This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Innovative Conservation: Low-Cost Sensors & High-Tech Data for Evaporative Cooling

Water Smart Innovations 2019 – Oct. 3

Elise Goldman Metropolitan Water District of Southern California

Frank Burns APANA, Inc. **Kent Sovocool,** Southern Nevada Water Authority

Data Driven Cooling Tower Optimization Study

Made possible by a grant from:



With Financial Assistance from:

- Metropolitan Water District of Southern CA
- Southern Nevada Water Authority
- The Central Arizona Project
- Sempra Energy Utility/ Southern CA Gas Company
- Western Resource Advocates
- U.S. Dept of Interior, Bureau of Reclamation
- U.S Environmental Protection Agency

http://www.bewaterwise.com/assets/icp167599-deliverable5_final-report.pdf



July 16, 1969, 6:32 AM GMT-7





Cooling Towers

Part of building HVAC - NO Copper Coils



Evaporative Condensers

Part of building Refrigeration - Have copper, stainless coils

Cooling Towers and Evaporative Condensers

30-50% of the building's water use

* Bill Hoffman Presentation Data 2016, (study confirmed grocery data 2017-2019)





WASTE

At a 10,000 unit level

40,000 AF /yr (23 Billon gal/yr)

Data Driven Cooling Tower Optimization

Innovation Conservation Program Grant - ICP167599 pgs. 27-37





DIGITIZATION CHANGES EVERYTHING

Water insights

Real time measurement and analysis shines light on waste.

Automation enables control at scale, everywhere.

Data driven outcomes - automated

This is Mark Johnson.

Mark is a Water Quality Specialist at the Gilbert Cooling Tower.

Mark works very hard.

But Mark had a problem.

Mark's problem was...

Data showed a high water use failure.

Failure was intermittent and not reproduceable.

481 - Gilbert Cooling Tower - Blowdown

Consumed Fri, Jun 15, 2018

2,535 gal

The controller manufacturer had him chasing issues that did not exist

The data pointed elsewhere....

The solution... data driven prescriptive guidance

Prescriptive Guidance
1st Look
2nd Look
Level 3 support
Fix Validation

Four Failure Categories Mapped

Mechanical Operational

Control Failures

Failure Chains

Data Driven Cooling Tower pgs. 27-37

© APANA ® 2018 All Rights Reserved. Domestic and Foreign Patents Pending

DATA is ground truth

19

Savings : 60 kgal/month 720 kgal/ year

Why real time data?

AMI Data

Real Time Data

Data Driven Cooling Tower Optimization Study

I N N O V A T I V E C O N S E R V A T I O N P R O G R A M

What did we learn with Mark?

114 units enrolled in the Data Driven Cooling Tower Optimization Study

Five different types of cooling technologies enrolled in the program

22 DIFFERENT WATER QUALITY SERVICE COMPANIES

105 DIFFERENT WATER QUALITY TECHNICIANS

31.7 AVERAGE NUMBER OF DAYS BETWEEN SERVICE VISITS

ALL UNITS TYPES HAD Events OVER 1,000,000 GALLONS

100-500 Ton Evap Condensers
1,000 Ton HVAC Units
Hybrind Condenser
Roof top AC unit
Swamp Cooler

Data mapped Three types of waste

Water Waste

Scale Events

Efficiency Gain Opportunities

Optimal Efficiency is the unit specific Max Possible COC

Waste Event Impact

Efficiency Gain Opportunity 27% Waste Events 28%

67 Evap Condenser units = 70 million gal/yr saved

87% of all enrolled units had a waste or scale event

Scale Events 45%

At a 10,000 unit level 23 billon gallons per year (40,000 acre feet)

Four Failure Categories Mapped

Control Failures

Failure Chains

The fleet is wasteful to very wasteful with elements of risk.

Impact	67 Evap Cond w/6+ months data in 2017			10,000 unit level		
Savings From	Gal/year save	Acre ft/yr save	Ga	allons save	acre ft/yr save	
Waste Event Containment	22,086,034	67.8	3,6	581,741,868	11,299	
Scale Event Containment	36,000,000	110.5	6,0	001,200,000	18,417	
Max COC Efficiency Gain	21,170,549	65.0	3,5	529,130,521	10,831	
Total	79,256,583	243	13,2	212,072,389	40,546	

Established a standard for defining "efficiency" and normalizing data so fair comparisons can be made across units every where.

Developed a way to capture site visit data needed to automate analysis, reporting and compliance with standards

Established a Key Performance Indicator (KPI) to help make efficiency a fair target for regulation

Study Recommendations

- 1. The water and energy savings documented warrants a larger scale demonstration necessary for regulation and drought response initiatives.
- 2. Include high-resolution measurement and real-time problemsolving in water conservation incentive programs.
- 3. The energy savings suggest electricity providers could enhance large-scale program implementation.

There are many people like Mark.

Let's help them save water

100

WHAT ARE WE DOING TO LEARN MORE?

With the Alliance for Water Efficiency

WHAT ARE WE DOING TO LEARN MORE?

Alliance for Water Efficiency and partners

Working with Pacific Northwest National Laboratory

Developing a model and best practices to identify facilities with cooling towers

ALLIANCE FOR WATER EFFICIENCY

NORTH AMERICAN COOLING TECHNOLOGIES PROJECT

Excel based model based on zip code taking real property data and zoning regulations

Estimate number of cooling towers (min/max) and cooling tonnage

Identify savings potential of alternative technologies and improvements to traditional techniques

DIGITIZATION CHANGES EVERYTHING

Questions?

Elise Goldman Metropolitan Water District of Southern California Frank Burns APANA, Inc. apana.com

<u>http://www.bewaterwise.com/assets/icp167599-deliverable5_final-report.pdf</u>