



Brewers Association
Water and Wastewater:
Treatment/Volume
Reduction Manual

2016 Sustainability
Benchmarking Update



LA Microbrewery Water Conservation

PART I

Takeaways from the Brewers Association Water &
Wastewater Sustainability Manual & Benchmarking
Reports

PART II

Applied to Existing Small & Independent Craft Brewers in
Los Angeles

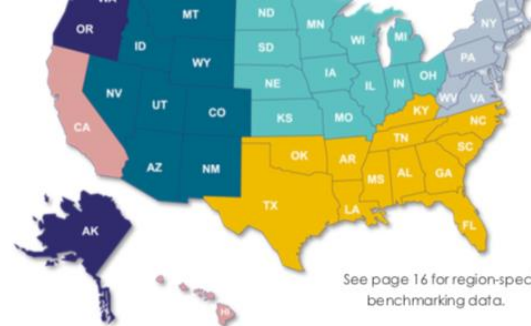
Breweries Reporting

Returning | First time

14 Brewpubs
29 Regional Breweries
35 Microbreweries

Returning Reporters

Alaskan Brewing Co. (AK)
Allagash Brewing Co. (ME)
Bear Republic Brewing Co. (CA)
Bell's Brewery, Inc. - Comstock (MI)
Bell's Brewery, Inc. - Kalamazoo (MI)
Bellway Brewing Company (VA)
Brewery Vivant (MI)
Broken Compass Brewing (CO)
Craft Brew Alliance - Kona (HI)
Craft Brew Alliance - Portland (OR)
Craft Brew Alliance - Portsmouth (NH)
Craft Brew Alliance - Woodinville (WA)
Discretion Brewing (CA)
Dry Dock Brewing Co. - North (CO)
Dry Dock Brewing Co. - South (CO)
Elliott Bay Brewhouse and Pub - Burien (WA)
Elliott Bay Public House and Brewery - Lake City (WA)
Elliott Bay Brewery and Pub - West Seattle (WA)
Epic Brewing Company (CO)
Ethereal Brewing (KY)
FiftyFifty Brewing Co. (CA)
Flying Fish Brewing Co. (NJ)
Fremont Brewing Co. - East (WA)
Fulton Beer (MN)
Goose Island Beer Co. (IL)
Great Divide Brewing Co. (CO)
Great Lakes Brewing Co. (OH)
Hopworks Urban Brewery (OR)
Iron Horse Brewery (WA)
Jackie O's Taproom - Brewery - Campbell St. (OH)
Jackie O's Public House & Brewpub - West Union St. (OH)
Lazy Magnolia Brewing Co. (MS)
Maine Beer Co. (ME)
New Belgium Brewing Co. (CO)
Odell Brewing Co. (CO)
Revolution Brewing - Kedzie (IL)
Rising Tide Brewing Co. (ME)
Sierra Nevada Brewing Co. - Chico (CA)
The Saint Louis Brewery - Bottleworks (MO)
The Saint Louis Brewery - Taproom (MO)
Stillmark Brewing Company (WI)
Upland Brewing Co. (IN)
Upper Hand Brewery (MI)
Urban Chestnut Brewing Co. - Grove (MO)
Urban Chestnut Brewing Co. - Midtown (MO)
Yards Brewing Co. (PA)
Zipline Brewing Co. (NE)



See page 16 for region-specific benchmarking data.

First Time Reporters

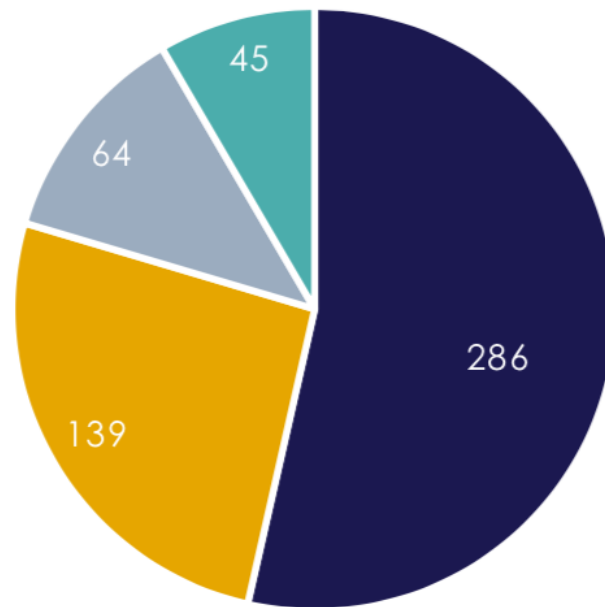
10 Barrel Brewing Co. (OR)
14th Star Brewing Co. (VT)
Arbor Brewing Company (MI)
Aslan Brewing Company (WA)
Bathub Row Brewing Co-op (NM)
Blue Point Brewing Co. (NY)
Breckenridge Brewery (CO)
Butcherknife Brewing Company (CO)
Dark Horse Brewing Co. (MI)
EagleMonk Pub and Brewery (MI)
Elison Brewery & Spirits (MI)
Elysian Brewing Co. (WA)
Four Peaks Brewing Co. (AZ)
Fullsteam Brewery (NC)
Grand Rapids Brewing Company (MI)
Horse & Dragon Brewing Company (CO)
Land-Grant Brewing Company (OH)
Left Hand Brewing Company (CO)
Maui Brewing Co. - Kihei (HI)
Mother's Brewing Co. (MO)
Mount Hood Brewing Co. (OR)
North Coast Brewing Co. Inc. (CA)
One Well Brewing (MI)
Pigeon Hill Brewing Co. (MI)
Rockford Brewing Company (MI)
Sierra Nevada Brewing Co. - Mills River (NC)
SKA Brewing (CO)
Town In City Brewing Co. (TX)
Upslope Brewing Company - Flatiron Park (CO)
Upslope Brewing Company - Lee Hill (CO)
Witch's Hat Brewing Co. (MI)

GHG Comparison

by Production Size

Lbs. CO₂/bbl

45	>100k bbl/yr.
64	10-100k bbl/yr.
139	1-10k bbl/yr.
286	<1k bbl/yr.

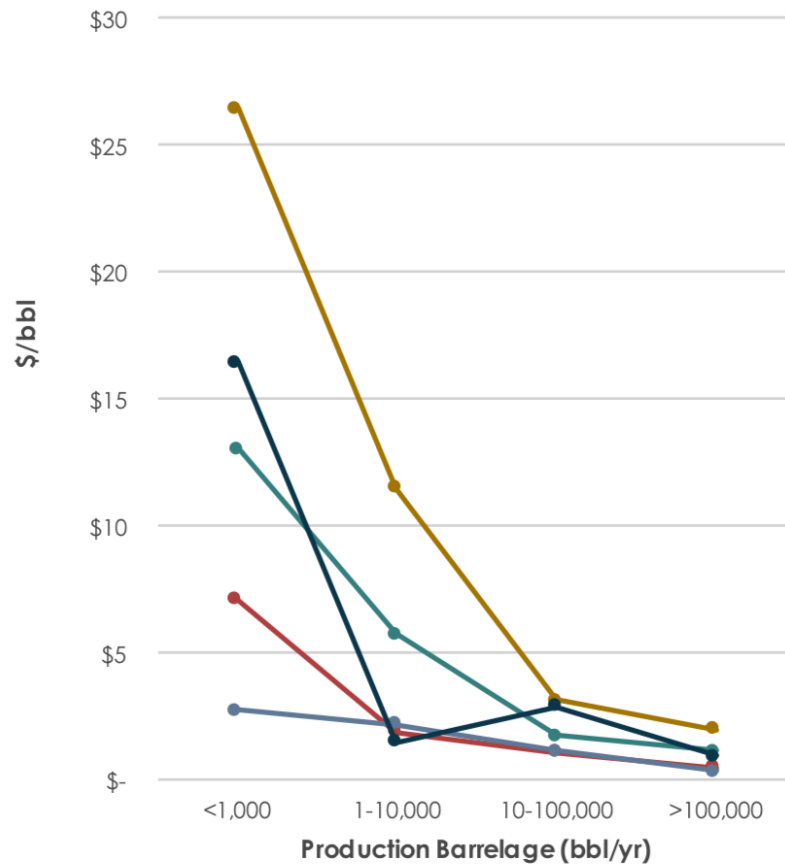


■ <1000 bbl/yr ■ 1-10,000 bbl/yr ■ 10-100,000 bbl/yr ■ >100,000 bbl/yr

Economies of Scale

Cost of Utilities
per Product Barrelage
bbl/yr

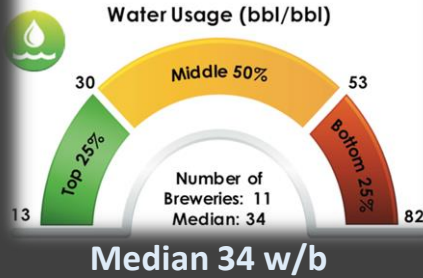
Electricity
Wastewater
Natural Gas
Water
CO₂



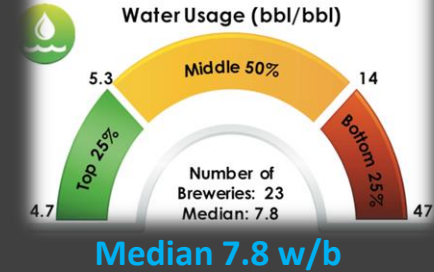
Electricity Natural Gas Water
CO₂ Wastewater

BENCHMARK & BALANCE

<1k bbl/year

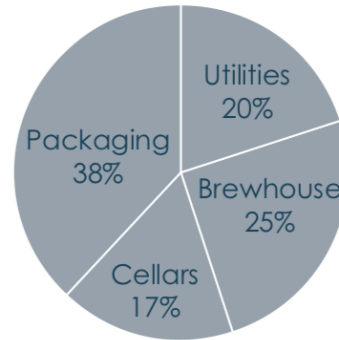


1k-10k bbl/year

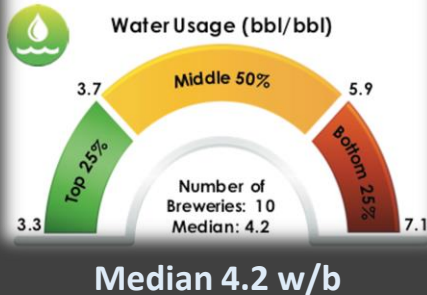


Typical Brewery Water Use Per Area

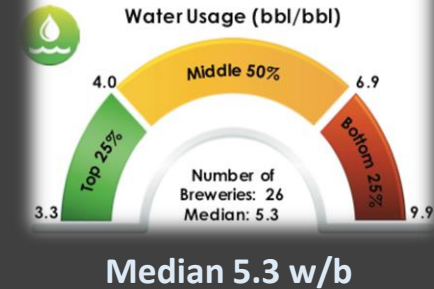
Water Use Per Department h1 Water/Total Beer



>100k bbl/year



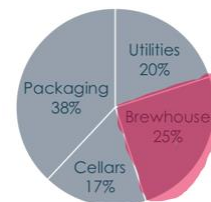
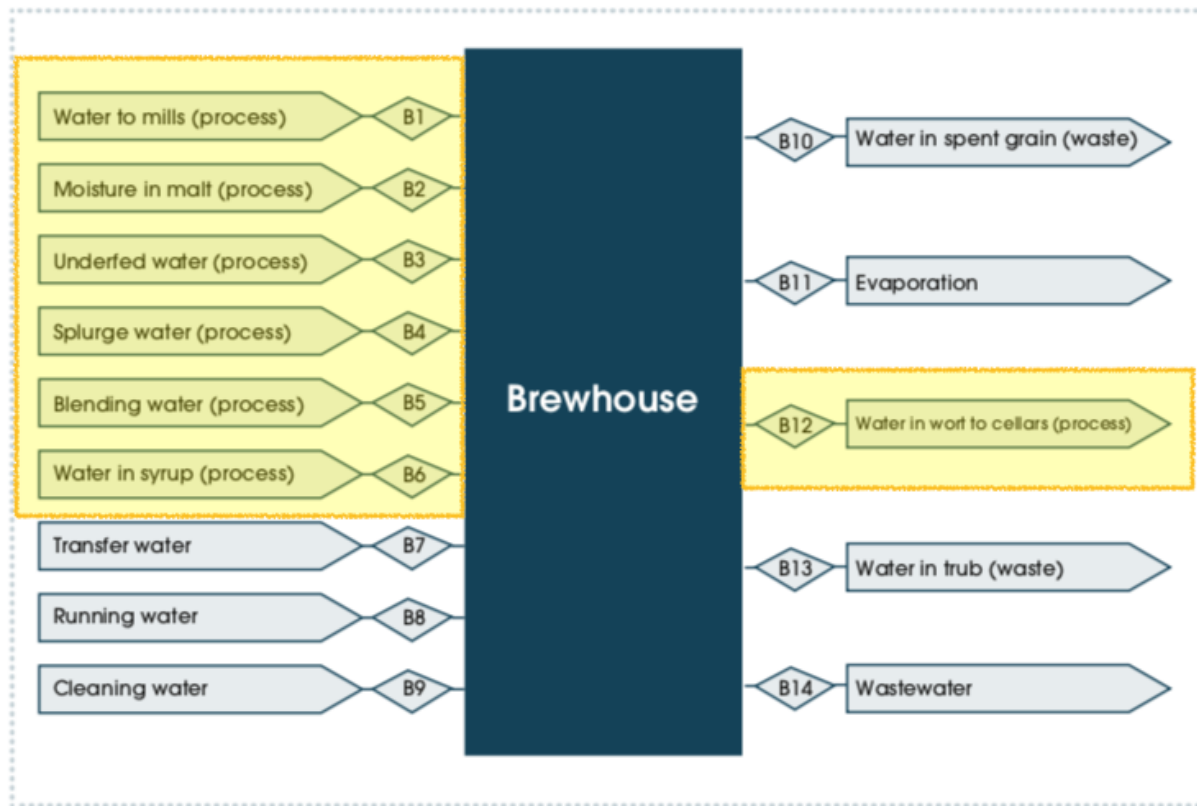
10k-100k bbl/year



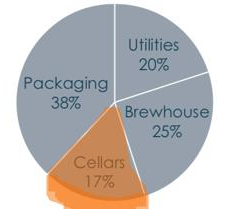
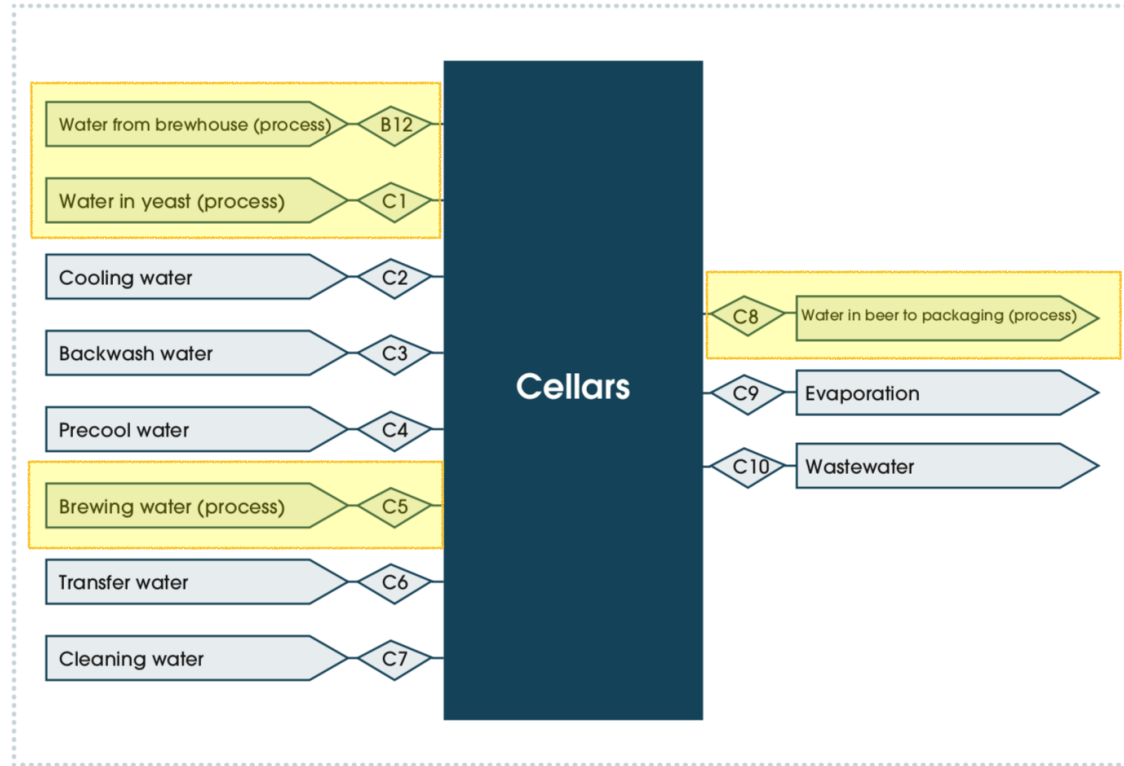
BREWERS ASSOCIATION : SUSTAINABILITY BENCHMARKING TOOLS

<https://www.brewersassociation.org/best-practices/sustainability/sustainability-benchmarking-tools/>

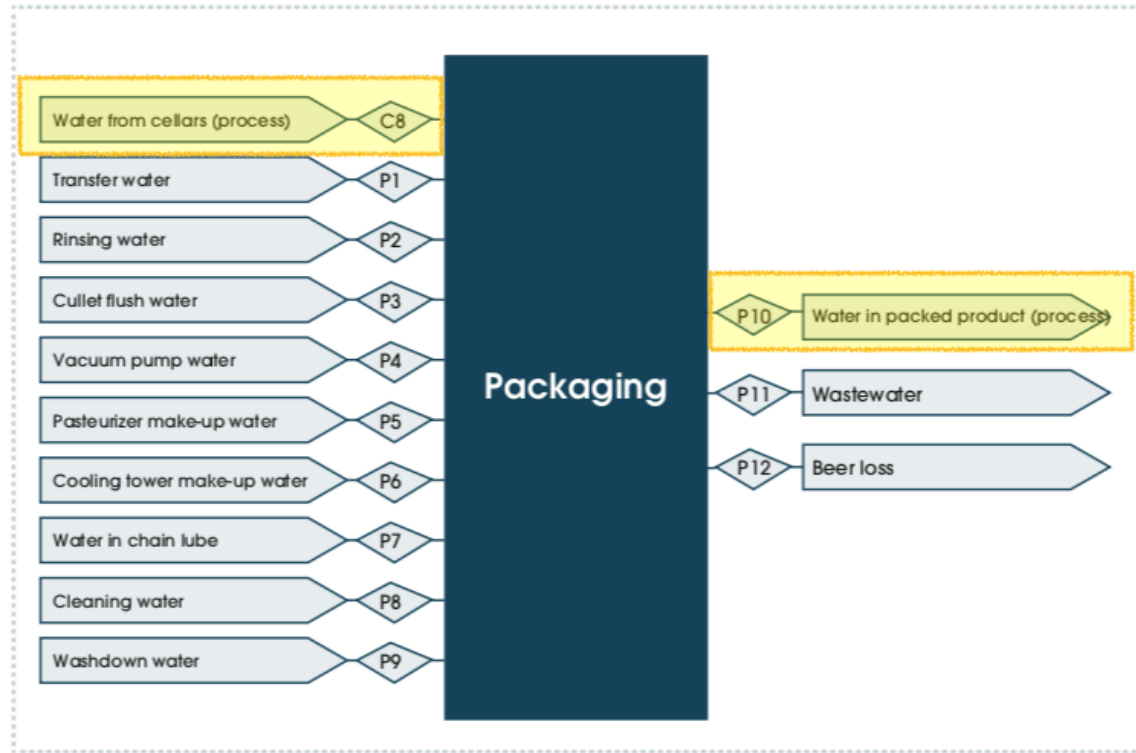
Brewing Water And Wastewater Sources



Fermentation Water and Wastewater



Packaging Water And Wastewater



Typical Reductions In Water Use

Water saving measure	Possible application	Typical reduction in process use (%)
Closed loop recycle	Fermentor cooling	>90
Cleaning-in-place (CIP)	New CIP set	60
Re-use of wash water	Cask washer	50
Countercurrent rinsing	CIP set	40
Good housekeeping	Hose pipes	30
Cleaning-in-place	Optimisation of CIP set	30
Spray/jet upgrades	Cask Washer	20
Brushes/squeegees	Fermentor cleaning	20
Automatic shut-off	Pump cooling water	15

Moving From Simple To More Complex Actions



- ✓ Adjust water flow
- ✓ Modify existing equipment or install water-saving devices
- ✓ Change to more water-efficient equipment
- ✓ Reuse or recycle water (treat if needed)
- ✓ Shift to a low-water or waterless process

Leak Detection Checklist

A systematic program of leak detection and repair can prevent future water waste. On a regular basis, thoroughly check the following areas:

- *restrooms and shower facilities (in-tank-type toilets, conduct dye tests to locate hidden leaks)*
 - *kitchens, dishwashing facilities and food-preparation areas*
 - *wash-down areas and janitor closets*
 - *water fountains*
 - *water lines and water delivery devices*
 - *process plumbing, including tank overflow valves*
 - *landscape irrigation systems*
-

EBEWE Benchmarking

LADBS Requirement for privately owned building 20k sq. ft. to benchmark & report annually by June 1st every year
with audits & retro-commissioning requirements starting 2019

The screenshot shows the LADBS website header with the Los Angeles Department of Building and Safety logo. The navigation menu includes Services, Our Organization, Forms & Publications, Locations, Contact, and Help. A status bar indicates the website is open today from 9:00AM to 4:30PM. A notice states the website will be closed on Indigenous Peoples' Day 10/8/2018. The main heading is "Existing Buildings Energy & Water Efficiency Program" with a subheading "Services / Green Building & Sustainability / Existing Buildings Energy & Water Efficiency Program". Below the heading is a large image with four buttons: "New Reports & Statistics", "Building Compliance Status (Check for your Building)", "EBEWE FAQs", and "Register your building". At the bottom, there are four colored buttons: "Existing", "Find your", "LA Dept of", and "Register your building".

The EBEWE Navigator form is titled "EBEWE Navigator" and is powered by the "LA Energy & Water Efficiency Resource Center" and the "Green Building Challenge". The form is divided into two sections: "Property Information" and "Contact Information".

Property Information

- * Property Information
 - Address
 - Building ID
 - AIN [\(find here\)](#)


Contact Information

- * Contact Information
 - Name
 - Title
 - Company
 - E-mail
 - Phone Number


At the bottom of the form are two buttons: "Prev" and "Next".

Summary of New Charges

Details on following pages.

Los Angeles Department of Water and Power Charges			
 800-499-8840	Water Charges	7/12/18 - 8/10/18	125 HCF \$1,031.51
	Total LADWP Charges		\$ 1,031.51

LADWP provides billing services for the Bureau of Sanitation. All money collected for the services listed in the City of Los Angeles Bureau of Sanitation Charges section is forwarded to them.

City of Los Angeles Bureau of Sanitation Charges			
 800-773-2489	Sewer Charges	7/12/18 - 8/10/18	\$597.24
	Total Sanitation Charges		\$ 597.24

Total New Charges \$ 1,628.75

Sewer Charges

Cust Ref :

SA # :

BILLING PERIOD

7/12/18 - 8/10/18

DAYS

29

SEWER RATE SCHEDULE

Sewer Service Charge - Multi Dwell and Commercial

Sewer Service Charge*	116.25000 HCF x \$5.11/HCF	594.04
Sewer Service Low Income Surcharge*		3.20

Total Sewer Charges \$ 597.24

*Your Sewer Service Charge is calculated on 93% of your water consumption.



LA SANITATION - FINANCIAL MANAGEMENT DIVISION (FMD) COMMERCIAL SEWER SERVICE CHARGE (CSSC) REQUEST FOR ADJUSTMENT

Please complete and sign the form, attach a copy of your DWP bill, and

MAIL TO:

LA SANITATION
COMMERCIAL SSC, PO BOX 79112
LOS ANGELES, CA 90079-0112

OR

FAX:

213 485-2984 OR
213 485-4269

To assist us in making an appropriate determination regarding your request for a sewer service charge adjustment, please provide detailed information regarding your request.

Your name: _____ (Required if requesting an adjustment)

Service address: _____

City _____ State _____ Zip _____

Mailing address: _____

(if different from service address)

City _____ State _____ Zip _____

Telephone number: () _____

Language Preference: ☐ English ☐ Spanish ☐ Other _____

Type of Adjustment Requested

- ☐ Vacancy Dates: _____ (start date – end date)
- ☐ Multi-Family Dwelling: _____ (# of units, bedrooms and irrigated area. See Irrigation requirement at right.)
- ☐ Water Evaporated by Cooling Tower: _____ (Provide #, chiller tonnage, Δ, % load factor, etc below)
- ☐ Water Leak Date: _____ (must submit repair bills with dates)
- ☐ Other: _____
- ☐ Irrigation: _____ (square footage of the irrigated area)

State what you are asking for (required): _____

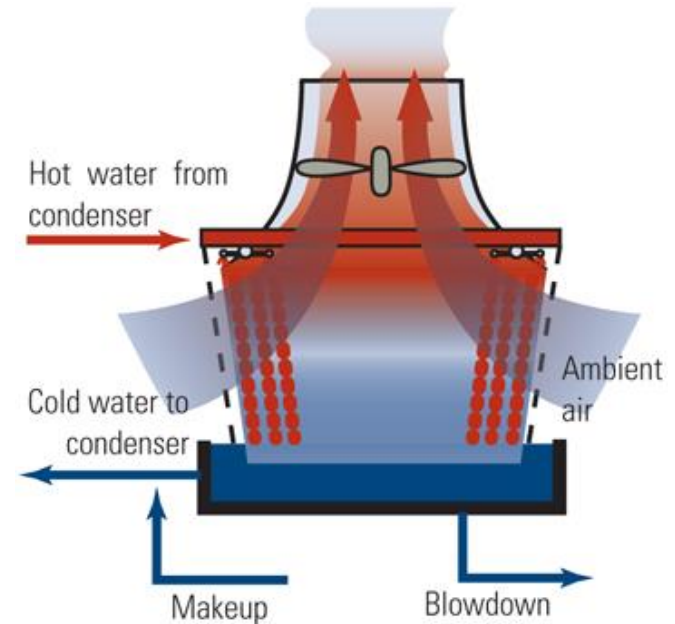
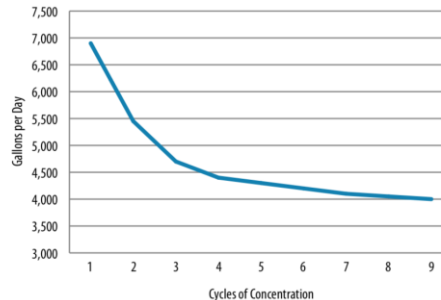
(Note: use opposite side of form for additional space)

Cooling Tower or Evaporative Condenser

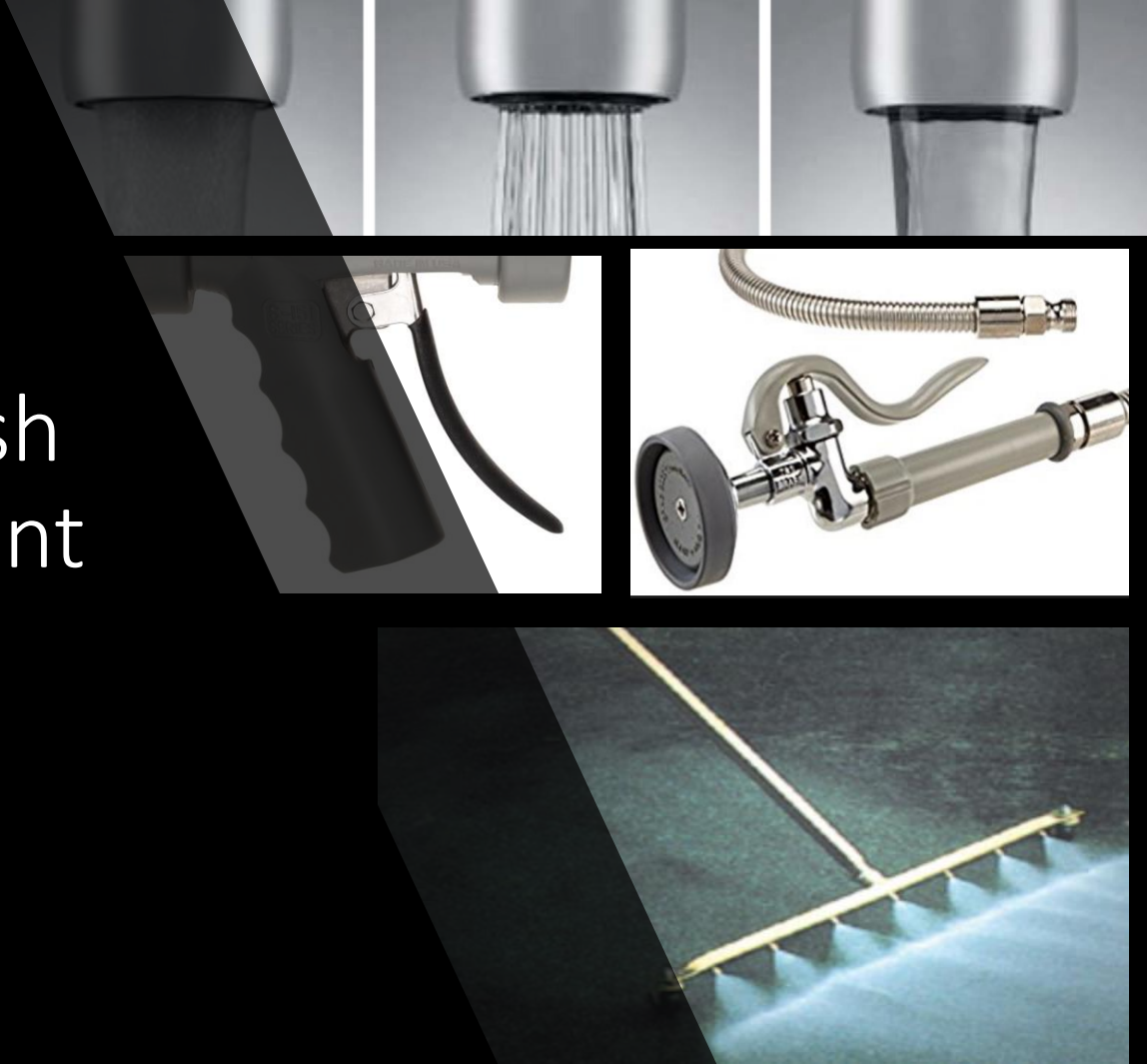
Table 6-1. Percent of Make-Up Water Saved by Maximizing Cycles of Concentration

New Concentration Ratio (CRF)												
Initial Concentration Ratio (C _i)	2	2.5	3	3.5	4	5	6	7	8	9	10	
	1.5	33%	44%	50%	53%	56%	58%	60%	61%	62%	63%	64%
	2.0	–	17%	25%	30%	33%	38%	40%	42%	43%	44%	45%
	2.5	–	–	10%	16%	20%	25%	28%	30%	31%	33%	34%
	3.0	–	–	–	7%	11%	17%	20%	22%	24%	25%	26%
	3.5	–	–	–	–	5%	11%	14%	17%	18%	20%	21%
	4.0	–	–	–	–	–	6%	10%	13%	14%	16%	17%
	5.0	–	–	–	–	–	–	4%	7%	9%	10%	11%
	6.0	–	–	–	–	–	–	–	3%	5%	6%	7%

Figure 6-3. Cooling Tower Water Usage at Various Cycles of Concentration for a 100-Ton Tower




Sanitation Wash Down Equipment Flow Control



Reverse Osmosis | RO Systems

A detailed view of an industrial Reverse Osmosis (RO) system. The setup includes multiple large, white, horizontal cylindrical pressure vessels (membrane modules) mounted on a stainless steel frame. A network of polished stainless steel pipes connects these modules, featuring various valves, gauges, and a pressure transducer. A red electric motor is visible at the bottom left, driving the system. The background shows a clean industrial environment with a green safety railing.



High Pressure Hot Water Power Wash System





Clean in Place (CIP) Systems

Instantaneous or Point of Use Hot Water Systems





TEETH FOR A CUSTOMIZED SUSTAINABILITY MANAGEMENT PLAN

WILLIAM S. CORDRAY

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