Water World: Success Stories and Tools for Water Use Reduction in Your Building Portfolio

January 6, 2015
3:00-4:00 PM EST
Overview and Agenda

- Welcome and Overview
- Cummins
- National Church Residences
- Environmental Defense Fund
- Additional Resources
- Question & Answer Session
## Today’s Presenters

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Todd Swingle</td>
<td>Cummins</td>
</tr>
<tr>
<td>Alan Mileti</td>
<td>National Church Residences</td>
</tr>
<tr>
<td>Steven Goldman</td>
<td>Environmental Defense Fund</td>
</tr>
</tbody>
</table>
WHO WE ARE

Cummins Inc., a global power leader, is a corporation of complementary business units that design, manufacture, distribute and service engines and related technologies, including fuel systems, controls, air handling, filtration, emission solutions and electrical power generation systems.

WORLD HEADQUARTERS
500 Jackson Street
Columbus, IN, 47201

STOCK SYMBOL (traded on NYSE)
CMI

FOUNDED IN 1919

WEB SITE
www.cummins.com

FORTUNE 500 RANKING
(2014) 168

SALES / EARNINGS
In 2013, Cummins earned $1.48 billion on revenues of $17.3 billion.

EMPLOYEES
Worldwide, approximately 48,000 people. More than 60 percent of the Company's employees are located outside the United States.

CUSTOMERS
The Company's customers are located in approximately 190 countries and territories that Cummins reaches through a network of more than 600 Company-owned and independent distributor locations and approximately 6,500 dealer locations.
Water Stewardship at Cummins

Water Conservation

Aspiration – We will continually reduce the amount of water we use in our operations and improve the quality of the wastewater we discharge.

2020 Goal: Reduce the water use intensity (normalized to labor hours worked) in our facilities by 33% as compared to a 2010 baseline.

Community Water Engagement

Aspiration – We will work together with our communities to ensure that everyone has adequate, safe, and sustainable water supplies.

2020 Goal: Achieve water neutrality (off-set the water we use) for 15 facilities in India, China, Africa, and Mexico by doing water projects (water quality, conservation, sustainable supplies) with our communities.

Risk Mitigation

Focus – We will understand risks posed by water scarcity and mitigate those risks commensurate with the exposure faced by our businesses and communities through processes including New Business Start-up, Management of Change, Corporate Responsibility Plans, and Purchasing Processes.
Segmenting Water Use

Source Water

Cummins Facilities

Cooling / HVAC
- Test Cell Cooling
- Cooling Towers
- Boiler Makeup

Employees & Other
- Restrooms
- Food Prep
- Misc Cleaning

Promoting Reuse and Recycling

Manufacturing
- Rinse Processes
- Parts Washers
- Water Treatment
- Machining Coolants

Other Facility Uses
- Irrigation
- Fire Systems
- Ion Exchange / RO Systems

Required Treatment

Discharge / Disposal
Make the Complex Simple

Prioritize

Consult

Achieve
Water World: Success Stories and Tools for Water Use Reduction in Your Building Portfolio

Alan Miletí
Utility & Procurement Specialist
National Church Residences – Columbus, Ohio
National Church Residences
Portfolio Statistics

# of properties in US and Puerto Rico 340
# of states with properties 28
# of residents served 24,000
Assets managed $1.4 Billion
Common Reasons for High Resident Water Consumption

• Resident habits

• Residents often aren’t aware of leaks or don’t report them when discovered

• Water conservation tips aren’t provided to residents. *(Many residents see no relationship between the amount of water they use and their cost to live in the property.*)

• Older fixtures

• Poor or aging plumbing
Water Consumption Statistics

• 45% of water use in the average American home occurs in the bathroom with 27% being used by toilets.

• Showering accounts for almost 17% of residential water use indoors. Replacing an older showerhead can save 50% in shower water usage.

• Bathroom and kitchen sinks account for 16% of the water used in the average American home. Replacing older faucet aerators can save up to 40% of faucet water use.
How much water does a leaking faucet waste?

- If leaking four drips per minute:
  - Over a half gallon per day
  - Over 17 gallons per month
  - Over 211 gallons per year

- If leaking a steady stream (5 drips/second):
  - Over a 43 gallons per day
  - Over 1,250 gallons per month
  - Over 15,768 per year
National Church Residences
Water Conservation Initiative

In order to most effectively tackle water efficiency initiatives, it is best to target high consumers within a portfolio. Benchmarking is critical in identifying these properties and ensuring that both savings and water reduction are being maximized.

**Water Benchmarking Process**

1. Collect at least 1 year of water and sewer bills for every property
2. Standardize annual consumption into gallons per person per day
3. The average of all properties consumption is the benchmark
4. Investigate anomalies for data errors or inconsistencies and correct or remove
5. A top-down approach should be used for retrofits targeting high consumers first
6. Once retrofits are complete, compare post-retrofit data to pre-retrofit data to determine savings
National Church Residences
Water Conservation Initiative

2011 Water Consumption Benchmark: 73.04 G/P/D

Abnormally low consumption is typically driven by meter errors and data inconsistencies.

Abnormally high consumption is typically driven by high irrigation usage, water leaks, or meter errors.
National Church Residences
Water Conservation Initiative

Identifying Retrofit Candidates

1. Determine outlier parameters
   - In this case, National Church Residences chose properties 25% higher than the benchmark

2. Evaluate costs vs. savings
   - Decide a target payback and ensure targeted properties will achieve organizational goals

2011 Water Consumption Benchmark:
73.04 G/P/D
National Church Residences
Water Conservation Initiative

**Phase 1 – Pilot**
Surveyed select properties and evaluated 12-month water history

- **Evaluated**
  - 13 properties
  - 1,401 units

- **Implemented**
  - 1 property
  - 167 units

- **Financials**
  - Cost: $24,000
  - Savings: $26,000
  - Payback: 11 months

**Phase 2 – Beta**
Surveyed select properties based on location (high water rates) and age

- **Evaluated**
  - GA, LA, and MI
  - 40 properties
  - 5,265 units

- **Implemented**
  - 4 properties
  - 692 units

- **Financials**
  - Cost: $54,213
  - Savings: $81,834
  - Payback: 8 months

**Phase 3 – Roll-Out**
Benchmarked portfolio for outliers; targeted sites w/ < 12 mo. payback

- **Evaluated**
  - All properties
  - 170 properties
  - 13,770 units

- **Implemented**
  - 32 properties
  - 2,822 units

- **Financials**
  - Cost: $201,700
  - Savings: $332,285
  - Payback: 7 months
National Church Residences
Water Conservation Initiative

**Portfolio Savings Analysis**

- Properties Implemented: 37
- Total Project Cost: $268,243
- Total Annual Project Savings: $440,119
- Average Payback: 7 Months

2011 Water Consumption Benchmark: 73.04 G/P/D

2013 Water Consumption Benchmark: 64.04 G/P/D

Legend
- Post-Retrofit
- Pre-Retrofit
While retrofitting aerators, showerheads, and toilets is the easiest and most cost-effective solution to water management, there are other factors that can drive high consumption.

- Water Leaks
- Faulty Equipment
- Meter Errors
- Irrigation

Other Factors Impacting Water Consumption
Other Factors Impacting Water Consumption

National Church Residences has developed the following strategies to better deal with water leaks, faulty equipment, meter errors, irrigation management, and other factors that contribute to high water consumption.

**Data Management Services**

- Utilizes third-party data management company for utility data analysis
- Auditing services monitor consumption and costs for anomalies and work with property to determine and resolve issue
- Quickly identifies water leaks, faulty equipment, meter and billing errors, etc.

**Organizational Energy Policy**

- Addresses all aspects of energy that would impact a property
- Specifically addresses water management and provides guidelines for checking for leaks, installing low-flow equipment, and sets irrigation standards
Thank You

Alan Miletì
Utility & Procurement Specialist
National Church Residences

2335 North Bank Drive
Columbus, OH 43220

Phone 614.273.3776
Fax 614.451.0351
amiletì@nationalchurchresidences.org
Steven Goldman

Environmental Defense Fund
EDF-GEMI Water Management Application Toolkit (WaterMAPP)

Steven Goldman, Marketing and Communications Coordinator, Corporate Partnerships, EDF
Agenda

- Overview of cooling tower operations—and the potential for water, energy, chemical, and dollar savings
- Review the key tools and resources—and how these can help your company
The Company We Keep
WHERE DO BUILDINGS use water?

Cooling is among the top consumers of water for large office buildings.

37% RESTROOM
28% COOLING/HEATING
13% KITCHEN/DISHWASHING
22% LANDSCAPING

...and because of the heat generated by computer equipment, data centers consume even more water for cooling.

50% RESTROOM
25% COOLING/HEATING
15% LANDSCAPING
10% KITCHEN/DISHWASHING

The actual percentages will vary by data center, with some consuming a significantly higher percentage of water for cooling.

Source: http://www.epa.gov/watersense/commercial/types.html#tabs-office
AT&T’s Water Footprint

- AT&T water footprint: 3.3B gallons of water annually
- 2012 budget: Water expenditures <2% of energy expenditures
- AT&T internal water activities: Scorecard, training, pilots

- < 2 percent of portfolio (125 facilities) = 50 percent of total water use
  
  31 in high or very high water stress regions

  - All had one thing in common: high evaporative cooling demands

  28% Amount of total water in an office building devoted to cooling
The Project

**Technical, Operational, and Free Air Cooling**

- **Technical**: One cooling tower filtration system upgrade costs less than $100,000 to install but promises more than $60,000 in annual water and sewer savings—paying for itself in less than two years.

- **Free Air Cooling**: A minor $4,000 equipment upgrade to expand free air cooling promises nearly $40,000 in annual savings.
Water Savings

• AT&T’s pilot projects achieved water reduction savings ranging between 14-40%.

• Potential scalability in the U.S:
  • 28 billion gallons of water could be saved by U.S. companies per year.
Wide Applicability
Free Tools to Jumpstart a Water Management Program

WaterMAPP

The Water Management Application (WaterMAPP) is an Excel-based, multi-tabbed spreadsheet with two primary components:

- The Water Scorecard helps you assess your company's water efficiency and can be used to create visibility for water performance at facilities. The Water Scorecard Guide offers an overview of the score card concept, calculations used by AT&T in developing their first scorecard, and provides detailed information about how you could develop your own scorecard.

- The Water Efficiency Calculator estimates water and financial savings from cooling tower or free-air cooling improvements — key data for making the water-efficiency investment business case.

Download the WaterMAPP tool

Cooling System Efficiency Guide & Videos

The Cooling System Efficiency Guide [PDF] and 12-video series on YouTube can be used by anyone in your organization to learn more about the fundamentals of how a cooling system works, and how it can be managed to minimize an organization's use of water, energy and chemicals.

Sample Water Audit Forms
WaterMAPP – Integrated Scoring/Savings

Water Scorecard Inputs

Score Card Data – Building Info
Facility Manager Name: Joe Manager
Building ID/Name: Headquarters Tower
Street Address: 123 Main St.
City: Detroit
State: MI
Zip Code: 48206
Closest City: Minnesota - Saint Cloud
Building Type: Admin
Water Stress Region: High
# of Tenants: 2,500
Square Footage: 20,000

Score Card Data – Water Consumption
Enter the last 24 months of water use (gallons):
Month 1 - Newest Month: 2,854,500
Month 2: 3,400,950
Month 3: 2,350,980
Month 4: 2,840,900
Month 5: 2,850,899

Water Scorecard Grading

Check your Grade!
Total Score: 80
Your Overall Grade Is: A-

Building Information
Facility Manager Name: Joe Manager
Building ID/Name: Headquarters Tower
Street Address: 123 Main St.
City: Detroit
State: MI
Zip Code: 48206

Category Scores

 Cooling Tower Efforts: 0%
   Innovation: 0%
   Rebates: 0%
   Re-Use: 0%
   Sewer Credits: 0%
   Greek: 0%
   Landscape: 78%

Annual Savings Potential

Current Cycles of Concentration: 3
Target Cycles of Concentration: 10
Electricity Used By Chiller (kWh/yr): 6,738,980
Blowdown Water (Gals/Yr): 6,738,980
Make Up Water (Gals/Yr): 33,695
Chemicals (lbs/yr): 46,297
Electricity ($/Yr): 33,695
Make Up Water ($/Yr): 15,365
Sewer Charges ($/yr): 46,297
Water Treatment ($/yr): 33,695
Total ($/yr): 95,357

Savings Potential from Free Air Cooling

Current Economizer Mode: No Air Economizer
Target Economizer Mode: Full Air Economizer
Electricity Used By Chiller (kWh/yr): 5,281,640
Blowdown Water (Gals/Yr): 10,393,436
Make Up Water (Gals/Yr): 96,126
Chemicals (lbs/yr): 23,697
Electricity ($/Yr): 71,403
Make Up Water ($/Yr): 51,957
Making the Business Case

- Key to scaling up potential savings is understanding all the areas you can save:
  - Water
  - Sewer
  - Chemicals
  - Energy

→ All included in the Water Efficiency Calculator
Training Webinar

Water Efficiency Webinar with EDF and AT&T

AT&T and Environmental Defense Fund (EDF) developed a free suite of tools that U.S. commercial and industrial sector buildings can use to collectively save up to 28 billion gallons of water annually. Buildings with cooling towers typically use 28% of their daily water use for cooling, and they have the opportunity to reduce that water demand by 14-40% with the Building Water Efficiency toolkit.

Watch the webinar and learn how to:

- Measure and manage water use
- Optimize building cooling
- Build the business case to realize an ROI on water management
Help Your Organization Save Water

• Raise awareness
• Use the Water Score Card tool to identify savings opportunities at facilities
• Share training materials, including the Cooling Efficiency Guide, Training videos, and webinar
• Use the WaterMAPP’s Water Efficiency Calculator to build the business case for identified efficiency opportunities
Additional Resources
For More Information

- Environmental Defense Fund
  - [www.edf.org/attwater](http://www.edf.org/attwater)
Q & A
Join Us for the Next Better Buildings Webinar

ESPC 2.0: How a New Generation of Energy Savings Performance Contracting is Improving Energy Efficiency in U.S. Buildings

Date: Tuesday, February 3
Time: 3:00 – 4:00 PM EST

Overview: Join Better Buildings Challenge Partners and Allies to learn how Energy Savings Performance Contracting (ESPC) is moving beyond the traditional education and hospital sector markets. Learn how you can take advantage of ESPCs to improve long-term energy performance in your buildings with little or no upfront cost. A representative from the Department of Energy will also introduce DOE’s ESPC Accelerator – a high impact program designed to support expansion of ESPCs among state and local governments.

Register [here](#).
Additional Questions? Feel Free to Contact Us

betterbuildingswebinars@ee.doe.gov

| Today’s Presenters | Todd Swingle  
Cummins  
[mailto:todd.swingle@cummins.com](mailto:todd.swingle@cummins.com)  
Alan Mileti  
National Church Residences  
[mailto:amileti@nationalchurchresidences.org](mailto:amileti@nationalchurchresidences.org) | Steven Goldman  
Environmental Defense Fund  
[mailto:sgoldman@edf.org](mailto:sgoldman@edf.org) |
|-------------------|-------------------------------------------------|-------------------------------------------------|
| DOE Program Leads | Holly Carr  
DOE, Better Buildings Challenge  
[mailto:holly.carr@EE.Doe.Gov](mailto:holly.carr@EE.Doe.Gov) | Kristen Taddonio  
DOE, Better Buildings Alliance  
[mailto:kristen.taddonio@EE.Doe.Gov](mailto:kristen.taddonio@EE.Doe.Gov) |
| Program Support   | Zach Abrams  
ICF International  
[mailto:zach.abrams@icfi.com](mailto:zach.abrams@icfi.com) | John Jameson  
ICF International  
[mailto:john.jameson@icfi.com](mailto:john.jameson@icfi.com) |

Follow us on Twitter @BetterBldgsDOE