IMPROVING WATER USE EFFICIENCY WITH STATE-OF-THE-ART TECHNOLOGY

# Industrial Water Use Efficiency

*Turning water management into a competitive, and climate advantage*

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THE STARTING POINT · INDUSTRY & WATER

# Where industrial water demand really comes from

Industry takes roughly a fifth of the world's freshwater — a handful of sectors dominate, and much of it is invisible, embedded in everyday products.

## MOST WATER-INTENSIVE INDUSTRIES (INDIA)

**Thermal power**
Largest industrial water user — cooling

**Pulp & paper**
~10,000 L per tonne of paper

**Textiles**
~2,700 L per cotton t-shirt

**Iron & steel**
Water-intensive across the process

*Ranked by water intensity — TERI / National Water Mission (bar length illustrative).*

## THE WATER WE CAN'T SEE

**~12,000 L**
to make one smartphone

**~140L**
For one cup of coffee

**~147,000 L**
to build one car

**up to 2M gal/day**
at a single semiconductor fab

Manufacturing drives most industrial water demand — global manufacturing water use is projected to rise **~400% (2000–2050, OECD)**. In India, industry uses ~10% of water today, and its share is rising fastest.

*Sources: TERI–National Water Mission (sector ranking); OECD Environmental Outlook to 2050; NITI Aayog / EAI; UNEP/WWF & industry embedded-water estimates.*

# Where water and energy converge: sector perspectives

## F&B



- ~**3–4 L** water per litre of product — most of it heated, then chilled.
- Cleaning-in-Place (CIP) can account for **~50%** of process water use, with each cycle requiring large volumes of water heated to 60-85°C, making it a major energy load.
- Hot water, steam & refrigeration make water-linked energy a top power cost.

## Pharma



- WFI (Water for Injection) is highly energy-intensive, requiring **~10-25 kWh per m³** to produce.
- Producing ultra-pure water can generate **~7×** more emissions than simply supplying water.
- Purification, hot recirculation (>80°C) and RO reject streams mean water and energy losses occur together.

## Textiles



- Typical water demand in medium-scale Textile/Dyeing Unit comes to about **1–2 million liters/day (MLD)** implying an energy cost of **~$0.02-0.09mn**
- Chennai's Tirupur Textile Cluster with 700+ dyeing units, historically use **90–120 MLD;** After adoption of ZLD systems (RO + MEE), pumping/treatment electricity bills surged to **~$300-400K** across clusters

## Data Centers



- AI data centers are effectively turning electricity into heat at unprecedented densities.
- A 100 MW hyperscale campus can evaporate **~2 million litres** of water every day.
- **60–80%** of India's data centres may face high water stress this decade.
- The next generation of digital infrastructure is increasingly a water-management challenge as much as a computing challenge.

*Sources: BioProcess Tools (WFI energy); textilecalculator & WWF/UNEP (textile water); Indian Textile Journal (Tirupur ZLD); Water Technology Online (F&B CIP); CEEW / DatacenterDynamics (data centres).*

# From pumps to platforms – technology that bends the curve

## VARIABLE FREQUENCY DRIVES



- Match pump speed to real demand — not peak design – **20-50%** energy saved vs constant speed
- VFDs eliminate this waste by adjusting motor speed in real time.

## IE5 – MOTOR EFFICIENCY



- Upgrading to higher efficiency - IE5 motors cuts motor losses at source — before water even moves
- **~30%+ less energy loss** compared to IE3 or less-efficiency motors

## Demand Driven Distribution (DDD)



- Smart pressure management across the entire network
- DDD uses real-time sensors to supply only what the network needs — when it needs it.

## SYSTEM INTELLIGENCE



- Solar pumping + iSolutions intelligence — from grid-free pumping to cloud-connected control
- **60-80%** O&M cost reduction vs. diesel pumps

PROOF IN PRACTICE · INDIA

# Measured savings use cases - cutting energy and water at Indian sites

## Shiva Textiles

Distributed Pumping · MAGNA3 (IE5)

Salem, Tamil Nadu



**–40%**
pumping energy vs a conventional central system

**IE5 motors**
highest-efficiency intelligent circulators

**Better ΔT**
improved cooling & fewer man-hours

## IT Park

Distributed Pumping (DiPu)

Coimbatore, Tamil Nadu



**–30%**
annual HVAC energy consumption

**~9 t $CO_2$/yr**
carbon emissions avoided

**–25%**
operational complexity

*Backed by global proof* — Carlsberg recycles 90% of process water · DDD cut pumping energy ~40% in Europe.

*Sources: India case studies — Shiva Textiles (Salem) & IT Park (Coimbatore), distributed pumping; global proof: Carlsberg & Demand-Driven Distribution cases.*

# Use cases: technology impact on global industries (1/2)

## Industry – F&B

Britvic, United Kingdom





### 70% Performance Boost for a UK Soft Drink Maker

**Challenge -** Leading UK soft drink manufacturer (Ribena, Lucozade) facing issues with manually controlled pump systems — inconsistent performance, high energy use and maintenance costs.

**Solution -** Energy Audit followed by optimized pump system with automated controls replacing manual operation. Right-sized pumps matched to actual process demand.

**Results - 70%** improvement in system performance. Significant energy cost reduction. Lower maintenance burden. Consistent product quality and reliable process operation.

# Use case: technology impact on global industries (2/2)



## Carlsberg · Fredericia, Denmark

**Onsite reuse + treatment**

*Total Water Management plant — RO, SMART Digital dosing, wastewater pumps & DID controls*

**90%**
process water recycled

**148,000 m³/yr**
freshwater saved

**~–50%**
water per litre of beer



## Acque Bresciane · Brescia, Italy

**Demand-Driven Distribution**

*Demand-Driven Distribution (4×22 kW) + SP95 well pumps — Torbole Casaglia booster station*

**–40%**
pumping energy (220k→130k kWh/yr)

**–50,000 m³/yr**
water saved

**4.5 → 3.5 bar**
pressure optimised



## ZWR Rottal · Lower Bavaria, Germany

**Demand-Driven Distribution**

*DDD — Hydro MPC-E boosters + CU 354 controller; serves ~6,000 properties*

**~30%**
energy saved

**Lower**
leakage & water loss

**Zero**
supply failures since install