Federal Utility Partnership Working Group
Houston, TX
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Francis Wheeler
Water Savers, LLC
(713) 504-6684
fwheeler@watersaversllc.com

Don Hofmann
Hofmann Water Technologies
(800) 289-1833
hofmann@hwt.com
Certifications and Training

Certifications and credentials: CWEP, LEED AP, CEM, CLIA, CLEP, CLIC, CLID and Water Sense Partner
Federal Water Efficiency Mandates

**Executive Order (EO) 13423**
- Potable water use intensity (WUI) reduction through FY 2015

**Energy Independence and Security Act 2007**
- Comprehensive water evaluations

**EO 13514**
- Extends potable WUI through FY 2020, adds new water use reduction for ILA* water use

**EO 13693**
- Supersedes EO 13514 and EO 13423, extends reduction requirements to FY 2025

*ILA = industrial, landscaping, and agricultural*
Planning for Federal Sustainability in the Next Decade

- Reduce potable WUI 2% per year through FY25 from a FY07 baseline

- Reduce industrial, landscaping, and agricultural (ILA) water use by 2% per year through FY25 from FY10 baseline

EO 13693 Water Provisions
Potable Water Use Intensity (WUI) Reduction

- WUI reduction: gallons per square feet of facility space
- 2% per year from FY07 through FY25

36% reduction
ILA Water Reduction

- ILA volumetric reduction: gallons
- 2% per year from FY10 through FY25
EO 13693 Water Provisions

Planning for Federal Sustainability in the Next Decade

• Construct and renovate Net Zero Water buildings

**EO 13693 Definition:** Net zero water building means a building that is designed, constructed, or renovated and operated to greatly reduce total water consumption, use non-potable sources as much as possible, and recycle and reuse water in order to return the equivalent amount of water as was withdrawn from all sources, including municipal supply, without compromising groundwater and surface water quantity or quality.
Planning for Federal Sustainability in the Next Decade

• Install water meters
  – Large water processes > 1,000 gallons per day
  – Irrigated areas > 25,000 square feet
  – All buildings > 1,000 gallons per day
Planning for Federal Sustainability in the Next Decade

• Develop a water balance
Water Balances Can Look VERY Different

Toilets 19%
Faucets 5%
Showers 2%
Janitorial (bathrooms/floors) 4%
Kitchen MISC 10%
Irrigation 12%
Floor Ice Machines 1%
Lab 1%
Boilers 5%
Garbage Disposal 1%
Kitchen Ice Machine 0%
Dish Washer 2%
Vacuum 1%
Sterilization 5%
Kitchen Food Prep 3%
Sterilization CT 5%
Film Processors 1%
Cooling Tower 21%
RO (Dialysis) 3%
LEAKS 3%
Toilets
19%
Faucets
5%
Showers
2%
Janitorial 
(bathrooms/floors)
4%
Kitchen MISC
10%
Irrigation
12%
Floor Ice Machines
1%
Lab
1%
Boilers
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5%
Film Processors
1%
Cooling Tower
21%
RO (Dialysis)
3%
LEAKS
3%
Sports Stadium Water Balance

- Irrigation, 61%
- Domestic Plumbing, 20%
- Misc. and Unaccounted, 13%
- Kitchen Equipment / Usage, 0%
- Laundry, 0%
- Cooling Towers, 6%
- Laundry, 0%
Hospital Water Balance

- Toilets, 24%
- Urinals, 5%
- Faucets, 11%
- Showers, 26%
- Misc. and Unaccounted, 21%

Water Usage Categories:
- Cooling Towers, 6%
- Reverse Osmosis, 0.2%
- Sterilizer CTs, 0.1%
- Sterile Washers, 0.01%
- Sterilizer Vacuums, 0.004%
- Commercial Laundry, 2%
- Laundry, 1%
- Dish Machines, 0.4%
- Steam Kettles, 0.4%
- Convection Steamers, 0.002%
- Pulpers, 0.1%
- Dipper Wells, 0.03%
- Ice Machines, 2%
- Pre-Rinse Sprayers, 1%
- Pre-Rinse Sprayers, 1%
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Cooling Water in Federal Facilities Represents a Great Savings Opportunity

- Government facilities use more than 125 billion gallons per year
- Cooling water accounts for more than 28 billion gallons
The Concept of Excess Water

- In a perfect system, only evaporated water would be consumed.
- Blowdown is needed to limit mineral concentration.
Breakdown of the 28 Billion Gallons

- **EVAPORATION**: Fixed for a given load profile
- **EXCESSIVE BLOWDOWN**: Typical Blowdown
- **OPTIMUM BLOWDOWN**: Typical Blowdown
Key Savings Strategies

- Minimize Losses: Overflow and Leaks
- Optimize Blowdown
- Alternative Makeup Sources
The Cost of Water Losses
(500 Ton System)

The Cost of Water Losses is significant, with blowdown, evaporation, and makeup costs adding up to over $5,000 per week!
Remote Monitoring:
Identifying Issues Quickly Saves Water and Money

- Typical CWS are checked weekly ... or monthly!
- Significant water loss can go undetected
- Continuous remote monitoring every 5 seconds, with email and SMS text messaging
Key Savings Strategies

- Minimize Losses: Overflow and Leaks
- Optimize Blowdown
- Alternative Makeup Sources
**Water Savings from Reduced Blowdown**  
*(500 Ton System)*

Reducing blowdown saves:

- Over 3MM gallons annually
- over $32,000 annually

<table>
<thead>
<tr>
<th>Cycles of Concentration</th>
<th>Blowdown</th>
<th>Evaporation</th>
<th>Makeup Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00</td>
<td>3,942,0</td>
<td>7,884,0</td>
<td>118,260</td>
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<tr>
<td>4.00</td>
<td>2,628,0</td>
<td>7,884,0</td>
<td>105,120</td>
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<td>5.00</td>
<td>1,971,0</td>
<td>7,884,0</td>
<td>98,550</td>
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<td>6.00</td>
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<td>7,884,0</td>
<td>94,608</td>
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<tr>
<td>7.00</td>
<td>1,314,0</td>
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<td>8.00</td>
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<td>90,103</td>
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<td>9.00</td>
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<td>10.00</td>
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<td>11.00</td>
<td>788,400</td>
<td>7,884,0</td>
<td>86,724</td>
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<tr>
<td>12.00</td>
<td>716,727</td>
<td>7,884,0</td>
<td>86,007</td>
</tr>
</tbody>
</table>

- **Makeup Cost** in $:
  - 3.00: 118,260
  - 4.00: 105,120
  - 5.00: 98,550
  - 6.00: 94,608
  - 7.00: 91,980
  - 8.00: 90,103
  - 9.00: 88,695
  - 10.00: 87,600
  - 11.00: 86,724
  - 12.00: 86,007

- **Makeup, gallons**:
  - 3.00: 7,884,0
  - 4.00: 7,884,0
  - 5.00: 7,884,0
  - 6.00: 7,884,0
  - 7.00: 7,884,0
  - 8.00: 7,884,0
  - 9.00: 7,884,0
  - 10.00: 7,884,0
  - 11.00: 7,884,0
  - 12.00: 7,884,0

- **Evaporation, gallons**:
  - 3.00: 7,884,0
  - 4.00: 7,884,0
  - 5.00: 7,884,0
  - 6.00: 7,884,0
  - 7.00: 7,884,0
  - 8.00: 7,884,0
  - 9.00: 7,884,0
  - 10.00: 7,884,0
  - 11.00: 7,884,0
  - 12.00: 7,884,0
Water Savings System
Partial Softening

- Patent-pending design
- Partial removal of hardness allows higher cycles – at same CWS hardness
- Skid-mounted
- Optional design for partial-deminerallization
Key Savings Strategies

Minimize Losses: Overflow and Leaks

Optimize Blowdown

Alternative Makeup Sources
Alternative Makeup Sources

- Low cost water source
- Variable quality
- Variable availability
- Control Issues
Water Savings System
Groundwater Reuse

From Ground Water System

MMF

From Softener and Filter BW

Sensors

City Water
(2 inch copper or steel)

WM

SOFT

Brine Tank

Chem Tank

UV

To Softeners

Sensors

WM

WM

WM

WM

City Water (2 inch copper or steel)
## Water Savings System

### Supplemental Well Water

<table>
<thead>
<tr>
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<th>Annual</th>
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<tbody>
<tr>
<td>Ton-hours</td>
<td>30,000,000</td>
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<tr>
<td>Average Tons</td>
<td>3,400</td>
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<tr>
<td>City Water Savings</td>
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<tr>
<td>Sewer Savings</td>
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<tr>
<td>Offset Costs</td>
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<td><strong>Net Savings</strong></td>
<td><strong>$324,500</strong></td>
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- For blowdown detail, see Page 2, Detail A
- For makeup detail, see Page 2, Details B & C
Conclusions

• Cooling systems represent a great opportunity for water savings.
• Remote monitoring saves water and money by identifying excessive water use quickly.
• Alternative water sources can be a good savings option.
• Optimization enables even greater savings and more consistent control.
Questions?