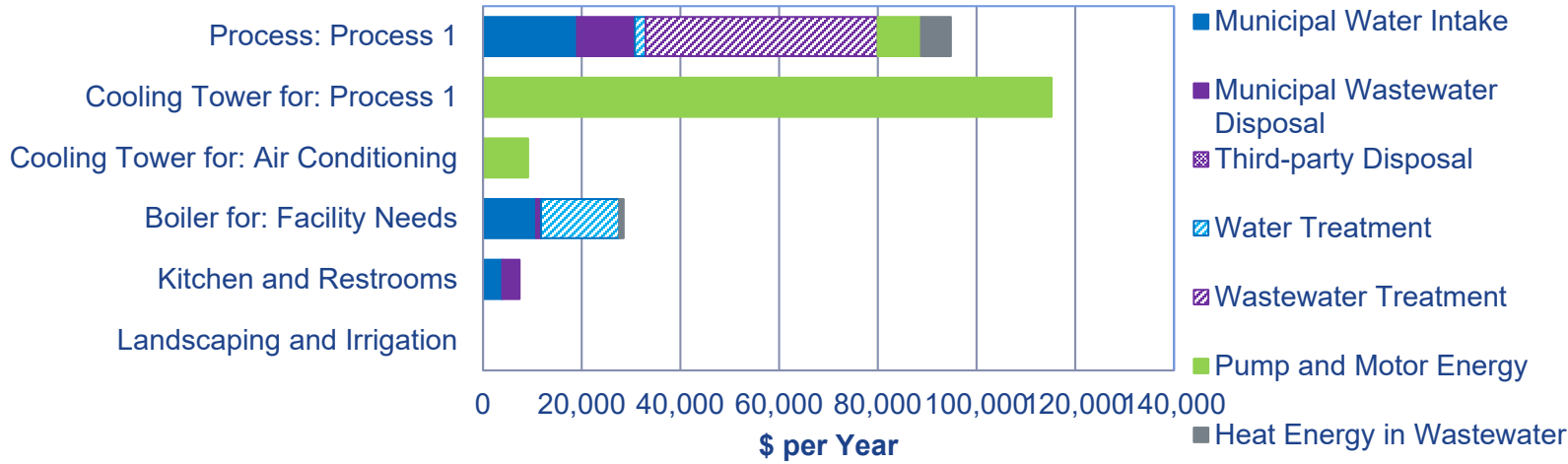
1. Understand baseline water procurement, use, and disposal in your plant(s)
2. Calculate your “true cost” of water (including embedded treatment, consumption, and disposal costs)
3. Identify opportunities to reduce water use to help you achieve cost and energy savings



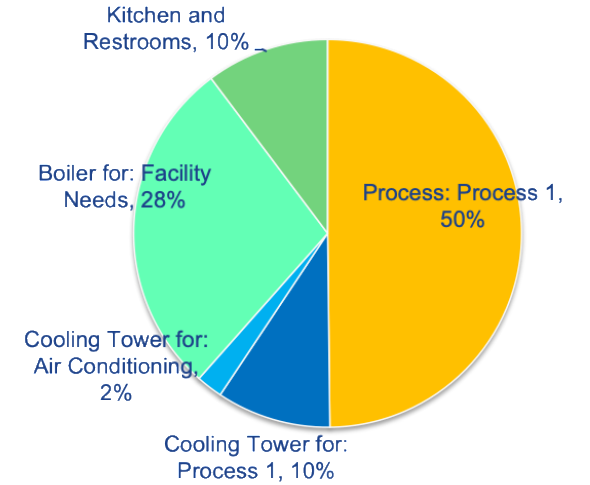
<https://www.energy.gov/eere/amo/plant-water-profiler-tool-excel-version-10-pwpex-v10>

# PWP provides comprehensive results

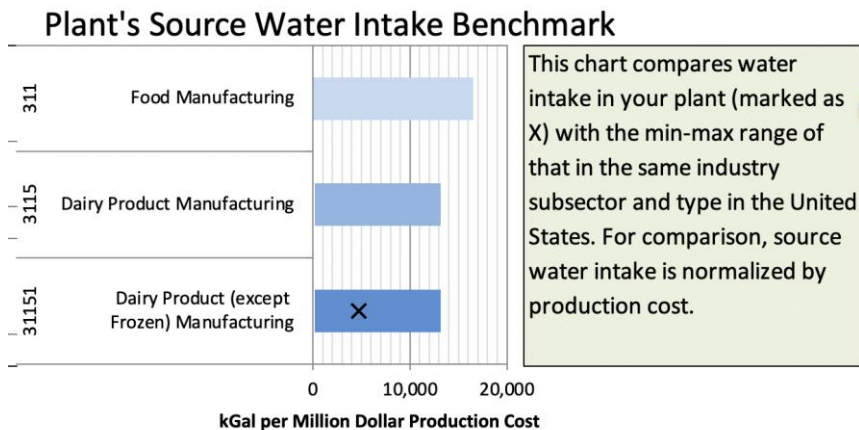
## True Cost of Water



## Water Intake by System



## Comparison with Industry Average



## Water Imbalance by System

Water-Using System	Incoming Water / Outgoing Water		Water Imbalance		
	Million Gallon per Year	Million Gallon per Year	Million Gallon Per Year	% of Incoming Water	% of Total Loss
Process: Process 1	6.8	6.405	0.395	5.8%	87.2%
Cooling Tower for: Process 1	1.3	1.3	-	-	-
Cooling Tower for: Air Conditioning	0.3	0.27	0.03	10.0%	6.6%
....					
<b>PLANT TOTAL</b>	<b>15.5</b>	<b>15.047</b>	<b>0.453</b>	<b>16.5%</b>	<b>100.0%</b>

# Calculators for Engineering Estimations

## BLOWDOWN RATE CALCULATOR

BASELINE		MODIFICATION		RESULTS		HELP
<b>Conductivity Readings</b>		<b>Conductivity Readings</b>				
Feedwater Conductivity	400 $\mu\text{S/cm}$	Feedwater Conductivity	200 $\mu\text{S/cm}$	Blowdown Rate (%)	7.84 %	3.45 %
Blowdown Conductivity	5500 $\mu\text{S/cm}$	Blowdown Conductivity	6000 $\mu\text{S/cm}$	Blowdown Rate (klb/hr)	85.11	35.71
<b>Boiler</b>		<b>Boiler</b>		Feedwater Rate (klb/hr)	1,085.11	1,035.71
Steam Flow	1000 klb	Steam Flow	1000 klb	Fuel Cost	\$1,894,827	\$833,071
Steam Temperature	500 °F	Steam Temperature	500 °F	Makeup Water Cost	\$223,402	\$93,749
Boiler Efficiency	85 %	Boiler Efficiency	85 %	Total Cost	\$2,118,229	\$926,820
<b>Operations</b>		<b>Operations</b>		<b>Fuel Savings</b>	<b>\$1,061,757</b>	
Operating Hours	8760 hrs/yr	Operating Hours	8760 hrs/yr	<b>Makeup Water Savings</b>	<b>\$129,653</b>	
Fuel Cost	4.99 \$/MMBtu	Fuel Cost	4.99 \$/MMBtu	<b>Total Savings</b>	<b>\$1,191,410</b>	
Water Cost	0.0025 \$/gal	Water Cost	0.0025 \$/gal	<a href="#">Copy Table</a>		
Makeup Water Temperature	50 °F	Makeup Water Temperature	50 °F			

**Blowdown Rate Calculator**  
Calculate Costs associated with boiler blowdown

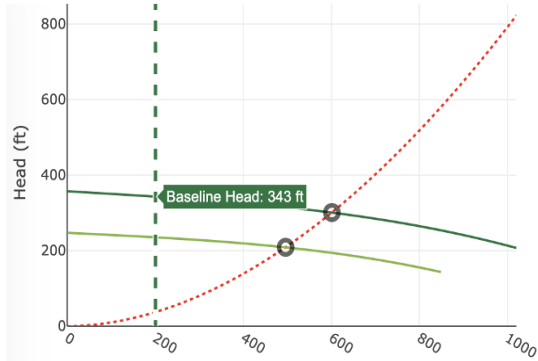
## PUMP HEAD TOOL

$K_s$  represents all suction losses from the tank to the pump  
 $K_d$  represents all discharge losses from the pump to the gauge  $P_d$

Fluid Specific Gravity	1.002
Flow Rate	3000 gpm
Suction Pipe diameter (ID)	12 in
Tank gas overpressure ( $P_g$ )	0 psi
Tank fluid surface elevation ( $Z_s$ )	10 ft
Line loss coefficients ( $K_s$ )	0.5
Discharge Pipe diameter (ID)	12 in
Gauge pressure ( $P_d$ )	124 psi
Gauge elevation ( $Z_d$ )	10 ft
Line loss coefficients ( $K_d$ )	1

[Generate Example](#) [Reset Data](#)

## PUMP CURVE



**Pump Curve Tools**  
Determine pump characteristics including flow from pump curves

## Case #1

[+Remove Case](#)

Water Flow Rate	1000	gpm
Cooling Load	100	MMBtu/h
<a href="#">Calculate Cooling Load</a>		
Annual Operating Hours	8760	hrs/yr
Cycles of Concentration	2	
Drift Eliminator	No	
Drift Loss Factor	0.2	%
Evaporation Loss	85	%
Correction Factor		

## Results

**Water Consumption 179,755.2 kGal**

**Cooling Tower Water Use Calculator**  
Analyze the effect of drift eliminators/cycles of concentration on cooling tower water consumption

# Diagnostic Equipment Loan Program

22 different kinds of tools for collecting onsite water and energy data

Loan equipment at no cost free to perform short term data collection and/or to test the tools firsthand before purchase



**Ultrasonic Flow Meter for non-intrusive flow measurement**



**Conductivity Meter to determine water quality**



**Run time loggers to monitor pump operations**

# Factsheets, Presentations, Reports and Case Studies



## Developing a Corporate Water Management Strategy for Manufacturers

Lessons Learned from the DOE Better Buildings Challenge Water Savings Pilot



Guidebook based on peer-to-peer information exchange water management best practices

A presentation slide with a green and white geometric background. The title "Leveraging Energy Management to Address Water Conservation" is written in white text on the green section. The Eastman logo is in the top right corner. Below it are two smaller logos: "ENERGY STAR Partner of the Year Sustained Excellence" and "Better Plants CHALLENGE U.S. DEPARTMENT OF ENERGY". At the bottom right, the name and title of Sharon L. Nolen are listed.

**EASTMAN**

ENERGY STAR  
Partner of the Year  
Sustained Excellence

Better Plants  
CHALLENGE  
U.S. DEPARTMENT OF ENERGY

### Leveraging Energy Management to Address Water Conservation

Sharon L. Nolen, PE, CEM  
Eastman Chemical Company  
Manager, Worldwide Energy Program

Past presentations from Cummins, Dow, Eastman, Ford, GM, Harbec, Nissan, Volvo

A slide for a Better Buildings webinar. It features the Better Buildings logo at the top left. The main title is "Better Buildings Space Conditioning Technology Team" with a red play button icon. Below the title, it says "National Renewable Energy Laboratory" and "February 14, 2020, 1-2 PM EST". At the bottom, there is a "Watch on YouTube" button and the U.S. Department of Energy logo.

Improving Cooling Tower System Efficiency with Alternative Water Treatment Strategies

Watch later Share

The logo for Better Buildings, featuring a stylized green and blue plant icon to the left of the text "Better Buildings" in a bold, sans-serif font. Below the text, "U.S. DEPARTMENT OF ENERGY" is written in a smaller, all-caps font.

### Better Buildings Space Conditioning Technology Team

National Renewable Energy Laboratory  
February 14, 2020, 1-2 PM EST

Watch on YouTube

U.S. DEPARTMENT OF ENERGY

Webinars on a variety of topics related to water efficiency

# Example Case Studies from Better Plants Solution Center



## New Technology

PepsiCo switched to purified air for cleaning Gatorade® bottles, achieving a **20 percent reduction** in water consumption throughout the process

## New technology

Electrolysis water treatment technology for cooling tower water treatment installed at a GSA buildings saved saves 20–50% of water consumption and 50–95% of the wastewater or sewer discharges.



## Recycle and Reuse Water

Nissan installed an automated water filtration system to eliminate the once-through rinse water, saving **48.6 million gallons** of water annually.

# Thank you!

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Kiran Thirumaran, [thirumarank@ornl.gov](mailto:thirumarank@ornl.gov), 214-801-0735

**Technical assistance resources can be found on the Better Plants website:**

<https://betterbuildingsolutioncenter.energy.gov/better-plants/water>

**Thank you!**