Water Conservation Strategies For Commercial Buildings
A Trillion Sensor Economy

Trillion Sensor Visions

SMART CITY

- Traffic Management
- Education
- Air Pollution
- Electromagnetic Emissions
- Open Data
- Smart Buildings
- Smart Home
- Smart Street Lights
- Smart Energy
- Water Quality
- Smart Parking
- Electric Vehicle Charging
- Waste Management
Water Sensors from Source to Use
Key Takeaways:

- Most Building Mgmt. Systems don’t monitor water use
- Data drives Conservation and verifies the results
- Hidden Value in process water optimization
- Water Conservation opens new opportunities for Energy Savings
Cooling Towers Consume 30% - 50%

Evaporative Cooling Systems Consume Large Volumes of Water

Most Buildings Don’t Monitor Water Use
Most Water Leaks Go Unnoticed Until Damage Occurs

Water Damage Insurance Claims Cost 3X of Other Claims

Identifying Leaks when they Occur Reduces Risk while Saving Cost

Wireless Sensors
Monitor & detect conditions you want to know about.

Wireless Gateway
Relays information to online monitoring software.

Dashboard & Alerts
Get alerts for any issue. Access data from anywhere.
Smart Irrigation

- 50% - 70% less water
- Precision watering
- Weather Adjustments
- Malfunction Alerts
- Reduced Chemical Use
New Technologies that improve performance

Electronic Water Conditioning Prevents Limescale While reducing chemical use, Conserving Millions of Gallons of Water per Year per Building.

Wireless Sensors and Cloud-based Analytics Measure & Verify Performance and Cost Savings
HydroFLOW Electronic Water Conditioning

Breakthrough Technology for preventing scale while reducing Water, Energy and Chemical Costs
Cooling Towers Consume Large Water Volumes

Cycles of Concentration

- When water evaporates, dissolved calcium remains
- Calcium concentrations increase with each cycle
- Increased risk of lime scale accumulation on equipment
- Scale Inhibitor chemistry does not prevent scale

Large Volumes of Water are Wasted each Day to Prevent Scale Formation on Equipment
Buildings Consume Large Water Volumes

Cycles of Concentration

• When water evaporates, dissolved calcium remains

• Calcium concentrations increase with each cycle

• Increased risk of lime scale accumulation on equipment

• Scale Inhibitor chemistry does not prevent scale

Large Volumes of Water are Wasted each Day to Prevent Scale Formation on Equipment
Scale and Biofilm Reduce Energy Efficiency

Reduction of Heat Transfer

- Biofilm
- CaCO$_3$ Limescale

Heat Resistance

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

Biofilm Thickness

0.02 0.03 0.2 1.0 2.0 mm

0.03 mm

1 mm

1 mm
Safely Increasing Conductivity Reduces Water *and* Sewer Costs

**Cycles of Concentration and Water Conservation**

- **3 Cycles of Concentration**
- **9 Cycles of Concentration**

![Graph showing the relationship between blowdown (GPM) and cycles of concentration.](https://via.placeholder.com/150)

- **Common Conductivity Set Point**: 1,500 μS/cm
- **Target**: 4,500 μS/cm

- **25.5 Million Gallons Per Year**
- **17 MM GPY**
- **6.38**
- **4.25**
- **3.64**
- **3.17 Million Gals per Year**

*1,000-Tons at 80% Load* 
*ΔT 10° F*
Increased Cooling System Efficiencies  
   = Water AND Energy Cost Savings

- Increasing Cycles of Concentration Increases Water Conservation
- Reduce energy use by 10-15% from scale and biofilm prevention
- Decrease Labor and Repairs
- Reduce OpEx and Extend Asset Value
Electronic Water Conditioning: Scale and Biological Control
Electronic Water Conditioning: Scale and Biological Control

2019 Examples
Cooling Towers with No Change in Chemistry

Month 1
Month 6 – April 2019
Month 1
Month 4 – May 2019

Astra Zeneca Medical Facility, Maryland
Lamar University, Beaumont Texas
Legionella Prevention for Cooling Towers

The Pulsed frequency causes biofilm and algae to detach from Pipes and equipment

Enhances Biocide and reduces consumption

Legionella habitat is removed by disrupting algae and biofilm, preventing colonization

An effective Secondary Bio-Control Program that operates 24/7
Managing Water from a Monthly Bill?

 Utilities
 City of Dallas
 And Services

 Account Number: 
 Service Address: 

 INVOICE SUMMARY

- Previous Balance: $5,817.97
- Payment(s): ($5,817.97)
- Balance Forward: $0.00
- Current Charges (See back for details):
  - Water Charges: $4,783.36
  - Sewer Charges: $3,057.41
- Total Current Charges: $7,840.76
- Total Amount Due: $7,840.76

WATER CONSERVATION TIP

Did you know half of watering your lawn deeply twice a week is all it ever needs? Push a 6-inch screwdriver into your lawn - if it goes into the soil easily, your lawn doesn’t need water. For more information, go to SaveDallasWater.com.

 CONTACT US?

Phone: (214) 651-1441
Email: WaterSpecialtyUnit@dallascityhall.com

MAIL PAYMENT TO:
City of Dallas
City Hall 22 South
Dallas TX 75277

ACCOUNT NUMBER: 750022100

Amount Due by 6/19/18: $7,840.76
Amount Due after 6/19/18: $8,232.80

Operation WaterShare
Mayor’s Summer Reading Program

Operation WaterShare
Mayor’s Summer Reading
Total Amount Enclosed: $0.00
Cloud-Based Water Performance Monitoring

- Monitor Make-up and Blowdown Water Use
- Cycles of Concentration
- Conductivity & pH Monitoring
- Baseline Comparisons of Historic Use
- Evaporation Credit Reporting
- Alarms and Reporting
After 3 Years of Operation

Sysco Foods Headquarters in Houston

- 4 Million Gallons conserved per Year
- Scale formation & Biofilm prevented
- Optimized Efficiency
- Reduced Maintenance & Repairs

Cost Savings Annually

- Water Use Reduced 45% - $19,000
- Wastewater Reduction - $20,000
- Energy Use Reduced 10% - $34,562
- Chemical use reduced 80%

Estimated Annual Water & Sewer Savings

$39,000

Estimated Annual Energy Savings

10% of $345,625

$34,562
Formal 3rd Party Engineering Study

The Program’s technology delivers Annual Savings:

- >$39,000 Water & Sewer Reduction Annually
  - Annual potable water use reduction of 4,341,024 gallons, saving Sysco $19,600 annually (Simple Payback).
  - Annual wastewater reduction of 3,069,224 gallons, saving Sysco $20,000 annually (Simple Payback).
- 10% electricity use reduction by the cooling plant, saving Sysco $34,500 annually (Simple Payback).

50-Year Analysis 2016 NPV

- HydroFLOW Cost / Benefit to Owner
  - $979,000 Water
  - $959,000 Electricity
  - -$274,300 O&M

50-Year Analysis 2016 NPV

- Sysco’s HydroFLOW Decision Impact to the Community
  - $1,004,200
  - $4,600

Performance Outcome Verification and Social, Environmental, and Financial Benefits of HydroTech Solutions High-Performance Water Management Program at Sysco Corporate Headquarters Houston, Texas
# Financial Gains from High Performance Water Management

## Financial Impact and ANALYSIS

<table>
<thead>
<tr>
<th>Operating Expenses</th>
<th>Monthly Performance</th>
<th>Yr 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>60 - Month Performance</th>
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</thead>
<tbody>
<tr>
<td>High-Performance Water Management</td>
<td>$1,806</td>
<td>$21,672</td>
<td>$21,672</td>
<td>$21,672</td>
<td>$21,672</td>
<td>$21,672</td>
<td>$108,360</td>
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<tr>
<td>Water Bill Savings (rate escalation 4%)</td>
<td>$(3,258)</td>
<td>$(39,092)</td>
<td>$(40,656)</td>
<td>$(42,282)</td>
<td>$(43,973)</td>
<td>$(45,732)</td>
<td>$(211,736)</td>
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<tr>
<td>Electric Bill Savings (rate escalation at 4%)</td>
<td>$(2,883)</td>
<td>$(34,596)</td>
<td>$(35,980)</td>
<td>$(37,419)</td>
<td>$(38,916)</td>
<td>$(40,473)</td>
<td>$(187,384)</td>
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<tr>
<td>Maintenance &amp; Repair Savings</td>
<td>$(50)</td>
<td>$(600)</td>
<td>$(600)</td>
<td>$(600)</td>
<td>$(600)</td>
<td>$(600)</td>
<td>$(3,000)</td>
</tr>
<tr>
<td>Chemical Efficiency Savings</td>
<td>$(300)</td>
<td>$(3,600)</td>
<td>$(3,600)</td>
<td>$(3,600)</td>
<td>$(3,600)</td>
<td>$(3,600)</td>
<td>$(18,000)</td>
</tr>
<tr>
<td><strong>Net Change in Actual Operating Expenses</strong></td>
<td>$(4,685)</td>
<td>$(56,216)</td>
<td>$(59,164)</td>
<td>$(62,229)</td>
<td>$(65,417)</td>
<td>$(68,733)</td>
<td>$(311,780)</td>
</tr>
<tr>
<td><strong>Change in Net Operating Income</strong></td>
<td>$4,685</td>
<td>$(56,216)</td>
<td>$(59,164)</td>
<td>$(62,229)</td>
<td>$(65,417)</td>
<td>$(68,733)</td>
<td>$(311,780)</td>
</tr>
</tbody>
</table>

**Gallons of Water Saved**

305,027

3,660,323

3,660,323

3,660,323

3,660,323

18,301,617
Key Takeaways:

• Hidden Value in process water optimization
• Data drives the decision and verifies the results
• Water Conservation opens new opportunities for Energy Savings
• New Construction or Retrofits
High Performance Water Management for Energy Savings

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