



Industrial Water Systems **Virtual INPLT Training & Assessment**

Session 8

Thursday – April 21st, 2022

10 am – 12:30 pm

Water Virtual INPLT Agenda

- **Week 1 (March 3rd) – Introduction to Industrial Water Assessment and Plant Water Profiler**
- **Week 2 (March 10th) – Understanding System Level Water use**
- **Week 3 (March 17th) – True Cost of Water**
- **Week 4 (March 24th) – Plant Water Profiler Working Session**
- **Week 5 (March 31st) – Identifying Water Savings Opportunity**
- **Week 6 (April 7th) – Virtual Treasure Hunt**
- **Week 7 (April 14th) – Estimating Water Savings Opportunities (Treasure Hunt Resources)**
- **Week 8 (April 21st) – Industrial Water System VINPLT Wrap-up Presentations**


Agenda – Session Eight

Today's Content:

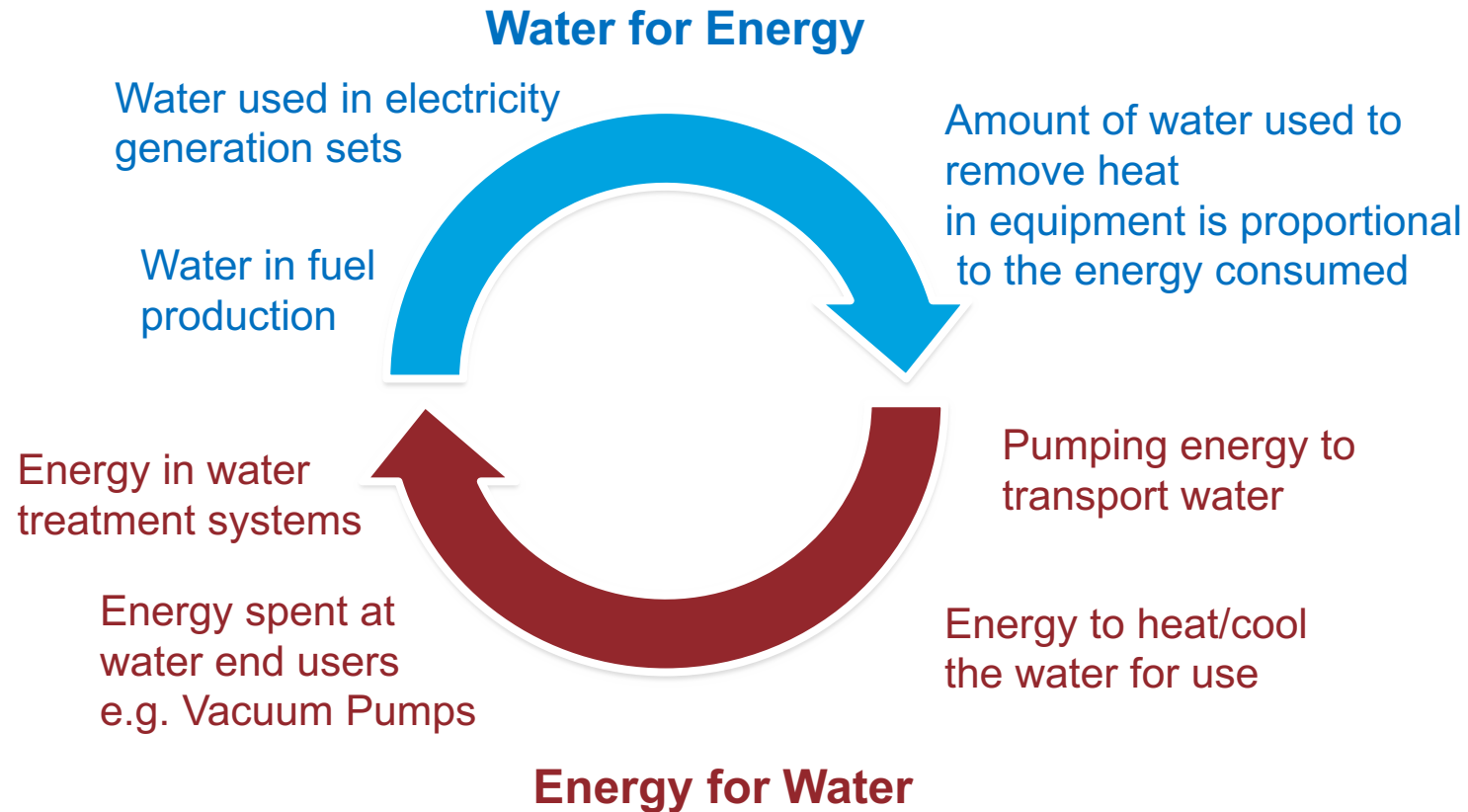
- Virtual INPLT Training – Review
- Presentation from Participants
 - Arnie Banawa and Alanie Hooton – Honda (Indiana Auto Plant)
 - Jason Sharpe - JLG
 - Glen Huffman – GM
 - Andy Lore – Honda (Anna, OH Engine Plant)
 - Tyler Roberts – BorgWarner
 - Joel Agner – Honda (Ohio Auto Plant)
 - Others
- Q&A



Drivers of water efficiency in Manufacturing

Cost savings	<ul style="list-style-type: none">• Cost of purchasing water for facility• Cost of material for water and wastewater treatment• Cost of discharging wastewater• Cost of energy for heating and cooling water• Cost of energy for pumping water	 <div>Water Energy Nexus</div>
Reducing business risks	<ul style="list-style-type: none">• Scarcity – Risk of disruption of water supply to plant due to drought conditions, regional scarcity etc.• Regulatory – Risk of increased government regulation on water use and pollution regulations• Environmental – Taking responsibility on sustainability creates better relationship for business	

Water - Energy Nexus : Interdependence at facility level



Even if water is cheap, the correlating impact water use has on energy can make it expensive

Quantifying water risks in your region

Physical Risks – Quantity

Measure's risk related to too little or too much water Eg. Water Stress

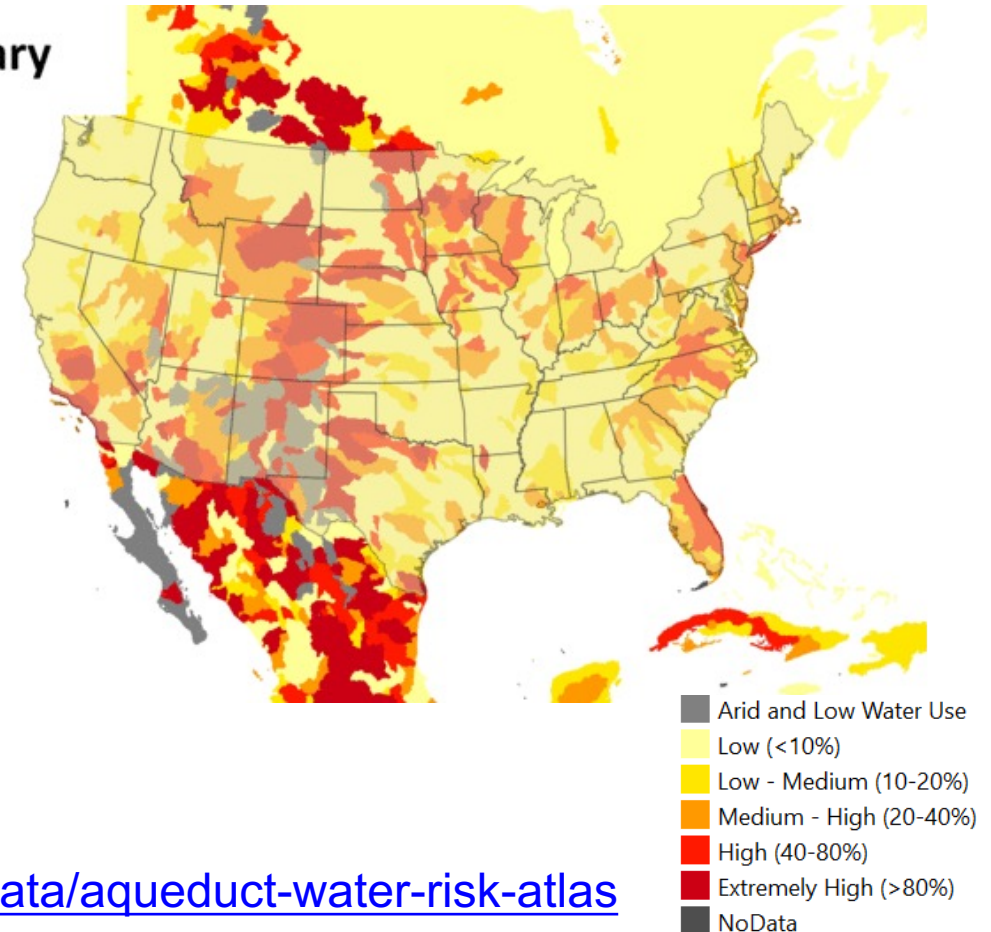
Physical Risk – Quality

Measure's risk related to water that is unfit for use. Eg. Untreated Connected Wastewater

Regulatory and Reputation Risks

Measures risk related to uncertainty in regulatory change and perception with the public. Eg. Environmental, social, and governance risk

January



<https://www.wri.org/data/aqueduct-water-risk-atlas>

Conducting a Water Use Assessment

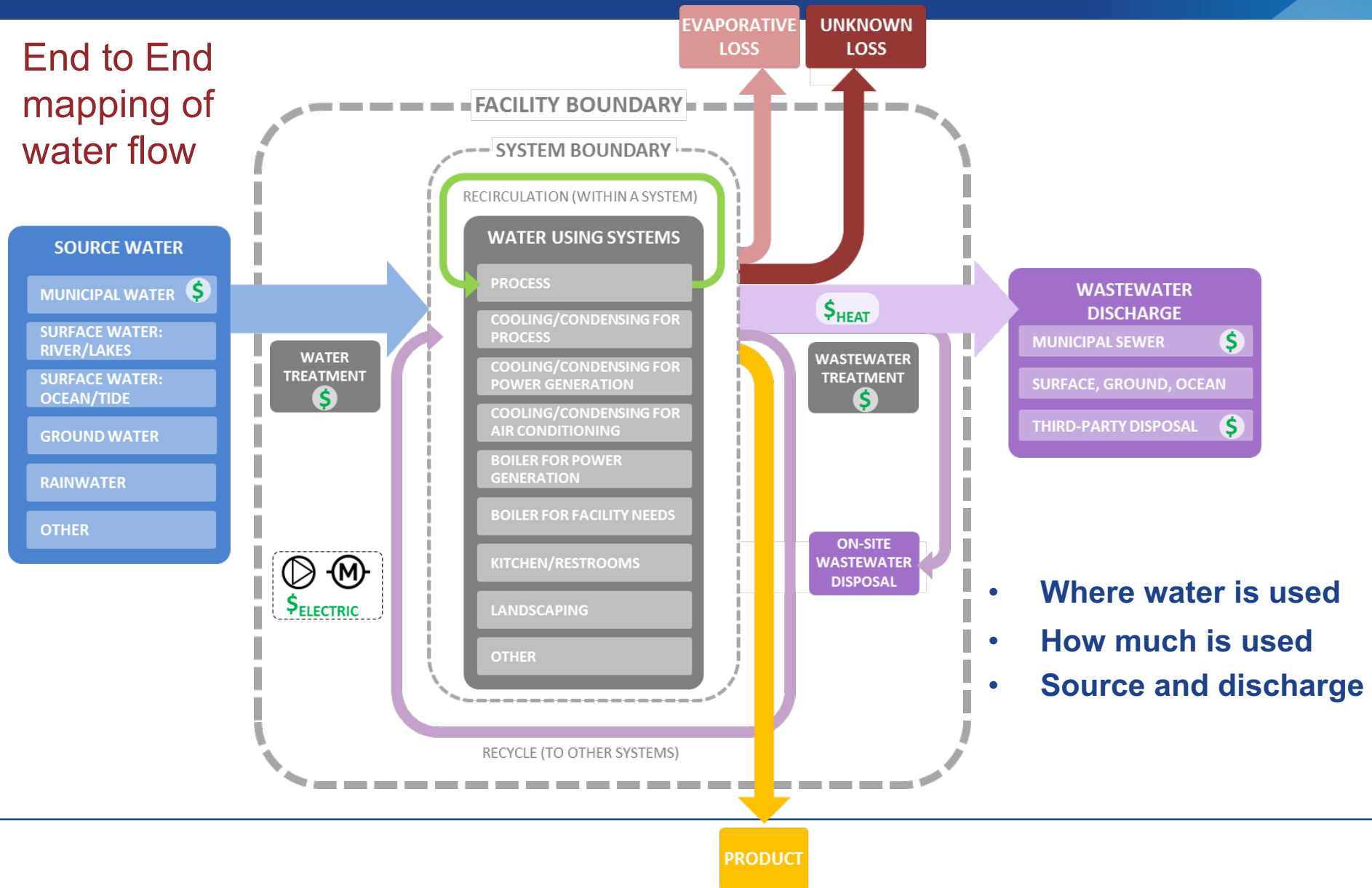
Step 1. Baseline water use

Step 2. Quantify true cost of water

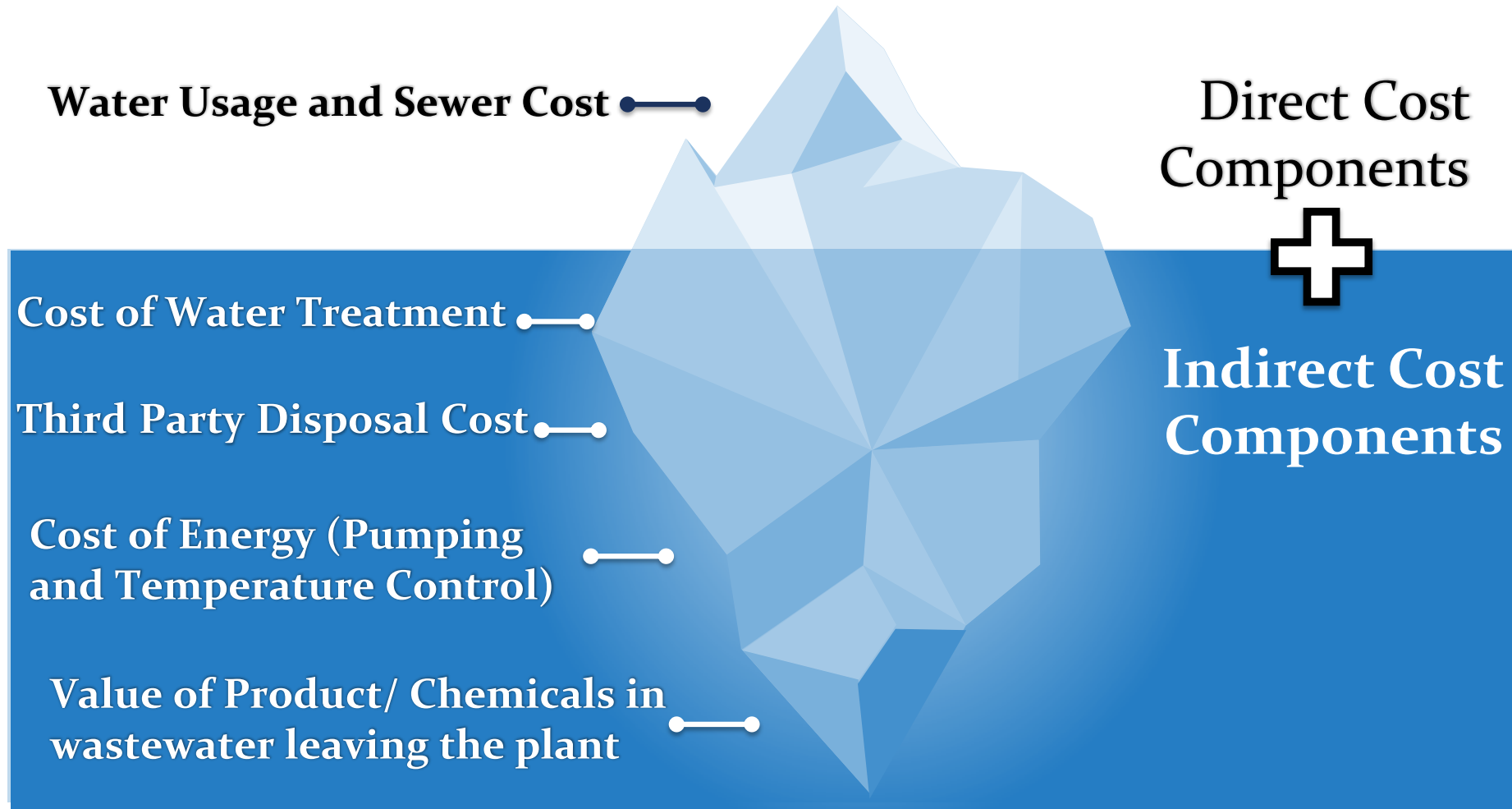
Step 3. Identifying Water savings opportunity

Step 1. Baseline water use

End to End mapping of water flow



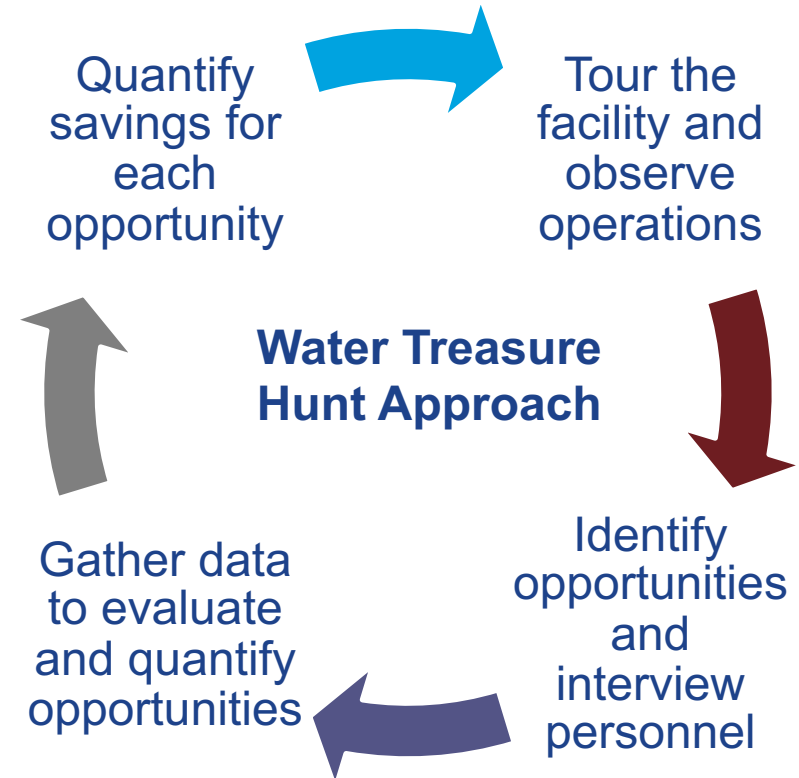
Step 2. True Cost of Water



Step 3: Identifying Water Savings Opportunity

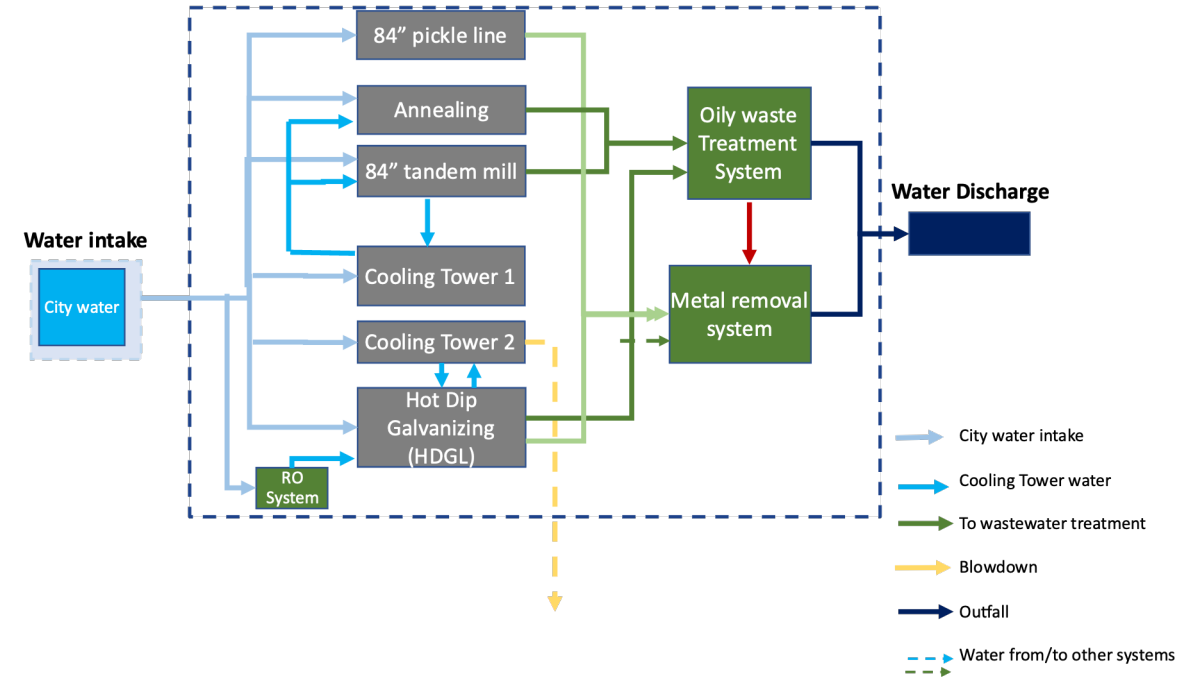
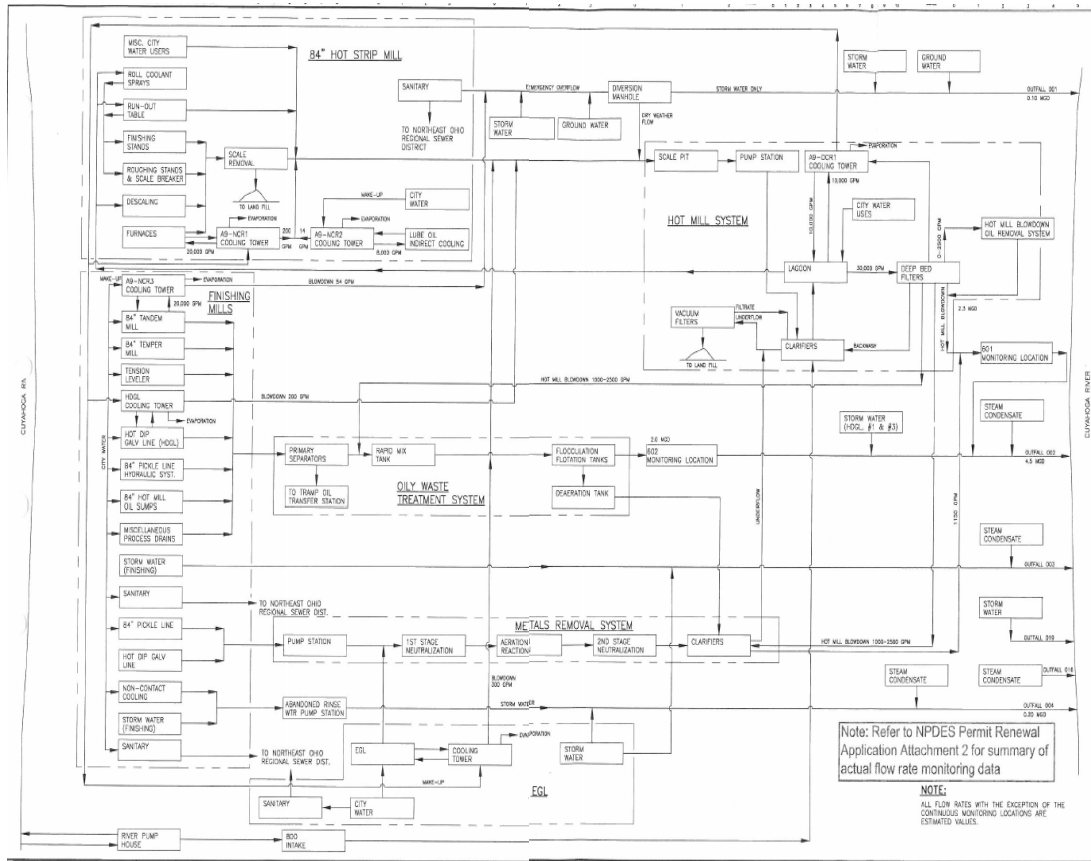
Water efficiency can reduce cost, improve resilience and reduce environmental impacts.

- Recycle and Reuse Water
- Efficient Design
- Implementing new technologies
- Optimized Operations
- Behavioral Improvements
- Proper Maintenance



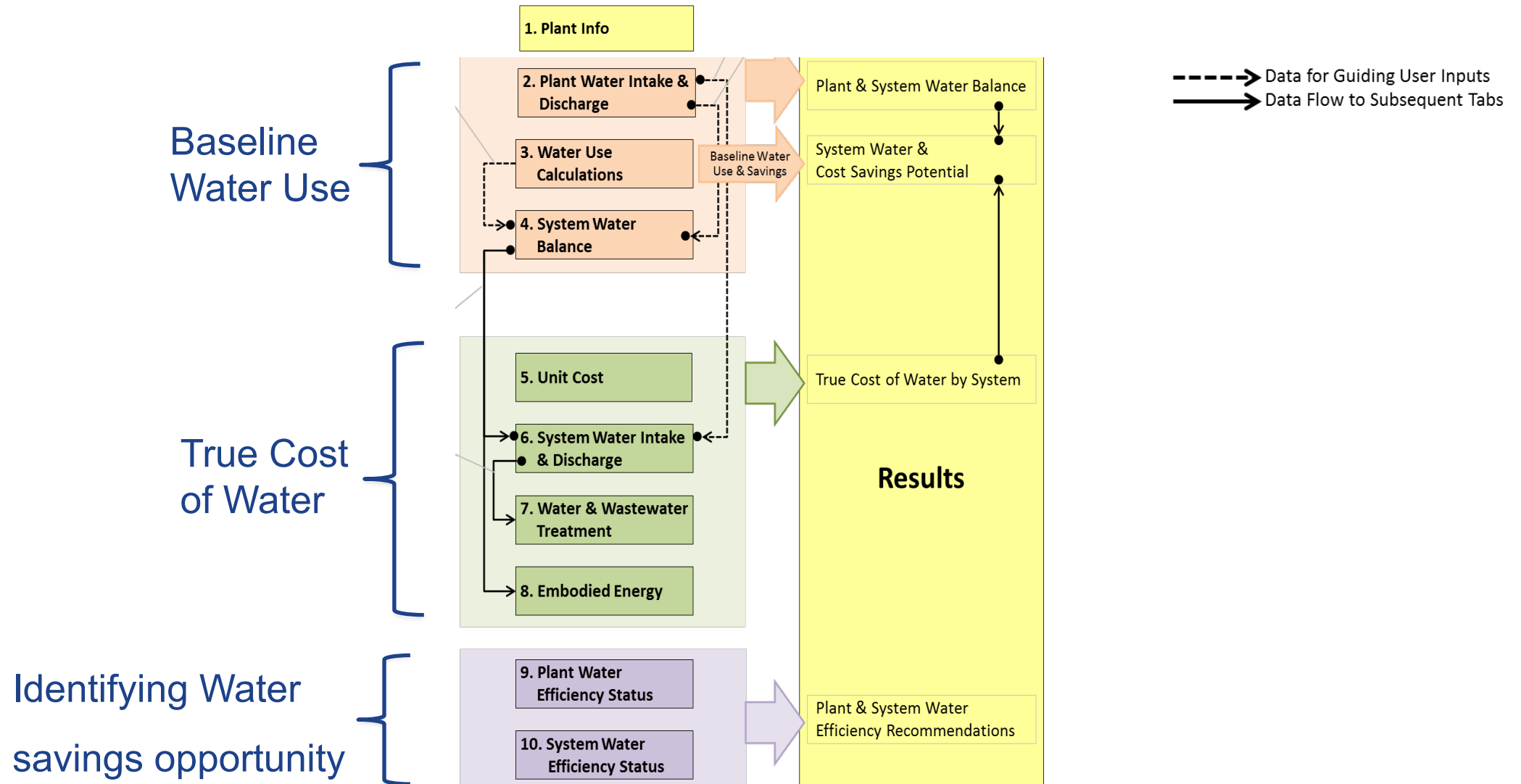
Tools and Techniques

An ideal water flow diagram makes baselining simpler



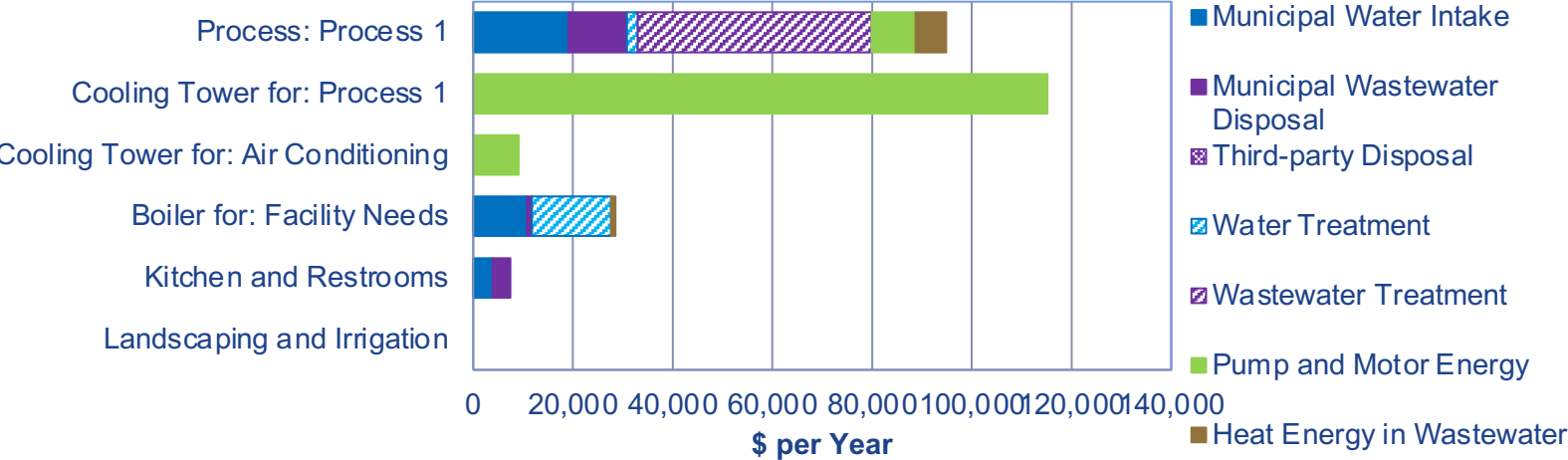
For a baseline assessment and water balance, water flow across each system or group need to be known

PWP Tool to help streamline water assessment

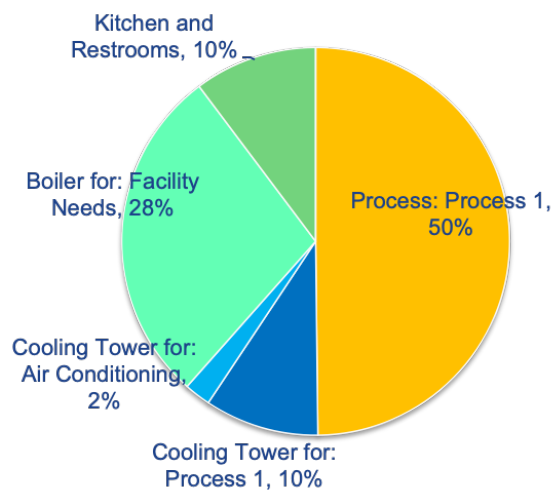


PWP results

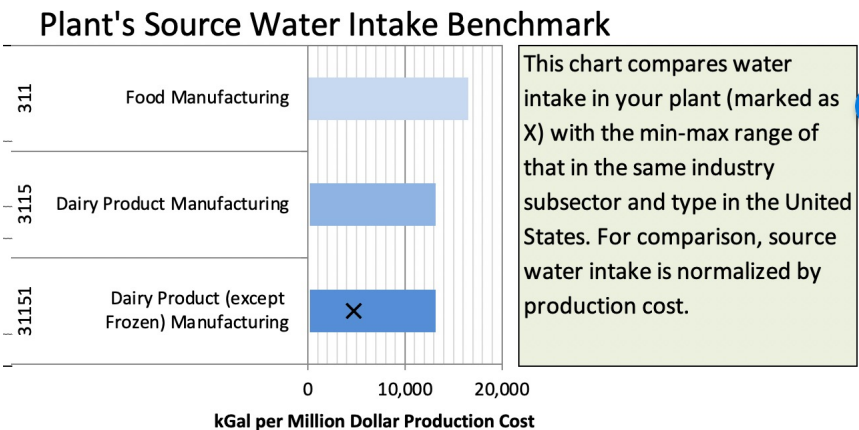
True Cost of Water



Water Intake by System



Comparison with Industry Average



Water Imbalance by System

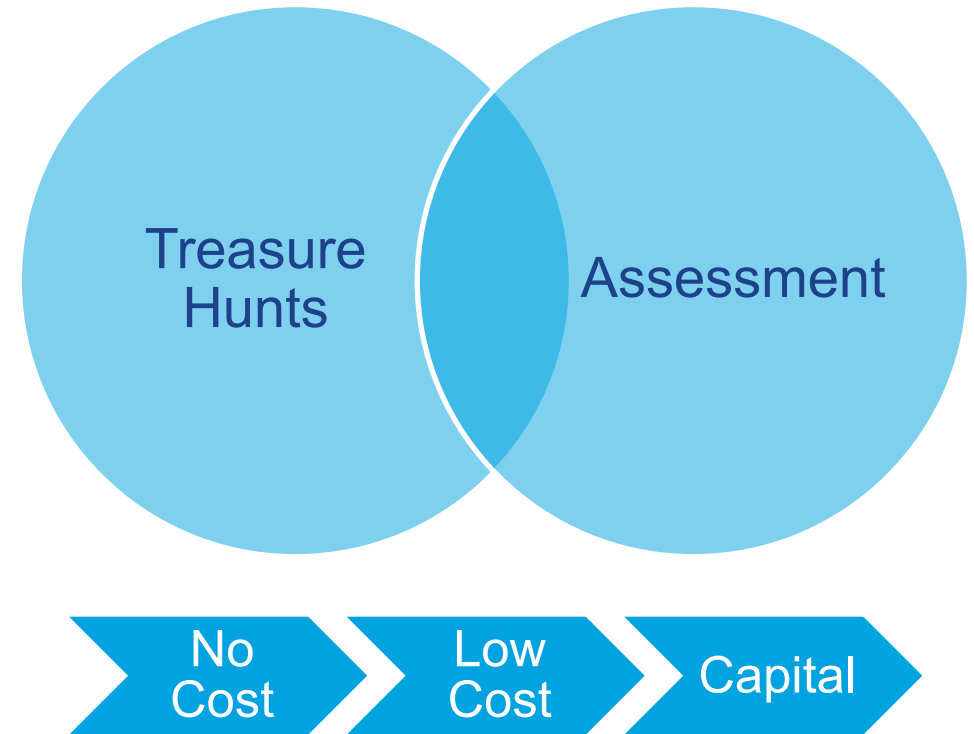
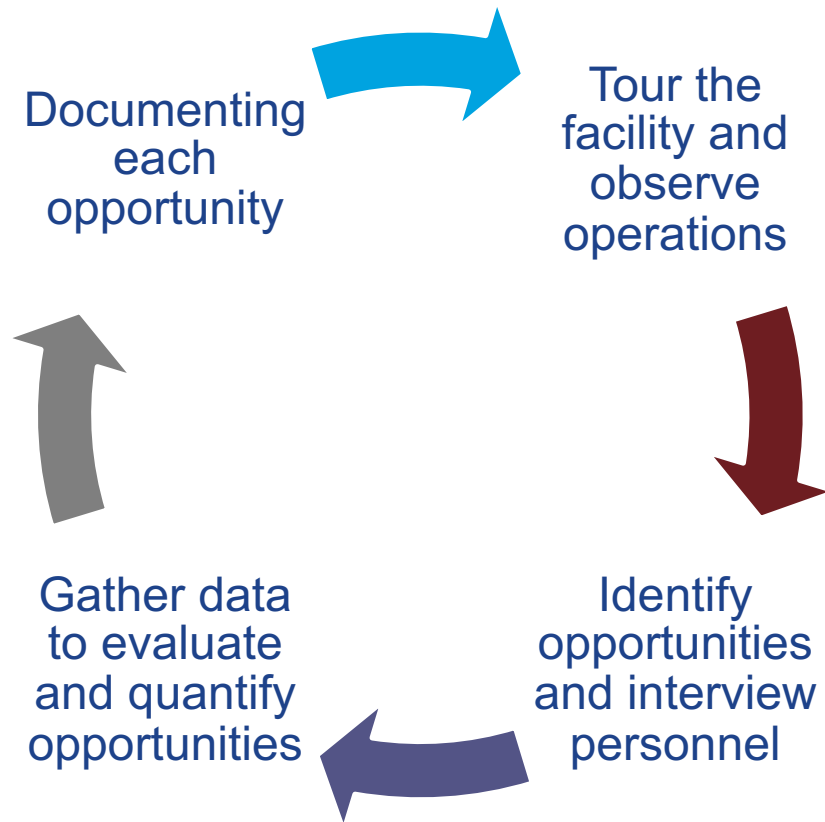
Water-Using System	Incoming Water Outgoing Water		Water Imbalance		
	Million Gallon per Year		Million Gallon Per Year	% of Incoming Water	% of Total Loss
Process: Process 1	6.8	6.405	0.395	5.8%	87.2%
Cooling Tower for: Process 1	1.3	1.3	-	-	-
Cooling Tower for: Air Conditioning	0.3	0.27	0.03	10.0%	6.6%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

Diagnostic Equipment

- Instruments and data loggers for onsite data collection



Treasure Hunt approach to find opportunity



DOE Tools for Treasure Hunt

WHAT DOES AN ENERGY TREASURE HUNT LOOK LIKE?



Integrated Energy Software - MEASUR



- All system level software tools will be available to through **one platform**
- Includes system modelers and individual calculators for **field validation**
- Includes **built-in guides** and **tutorials**

MEASUR – Treasure Hunt Module

Treasure Hunt Example
Last modified: [icon]

Facility Basics **Find Treasure** Treasure Chest Report

Find ways to save your hard earned treasure!

Use one of the following calculators to determine savings opportunities within your manufacturing facility.

Once an opportunity has been found, save the opportunity to your "Treasure Chest".

Add more details to each opportunity by clicking the [icon] icon and filling out an opportunity sheet.

Click the "Treasure Chest" tab to view a summary of your found treasure.

Filter Calculators by Utility Type:

Lighting Replacement

The calculator is designed to quantify the energy savings associated with lighting opportunities.

Replace Existing Motor

This calculator calculates the energy savings, cost savings, and payback period for replacing an existing motor with a higher efficiency motor.

Upgrade Motor Drive

The Motor Drive Calculator compares the annual energy cost of three motor drives: V-belt drive, Notched V-Belt drive, and Synchronous Belt Drive.

Natural Gas Reduction

This calculator is used to quantify the energy savings associated with reducing natural gas usage.

Electricity Reduction

This calculator is used to quantify the energy savings associated with reducing electricity usage.

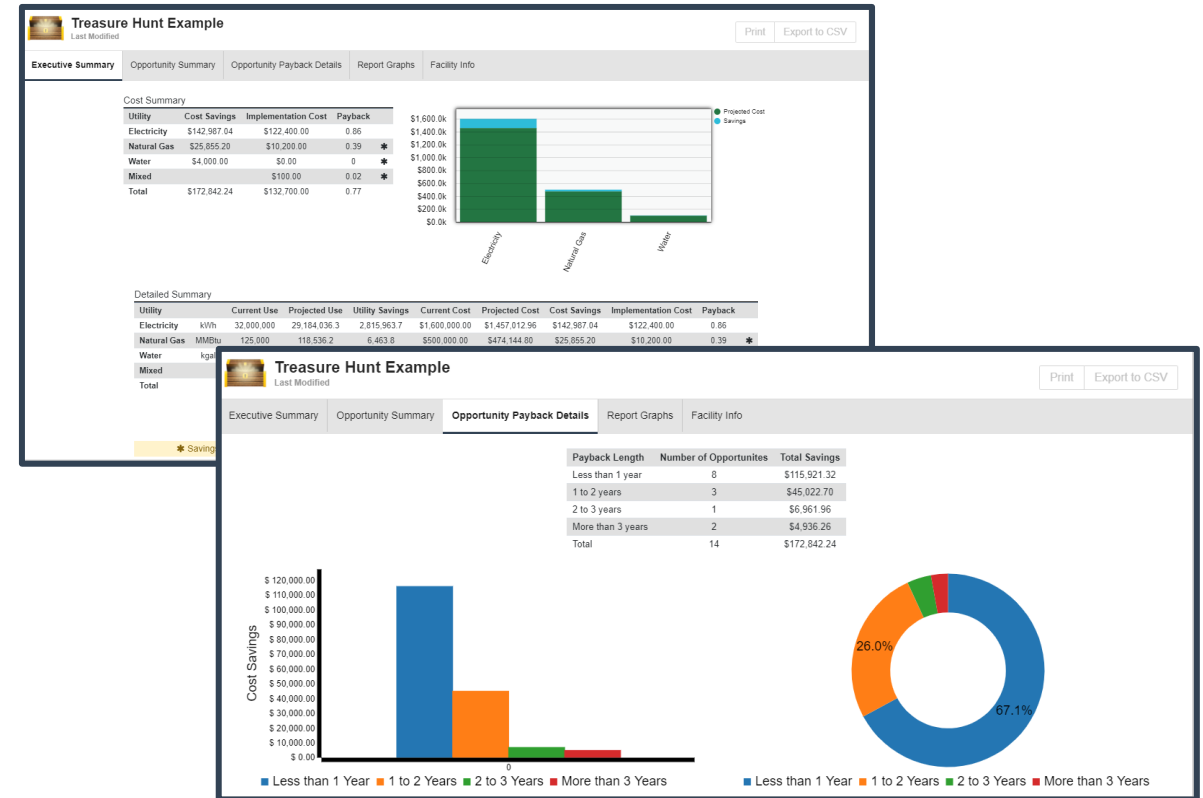
Compressed Air Reduction

This calculator reduces the compressed air use. Real description needed.

Custom Savings Opportunity

This calculator provides a space to add a Treasure Hunt Opportunity without using a calculator (such as after having done off-sheet calculations). Enter Baseline and Modification Utility use to calculate savings.

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Find low/no cost savings opportunities and documenting them for each treasure hunt team

Calculators

Case #1

+Remove Case

Water Flow Rate

1000

gpm

Cooling Load

100

MMBtu/h

Calculate Cooling Load

Annual Operating Hours

8760

hrs/yr

Cycles of Concentration

2

Drift Eliminator

No

Drift Loss Factor

0.2

%

Evaporation Loss

85

%

Correction Factor

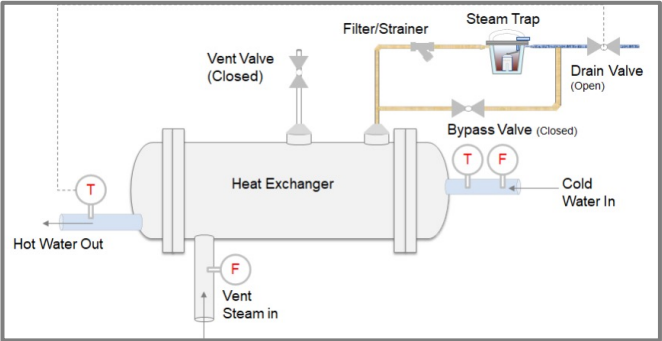
Results

Water Consumption

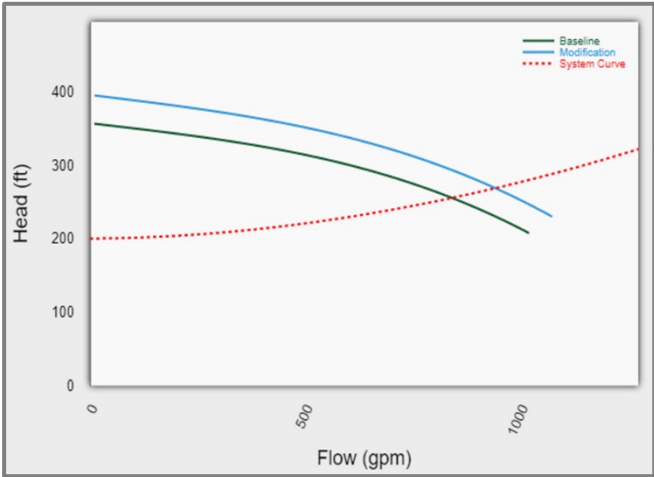
179,755.2

kGal

Cooling Tower



Vent Steam



Pump Curve

BLOWDOWN RATE CALCULATOR

BASELINE

MODIFICATION

RESULTS

HELP

Conductivity Readings

Feedwater Conductivity

400

µS/cm

Blowdown Conductivity

5500

µS/cm

Water Flow

1000

gpm

Water Temperature

500

°F

Boiler Efficiency

85

%

Operating Hours

8760

hrs/yr

Fuel Cost

4.99

\$/MMBtu

Water Cost

0.0025

\$/gal

Makeup Water Temperature

50

°F

Generate Example

Reset Data

Conductivity Readings

Feedwater Conductivity

200

µS/cm

Blowdown Conductivity

6000

µS/cm

Boiler

Steam Flow

1000

gpm

Steam Temperature

500

°F

Boiler Efficiency

85

%

Operations

Operating Hours

8760

hrs/yr

Fuel Cost

4.99

\$/MMBtu

Water Cost

0.0025

\$/gal

Makeup Water Temperature

50

°F

RESULTS

Baseline

Modification

Blowdown Rate (%)

7.84 %

3.45 %

Blowdown Rate (dth/hr)

85.11

35.71

Feedwater Rate (dth/hr)

1,085.11

1,035.71

Fuel Cost

\$1,804,827

\$833,071

Makeup Water Cost

\$223,402

\$93,749

Total Cost

\$2,118,229

\$926,820

Fuel Savings

\$1,061,757

Makeup Water Savings

\$129,653

Total Savings


\$1,191,410


Copy Table

Boiler Blowdown

Process Application	Water Required for Processing	Process Water Consumed in Product	Process Water Losses (Evaporation/Other)	Production Units per Year	Hours Water Used per Year	Fraction of Gross Water Use Recirculated	Total (Million Gallon per Year)					
							Gross Water Use	Source Water + Water from Other Systems	Wastewater Discharge + Recycled to Other Systems	Process Water Consumed in Product	Process Water Losses (Evaporation/Other)	Recirculated Water
	Gallon per Production Unit	Gallon per Production Unit	Fraction of Incoming Water				Incoming	Outgoing (Leaving the System)				
Process: Steel treatment 1 & 2	97.0	-	0.1	1,270,000.0	-	-	123.19	123.19	110.871	-	12.319	-
Process: Steel treatment 3 & 4	97.0	-	0.1	1,270,000.0	-	-	123.19	123.19	110.871	-	12.319	-
							-	-	-	-	-	-
							-	-	-	-	-	-
							-	-	-	-	-	-
							-	-	-	-	-	-
Aggregated Results												
Process: Steel treatment 1 & 2							123.19	123.19	110.871	-	12.319	-
Process: Steel treatment 3 & 4							123.19	123.19	110.871	-	12.319	-

Process Calculator (PWP)

 Better Plants
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Resources

- Water Risk Atlas: <https://www.wri.org/data/aqueduct-water-risk-atlas>
- PWP Tool: <https://www.energy.gov/eere/amo/plant-water-profiler-tool-excel-version-10-pwpex-v10>
- MEASUR: <https://www.energy.gov/eere/amo/measur>
- Treasure Hunt Toolkit: <https://betterbuildingssolutioncenter.energy.gov/better-plants/energy-treasure-hunts>
- BP Virtual Training: <https://bptraining.ornl.gov/>
- Diagnostic Loan Program: <https://betterbuildingssolutioncenter.energy.gov/better-plants/diagnostic-tools>

Presentation from Participants

Participant Feedback

- Key takeaways from the event
- Findings from the water assessment
- Next steps for water efficiency at your facility
- How can we improve the training

**Thank you all for attending the VINPLT on water
efficiency in manufacturing**

I hope the training was helpful

**If you have specific questions, please stay online and
we will try and answer them.**

**Alternately, you can email questions to me at
thirumarank@ornl.gov**