Funding & Improving CHW Plant Efficiency at the University of Utah

IDEA Campus Energy Conference

Atlanta, GA

2/19/2014

4:30 – 5:00 pm

Kelly Gibbons University of Utah

Tim Burkhalter Burns & McDonnell

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Case Study

State University with undergrad enrollment > 22,000

In 2010 new staff questioned central utility plant operations and efficiency

Commissioned study to diagnose plant production and distribution issues…….. focus quickly shifted away from central plant and towards buildings.

Leads to recognition of building maintenance issues and additional studies

Funding Mechanism - Campus implements TPM (Total Productive Maintenance)

What Will We Cover…….The Timeline

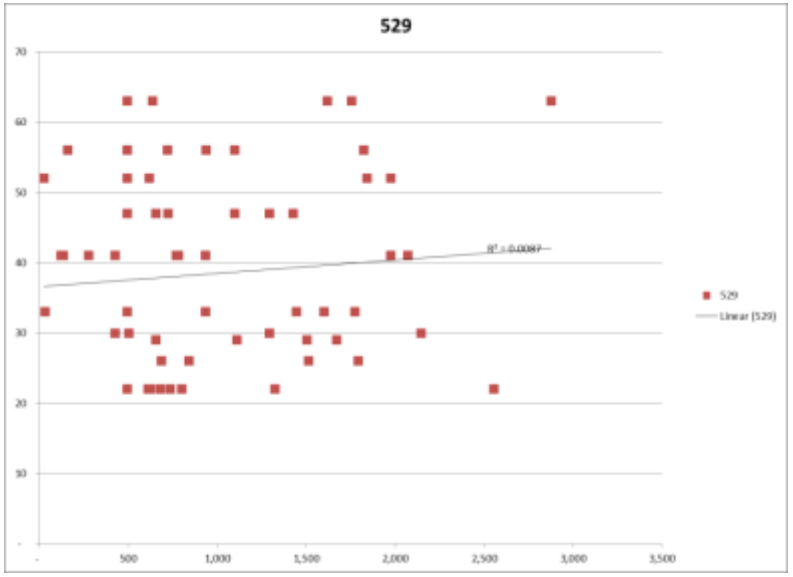
Pre 2010	Plant provides chilled water to customers…*no questions asked*
2010	The Problem Statement: *What is wrong with the plant?.....I'm running chillers all winter……*
2011	Detailed Energy Analysis / Review "worst offending buildings"
2012	Project develops Chilled Water Flow Model
2013-future	Implement the fixes TPM (Total Productive Maintenance)

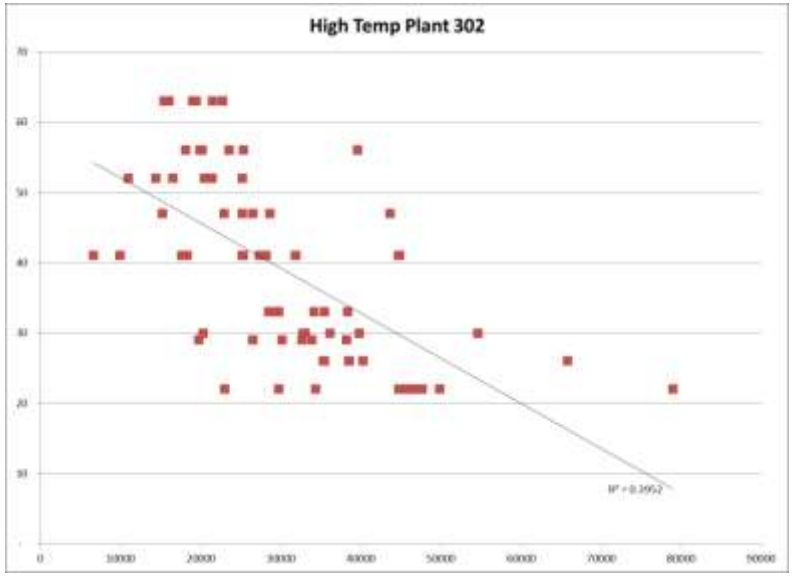
Assignment #1 – Why Do I Run Two Chillers All Winter…..?

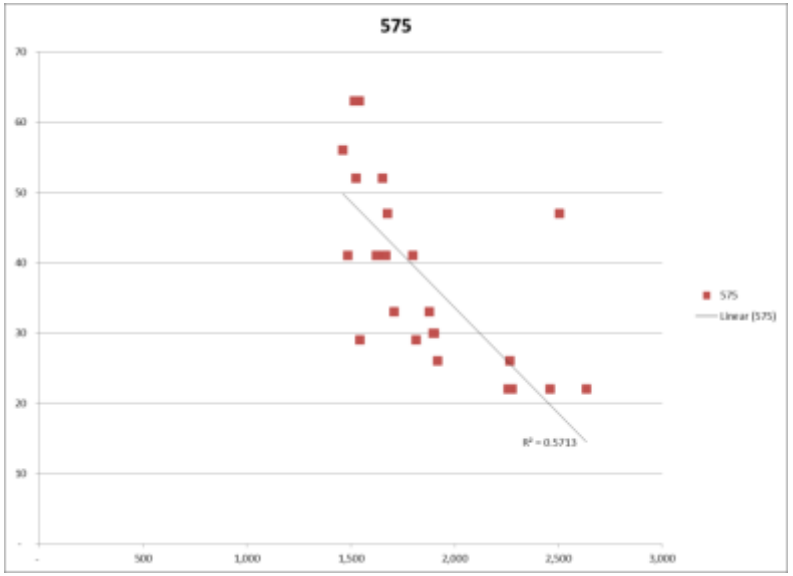
12,000 TR Plant

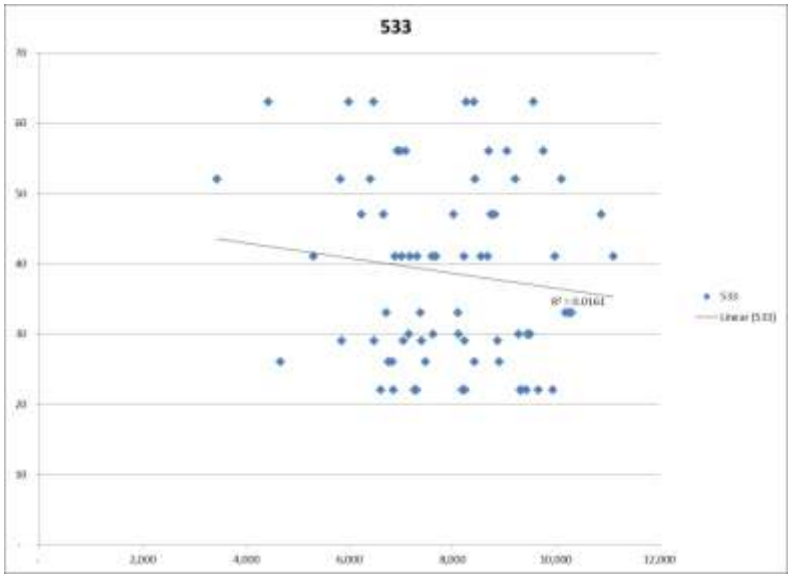
Building Performance Drives Plant Operations

deg F vs. MMBtu Heating









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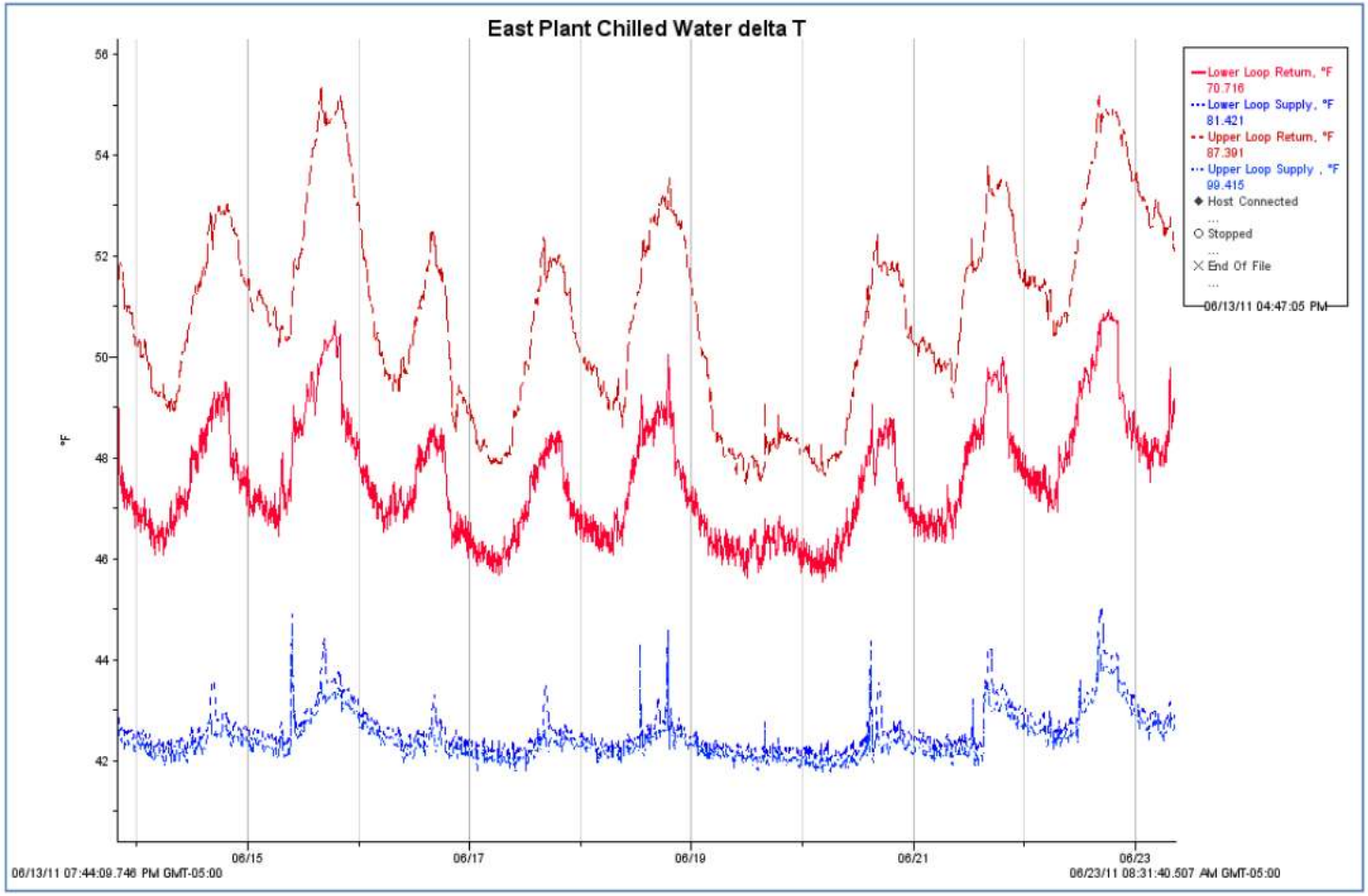

Plant dT is poor…. even in Summer

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Assignment #1: It's Not The Plant…..

It's the Buildings

Suggestions:

Find/Eliminate Simultaneous Htg/Clg

Improve Chilled Water dT (Ranges from 2 – 10 F year round)

Water Side Economizer Sequence not Appropriate

Develop Flow Model (Reduce Tertiary Pumping)

Replace Coils and control valves, calibrate/repair controls in Select Buildings

RESULT: Implement at 1.5 year Payback ……..Where do we focus?...Pick two facilities

Assignment #2 – Detailed Review of Two Facilities

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Sample Building……Period 2007 to 2010

	Consumption	Cost
Heating Water	46% ⇧	6% ⇩
Chilled Water	6% ⇧	20% ⇧
Electricity	13% ⇧	45% ⇧

Note: (2010 Utilities ~ $350k)

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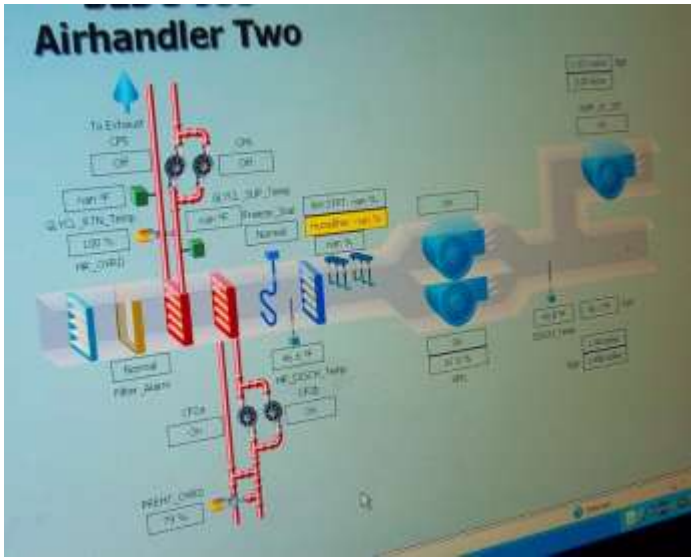
Assignment #2 – Detailed Review of Two Facilities



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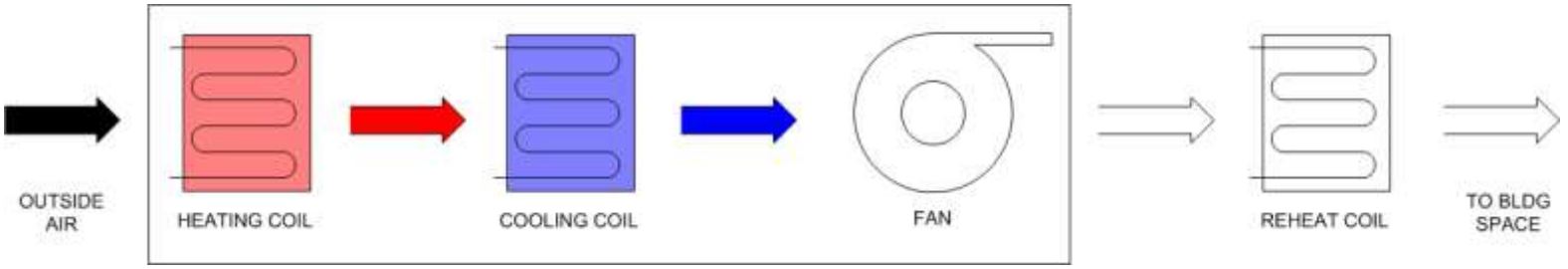

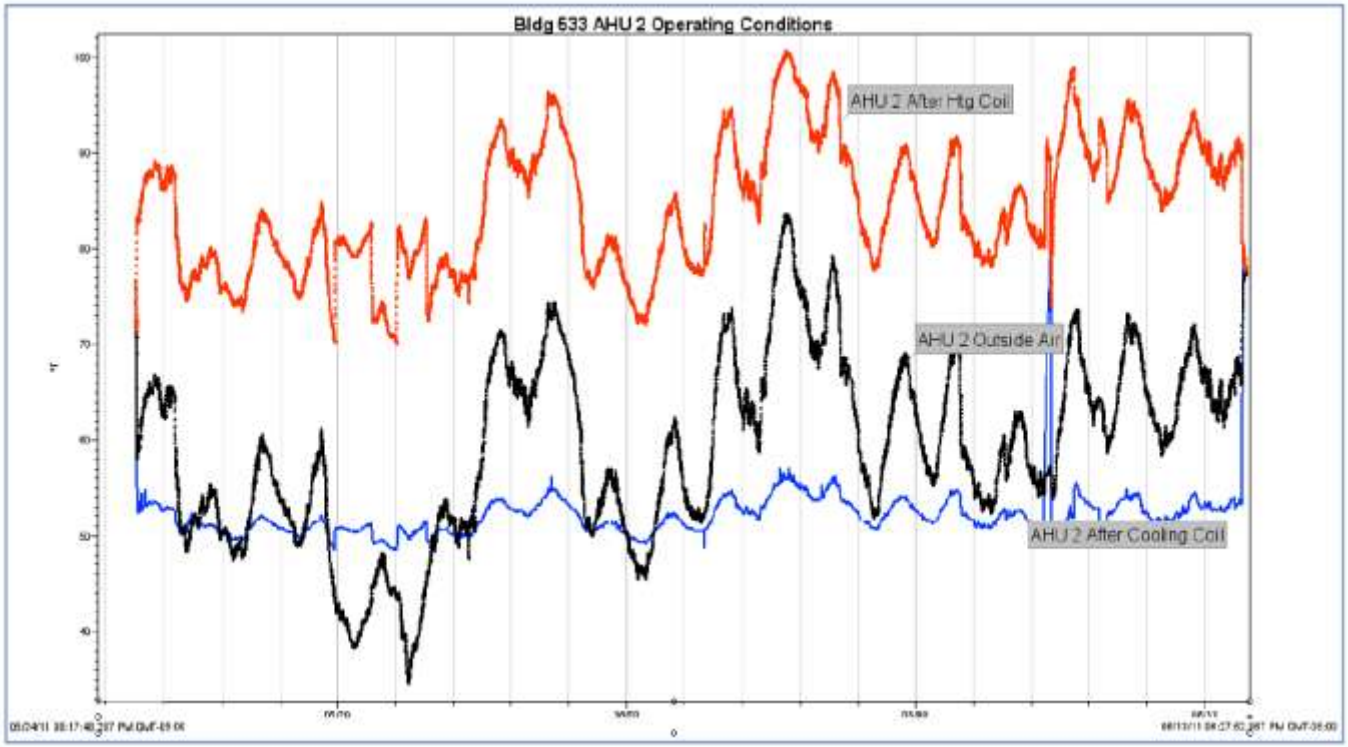

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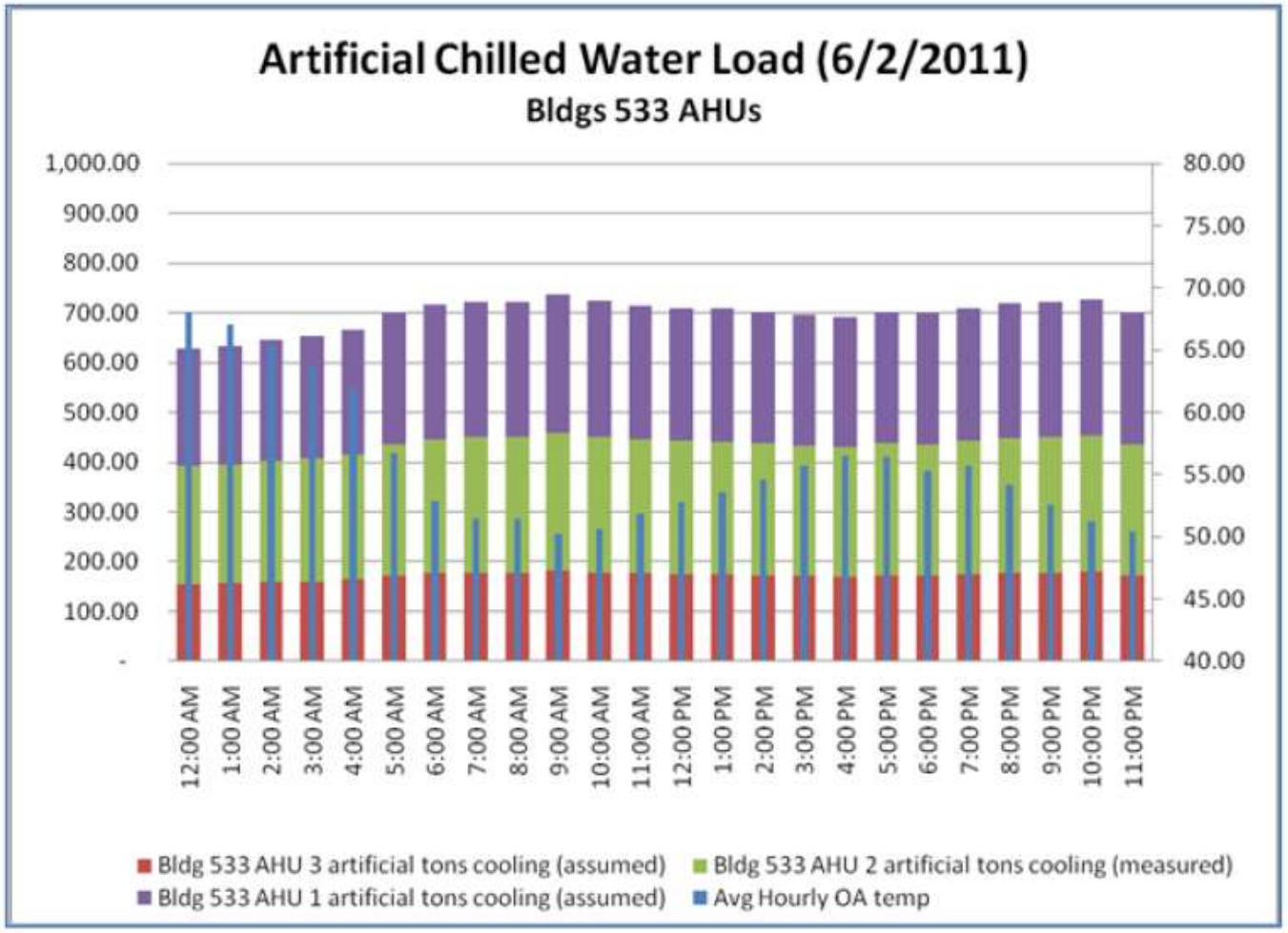

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Fund the Improvements: Total Productive Maintenance

Reliable operation of manufacturing equipment to maximize production and profits

Planned Maintenance vs. Emergency Repairs

Maintain Optimal State

Deterioration Prevention

Continuous Improvement

Proactive vs. Reactive

Learn by Doing

Total Productive Maintenance: University of Utah Details

One time funding obtained by Facility Operations

Budget of up to $1.3M, no payback required

Whole system approach
- Mechanical improvements
- Energy Efficiency Improvements

Energy Savings Capture

Develop model for future

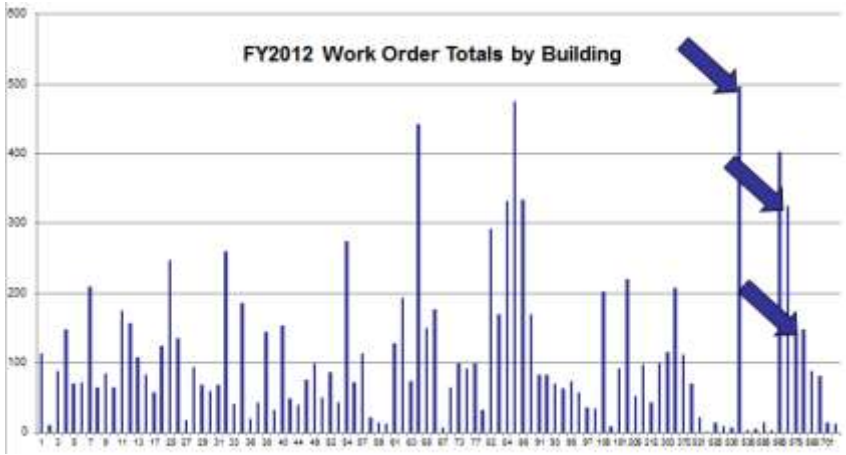
Build case for future funding

Total Productive Maintenance: Select Critical Buildings

How did we identify where to start?

1. Where?
   - Reach back to Prior Studies – Documented issues
   - Where are the consistent issues
   - Critical building functions
   - Proximity

2. Which Buildings?
   - Energy use
   - Work Orders



Total Productive Maintenance: Keys to Success

Focus efforts on critical buildings and components (80/20 rule)

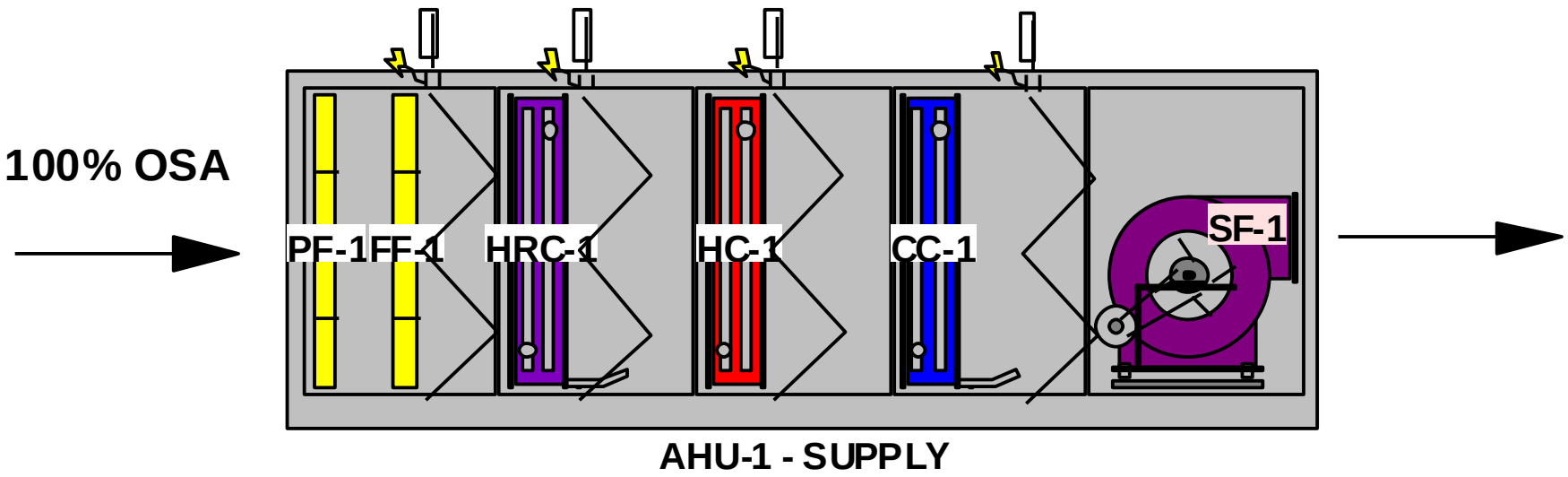
Pace ourselves

Management commitment

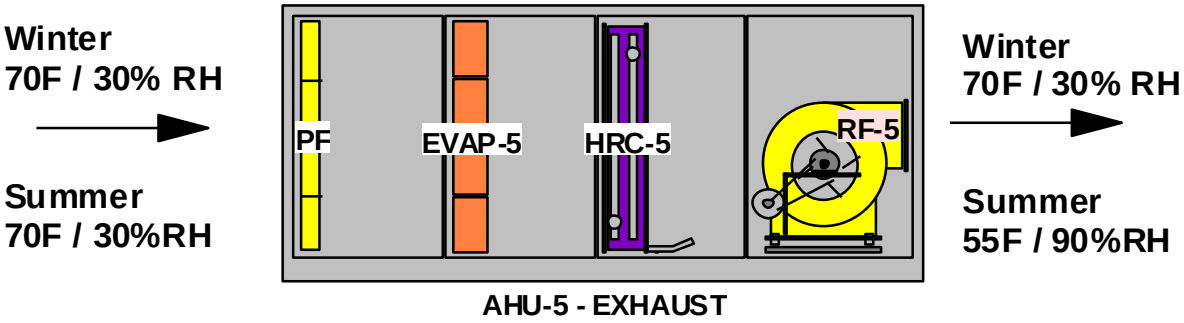
Cooperative effort

Solve repeating operational issues in the buildings

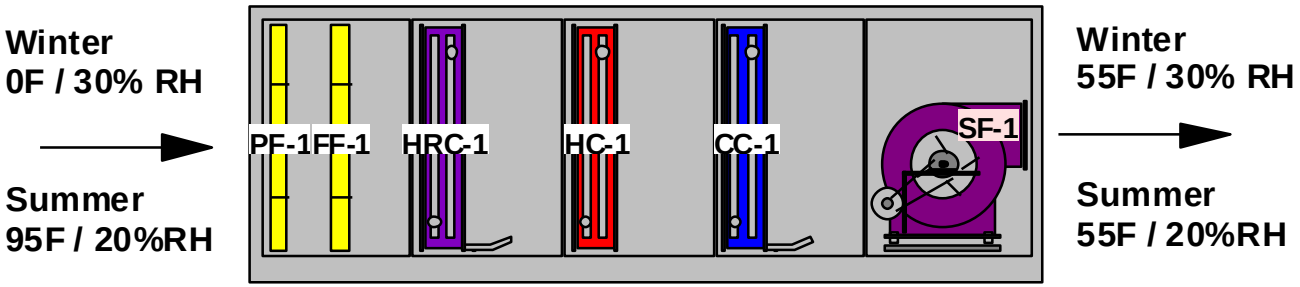
Typical Projects: Modernize AHU



Typical Projects: EVAP in Exhaust AHU

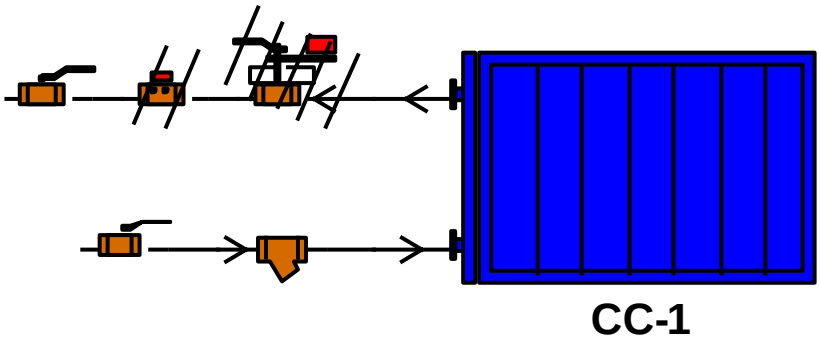


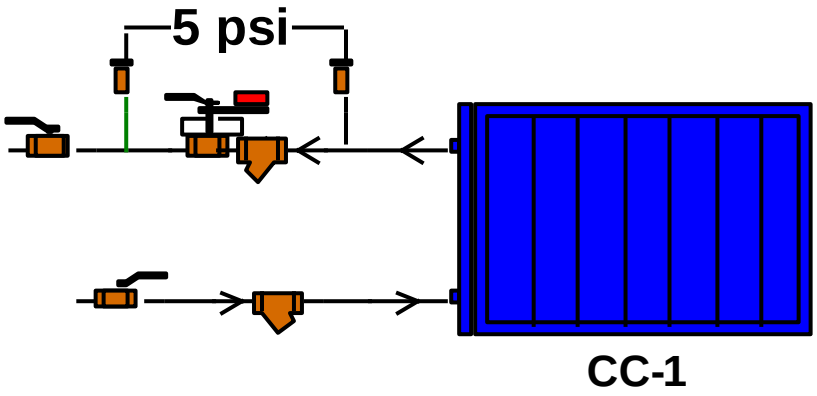
AHU-5 - EXHAUST



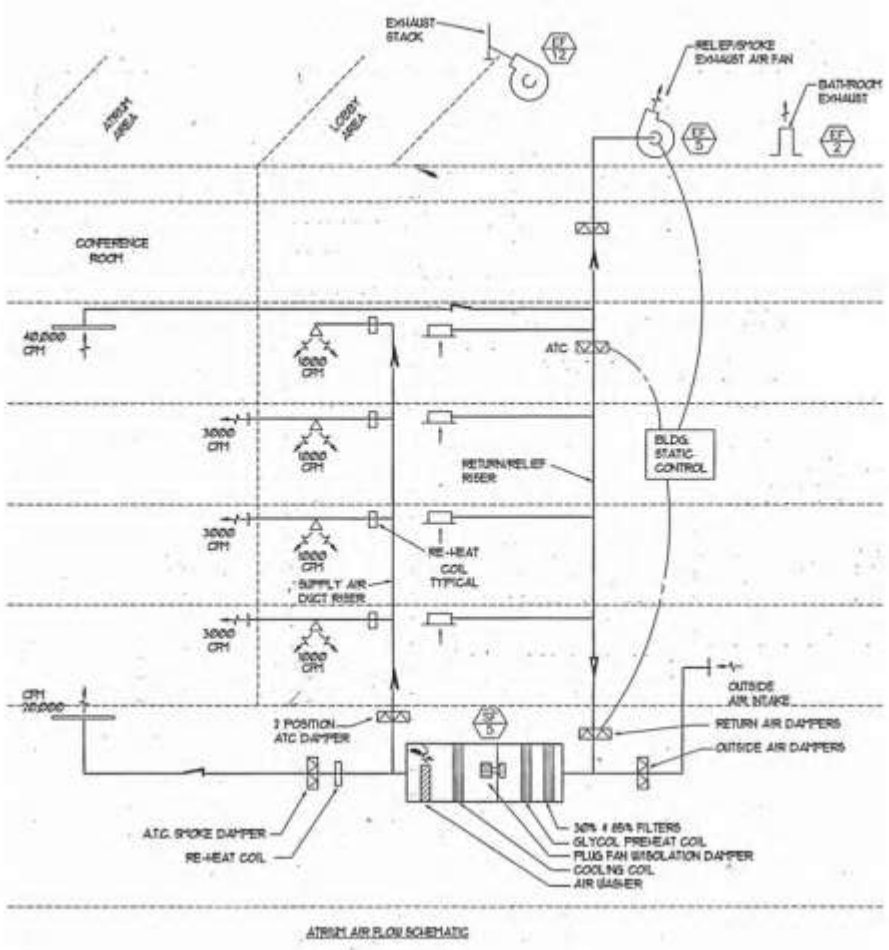
AHU-1 - SUPPLY

Typical Projects: Renovate CHW Systems





Typical Projects: Resolve Relief Air Flow Issues



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Total Productive Maintenance: Cost/Savings/Benefits

Existing Program:

Current Funding: $1.5 M / year

To Date: Simple Payback < 2.5 years

2-3 Buildings/year

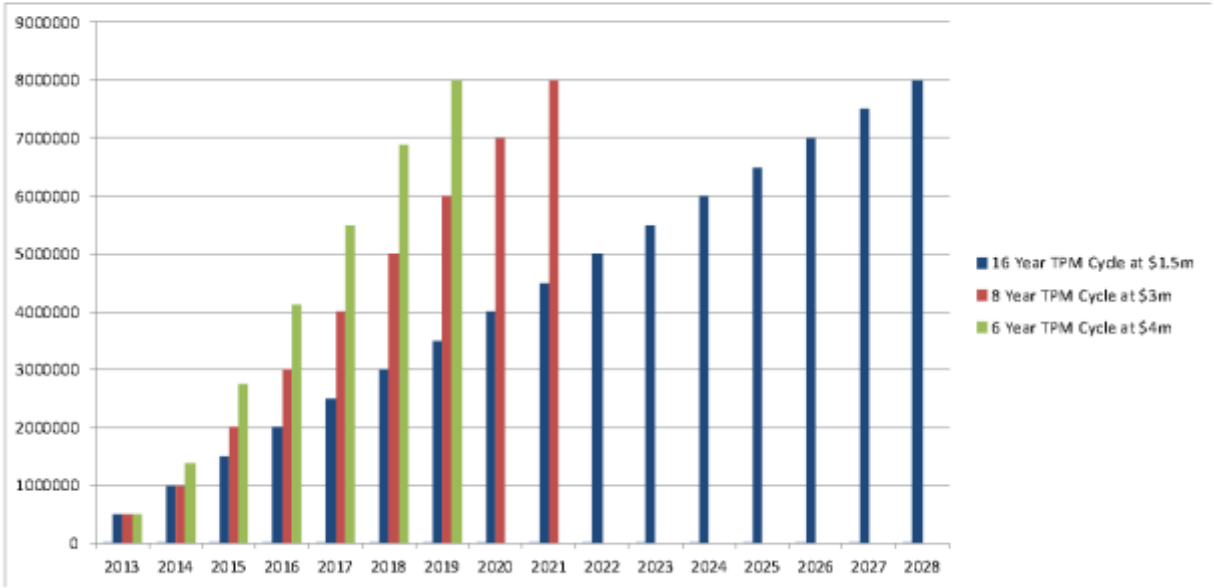
Significant savings

Future Program:

Accelerate funding

Repeat cycle

TPM All Building Cycle



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Case Study-Takeaway

Identify Opportunity

TPM is a Holistic Approach

Present Successes to MGMT

Identify Highest Priority

Good Operation = Energy Savings

Results in Better Buildings

Thank You

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