Water Efficiency in Industrial Sector

By:

Green Path Solutions

Al Obeid, Mohammad Faris

O&M JCE®, CEM®, CMVP®, CWEP®, CEMP®, CLSSGB
Resource, Water & Energy Consultant, RO Desalination Expert

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00962 79 299 1860

moh.faris@greenpathsol.com

About Author:

EMAIL
moh.faris@greenpathsol.com

PHONE NUMBER
00962 79 299 1860

ADDRESS
Amman - Jordan

Mohammad Faris

CE, RE®, CEM®, CWEP®, CMVP®

About Me

Senior Consultant Engineer with more than 27 years' experience in Water systems, with an extensive experience in leading EPCs, O&M activities and as a consultant in Resource, water and energy efficiency. Mohammad had lot of researches in enhancing water efficiency in the industrial and Municipality sectors.

Education

1992 - 1996 **Bachelor Degree**
University of Mosul/ Mechanical Eng.

Professional Skills

- Project Management
- O & M Management
- Water Desalination
- Computer skills
- ISO Consultation
- Capacity Building

Work Experience

2018 - present **Resource, Water, & Energy Consultant**
Green Path Solutions / Amman, Jordan

1999 - 2018 **Factory Manager**
Nestle Co. / Saudi Arabia & Jordan

Achievements

2024 - **Achievement 01**
Water efficiency for industrial sector

2024 - **Achievement 02**
Resource efficiency Industrial Sector

Introduction:

- Water scarcity has become a serious issue in the region, especially in Jordan, due to the limited resources, climate change, low level of rainwater recharge, and over-extraction to cover the sudden increase in demand; The situation is getting worse due to the increase numbers of refugees coming from neighboring countries, exceeding available resources.
- All of these factors have contributed in increasing pressure on the availability of water needed for Industrial activities. Therefore, increasing the use of water as a main required resource will contribute to reducing the deficit between water supply and demand.
- In Jordan, the Industrial sector represents 25% (13 Billion U$D) of the national GDP, employing over 250,000. Using the right amount of water in manufacturing will result in cost saving and environmental benefits. It will also have a significant impact on encouraging the investors to start thinking about Jordan as a preferred environment for investment.

Abstract:

- This paper discusses case studies in increasing the water efficiency in industrial sector through conducting the water audit as a great tool to identify the opportunities that can be implemented to increase water utilization thus reduce water consumption.
- The industrial sector offers many opportunities to save water by identifying the best practices of how water is used, ways of saving, what type of water and the minimum quality required that can be used. This initiative is proven to have a significant reduction in water consumption in manufacturing that lead to saving in production cost and positive impact on environment, without comprising quality, and safety.
- The result shows a reduction in raw water consumption of up to 40% per unit of production, and this saving leads not only in water consumption cost but also in reduction in water treatment cost, wastewater investment, and costs associated with its discharge, and thus energy cost. Most importantly, however it secures the water availability for future expansion and meeting the demand.

Water Usage in Manufacturing:

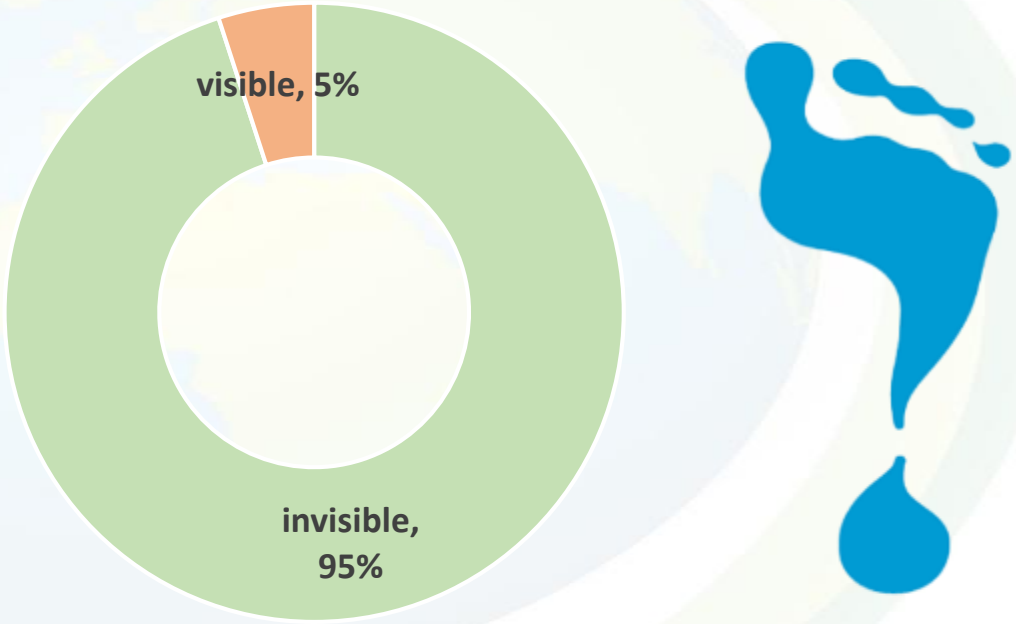
- Solvent.
- Cooling & Heating agent.
- Transport medium.
- Cleaning & Disinfection.
- Personal hygiene.
- Ingredients.

Water Footprint:

10,000 liters to create a single pair of Jeans.

But

500 liters to make a single pair of Jeans from a recycled one.



Virtual water is 95%

Why Water Audit:

- ✓ Water Shortage - Identify opportunities for water conservation and improvement measures.
- ✓ Cost saving - Improve Financial Performance through cost saving (Water & Energy).
- ✓ Enhance Knowledge of water distribution system.
- ✓ Benchmarking - Asses and improve the performance of the water treatment systems -
- ✓ Operation reliability - Enhance water efficiency and productivity.
- ✓ Alignment with SDG6&12, Reduce environmental impact on climate.
- ✓ Improve water quality and safety.
- ✓ Prevent accidents or sabotage.
- ✓ Provide short term and long term sustainable water management – secure supply.
- ✓ Reduce risk or exposure to rising of prices.

Water Audit:

A Systematic and integrated approach of measuring and accounting for water use and losses in systems, identifying and implementing water conservation and improvement measures.

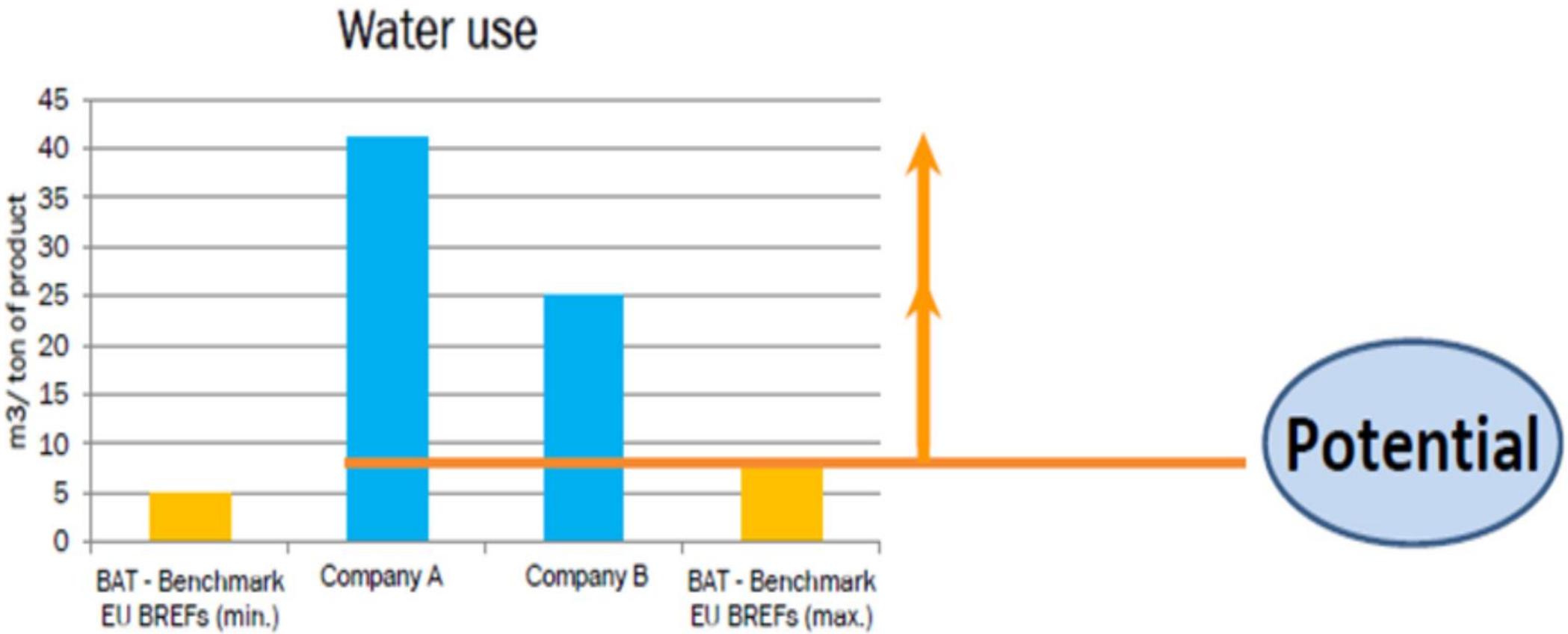
The water audit includes reviewing the performance across the site considering everything from how you purchase or receive water, how o treat the water, to the amount you waste through consumption or leakages.

The water audit is a qualitative and quantitative analysis process.

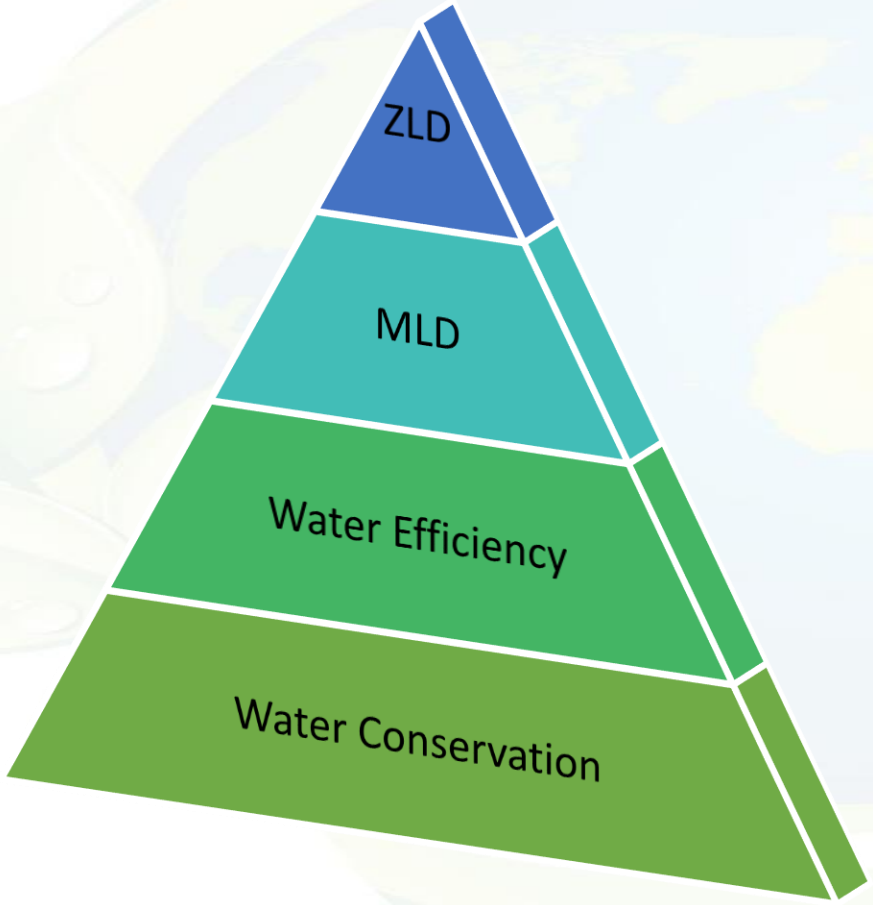
Audit Process Review:

The 5 R's:

Benchmarking:



Minimum Liquid Discharge MLD vs. Zero liquid Discharge ZLD:

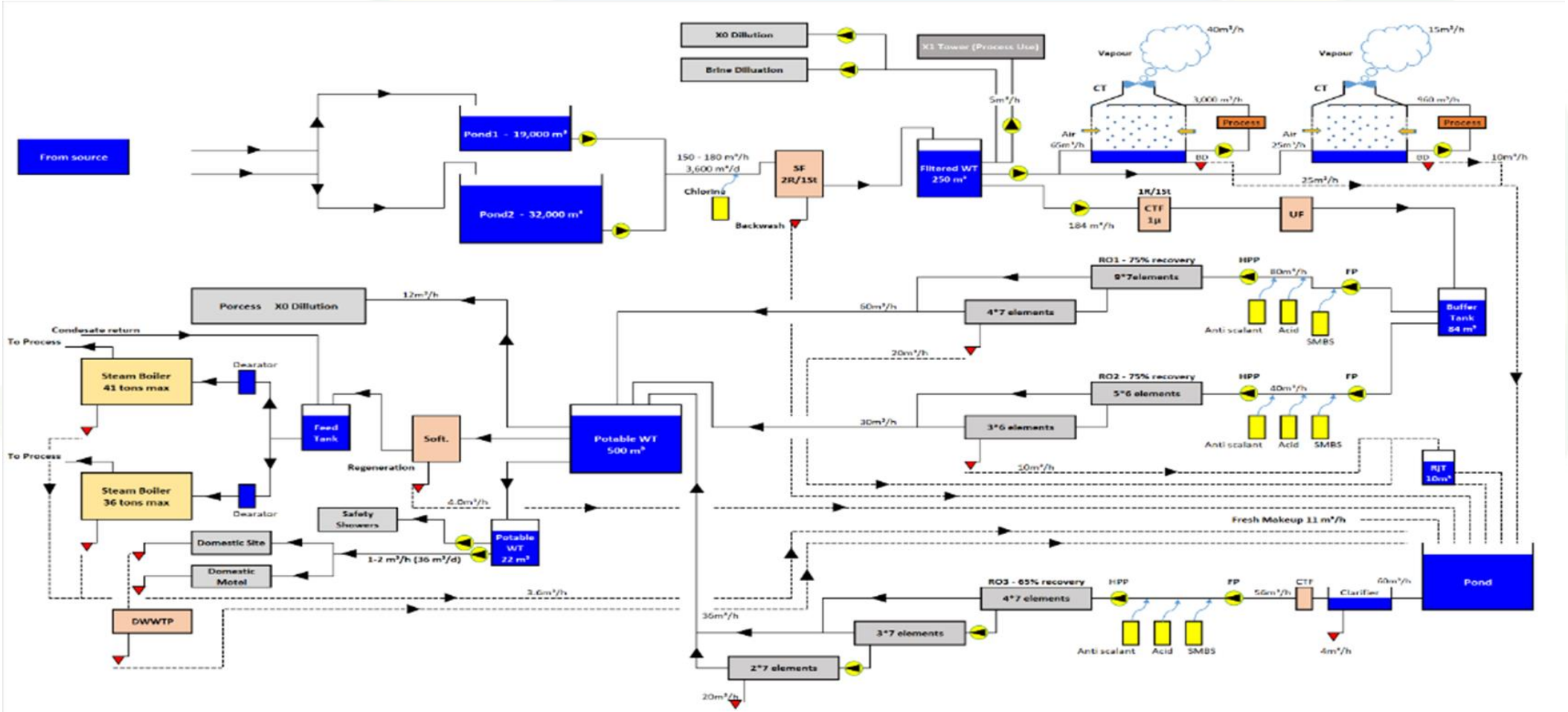


Do you need Zero Liquid Discharge?

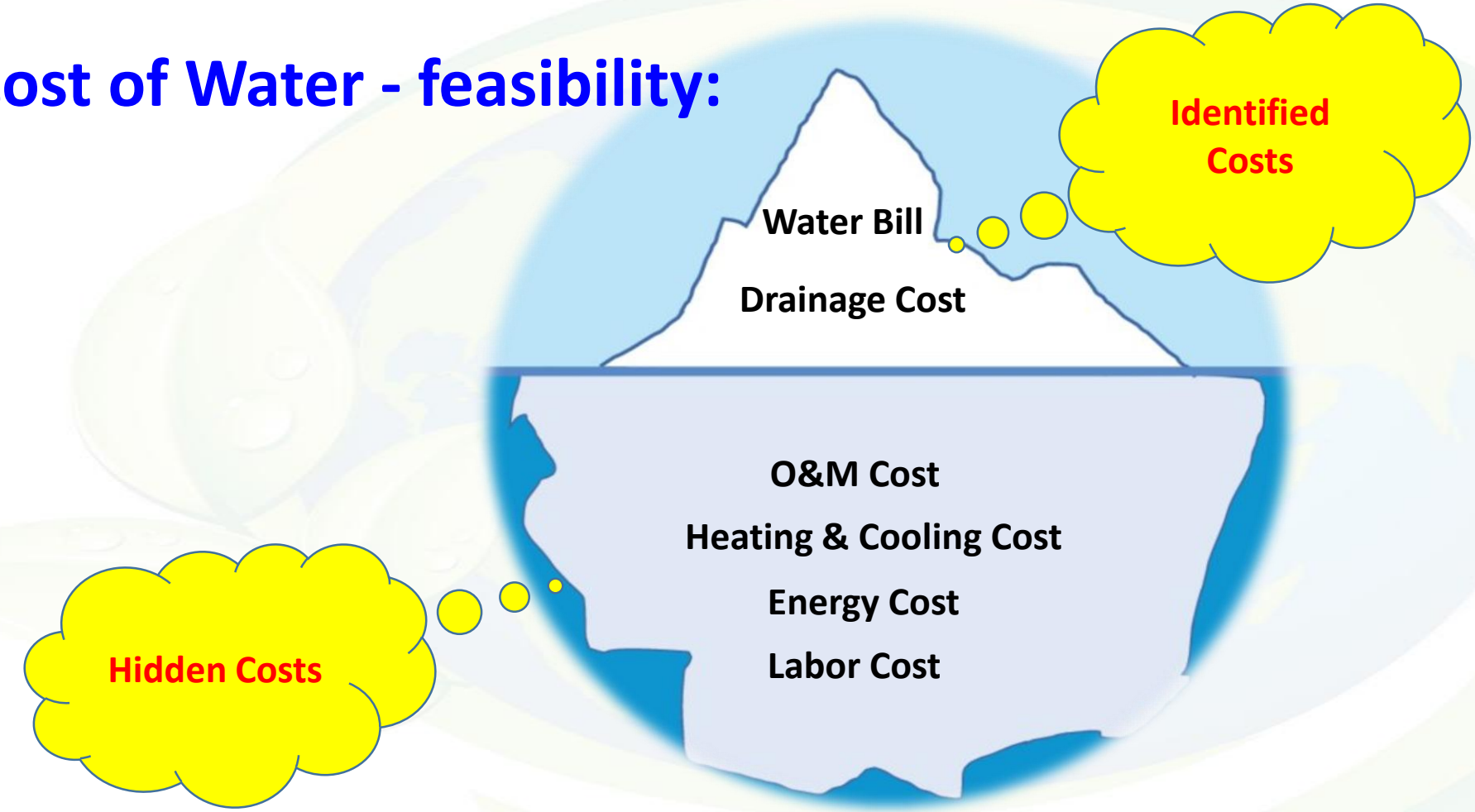
Before considering zero liquid discharge, understand your treatment goals, economics, and regulatory requirements. For example, concentrating wastewater to a lower volume brine that can be sent for disposal may be more cost effective that producing zero liquid discharge solids.

Audit Tools:

Water Mapping:



True Cost of Water - feasibility:



What about the Risk Impacts and the Missed Opportunities?

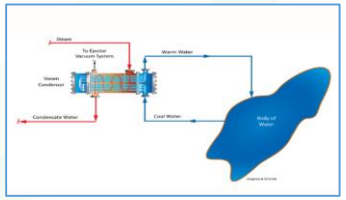
Saving Opportunities:










Water Saving Opportunities:

System	Effective O&M Clear SOP	Reuse/recycle waste	Data driven strategy	Alternative Technology	Alternative source
Reverse Osmosis	Leakages / monitoring	Reject water			
Multimedia filter		Backwash water	Backwash	Cartridge filter	
Softener		Brine water	Regeneration	Antiscalant	
Wastewater WWTP		After tertiary treatment			Cleaning & flushing
Cooling Towers	Drift eliminator	Blowdown water	Blowdown/cooling T°C	Dry cooling	Makeup water
Steam Boilers	Leakages /	Blowdown/condensate	Blowdown / CoC.		Makeup water
Once through cooling		The effluent	Cooling flow	Dry cooling	
Cleaning & Washing	Planning / 5T's	Cleaning solution/ final rinse	Frequency/ no. of steps	Dry cleaning	Cleaning
Production Process	Leakages / monitoring / overfilling			Thawing by microwave oven	
Domestic Use	Leakages / monitoring / overpressure	Greywater/ final rinsing		Water saving devices Aerators, IR tabs	Toilets' flushing
Landscaping	Leakages / monitoring / overflow		Smart control weather/moisture	Drip irrigation	Irrigation

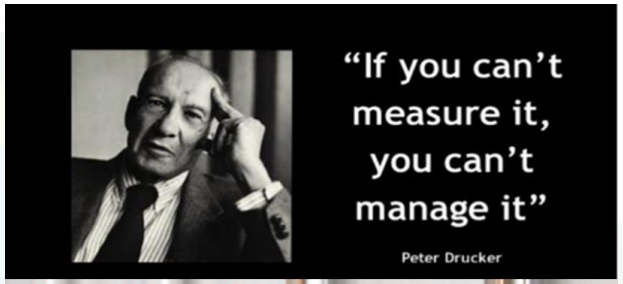
Best Practices:

Tips:

Water Champion

Define Roles & Responsibilities

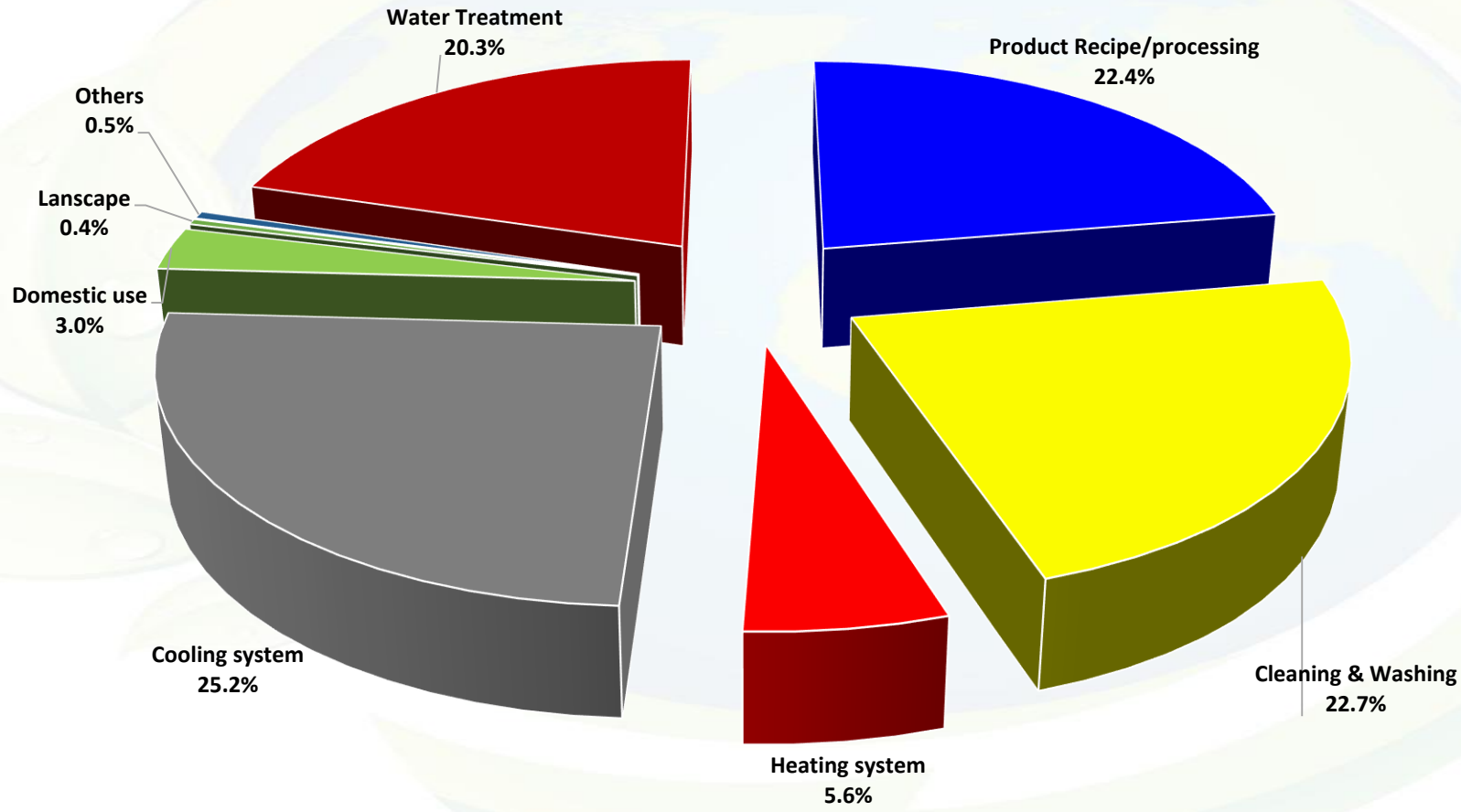
- Production
- Maintenance
- Quality
- Procurement
- HSE



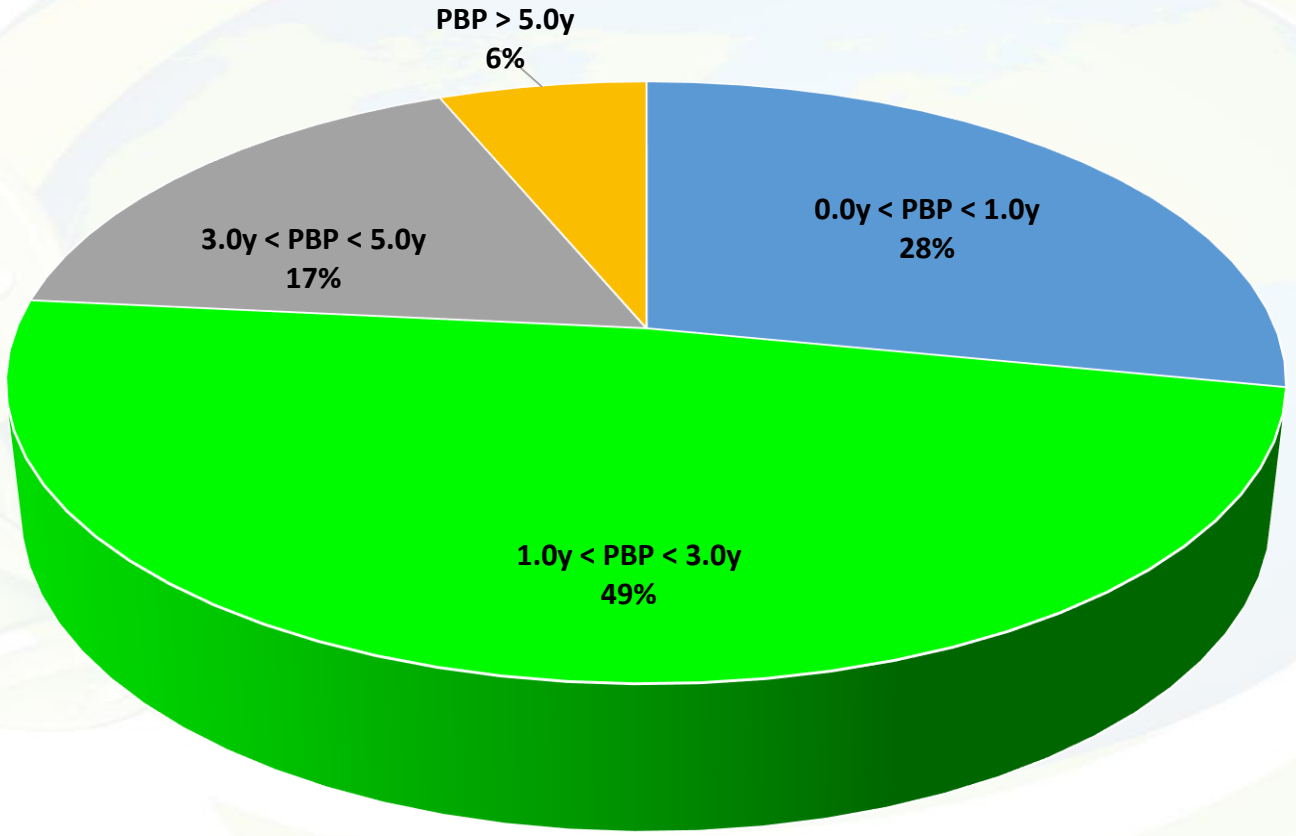
Alternative water resource

Case studies – 16 factories:

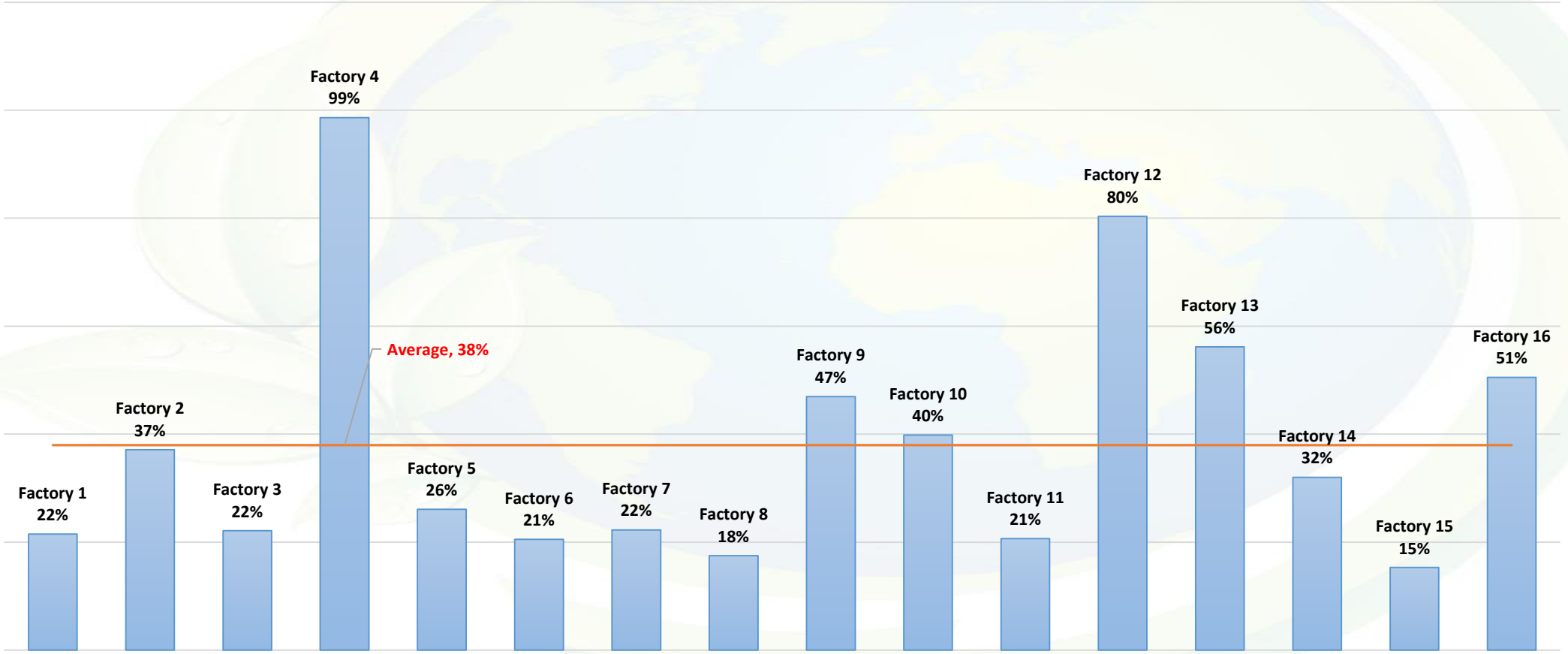
Water Balance:



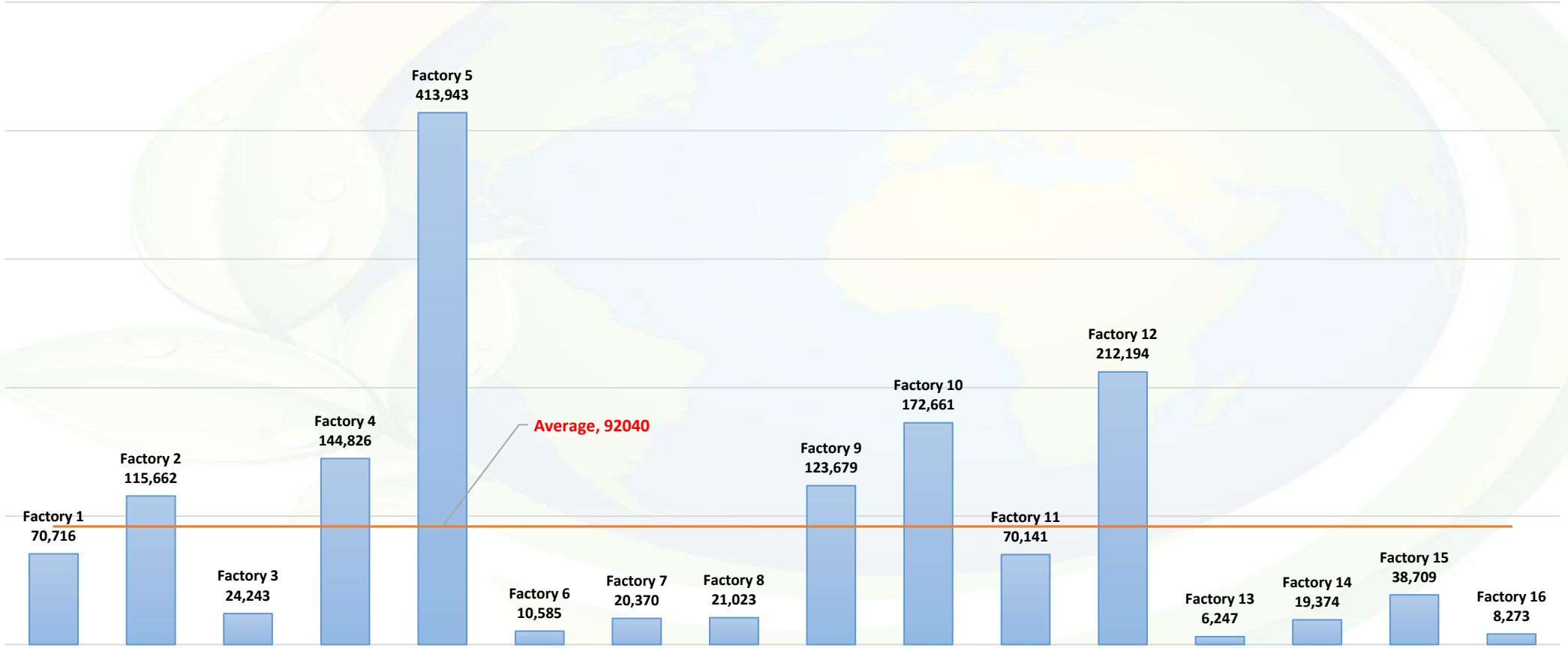
Investment Payback:



Water Saving in % m³:



Water Saving in JD:



Q & A

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moh.faris@greenpathsol.com

+962 79 299 1860

Resource Efficiency Expert

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