

Take Control Using Analytics to Drive Building Performance: Overview



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Introduction to the Webinar

- Important reasons why we must do more to improve building operations
- Current deficiencies in building operations
- Key gaps and best practices in control system deployment and operations
- Common problems with building operations
- Building analytics basics

Only 14% (43% of conditioned space) of the building stock has building automation systems

Source: 2012 Commercial Building Energy Consumption Survey

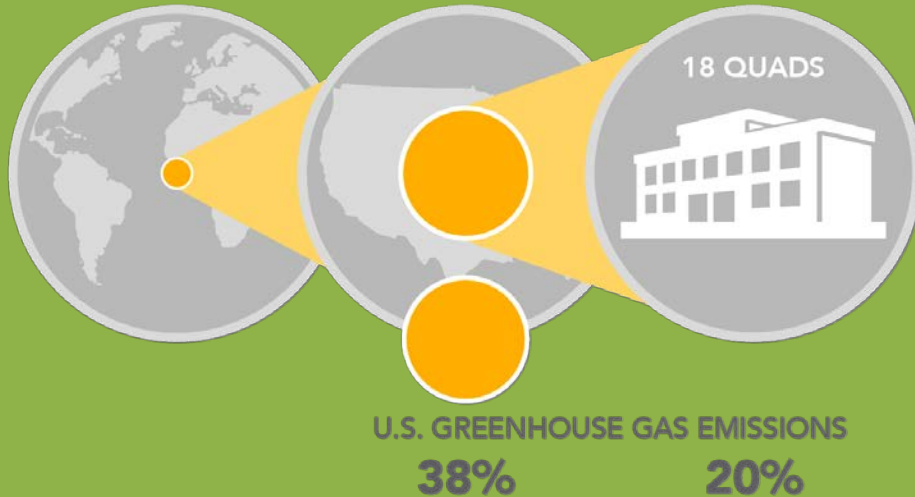


**Important reasons why we must do
more to improve building operations**

CONTRIBUTION OF
U.S. BUILDINGS TO
TOTAL WORLD ENERGY
9%

U.S. BUILDINGS
PRIMARY
ENERGY USE
40%

COMMERCIAL
BUILDINGS



- U.S. EPA's Clean Power Plan
- City and State “Tune-up” mandates

CONTRIBUTION OF
U.S. BUILDINGS TO
TOTAL WORLD ENERGY

9%



U.S. BUILDINGS
PRIMARY
ENERGY USE

40%



COMMERCIAL
BUILDINGS

18 QUADS



U.S. GREENHOUSE GAS EMISSIONS

38%

20%

BUILDING &
EQUIPMENT
EFFICIENCY

20-60%

DISTRIBUTED
RENEWABLE
GENERATION

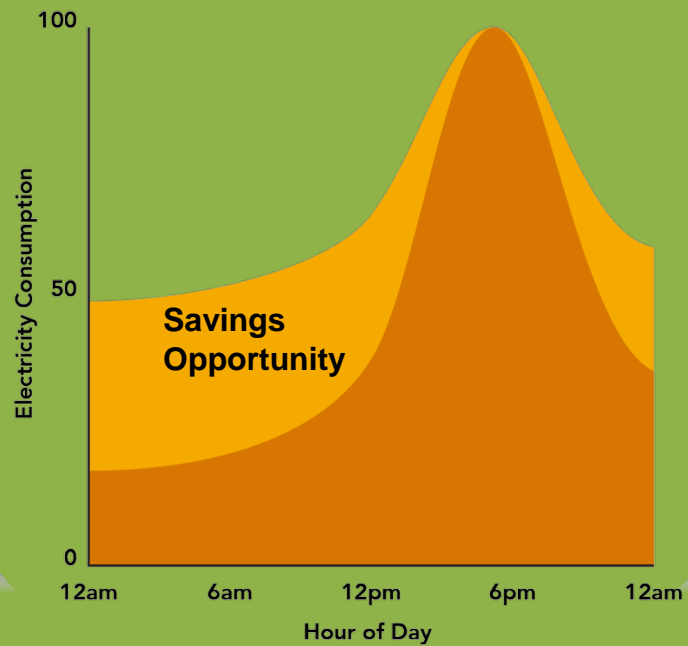
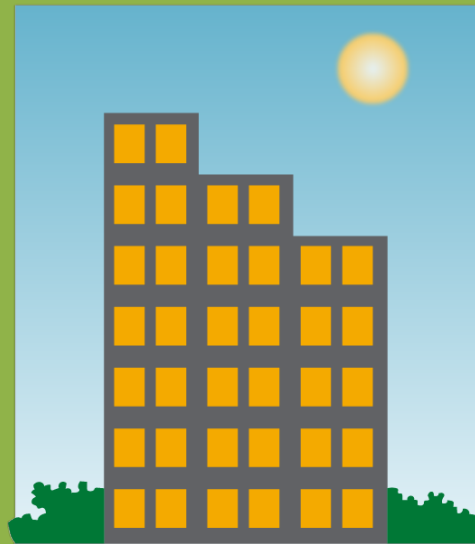
15-30%

OPERATING
EFFICIENCY

20-30%

Current deficiencies in building operations

00100 10
01101 10



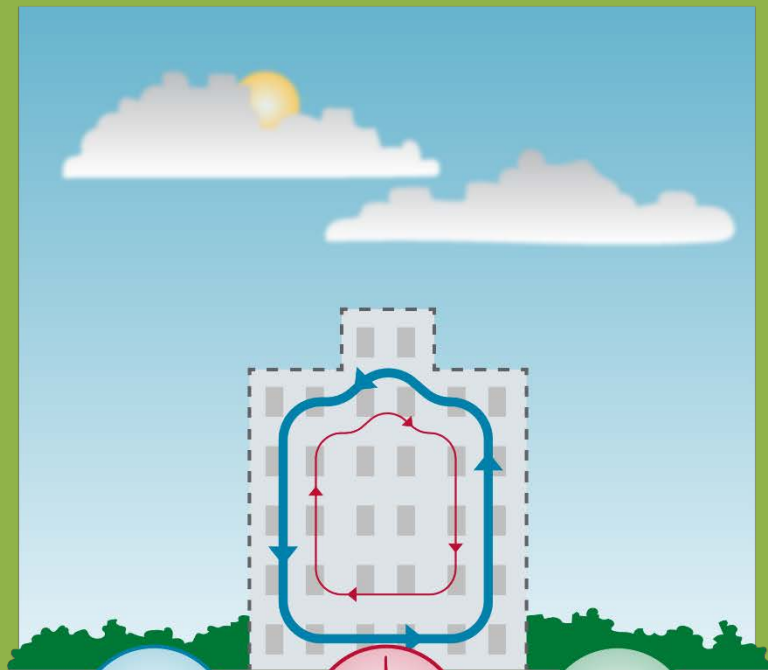
Building Systems Lack “Self-Awareness”

Systems are designed and sized to provide comfort for a “design” day ...

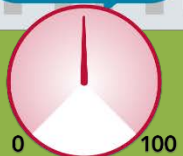


... but they are operated as if every day is a design day...

00100 10
01101 10



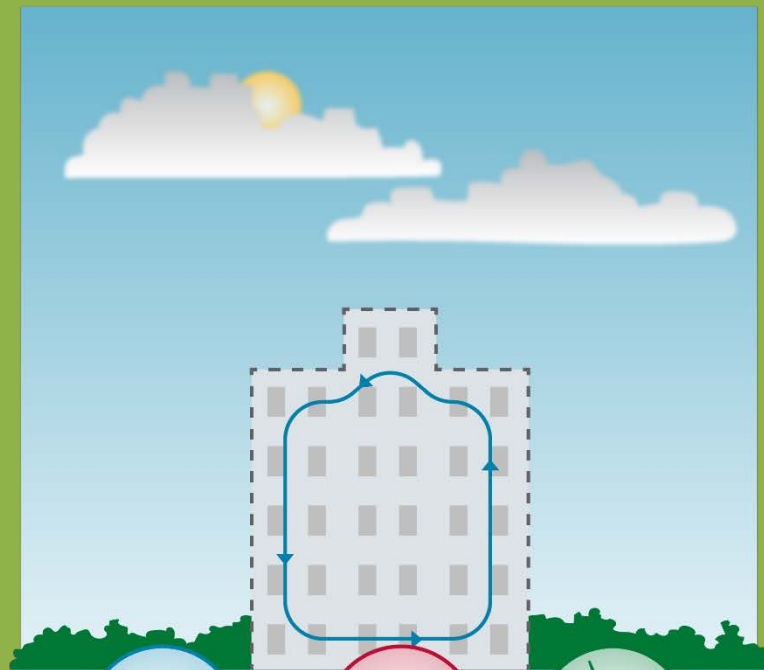
Cooling



Heating



Fan



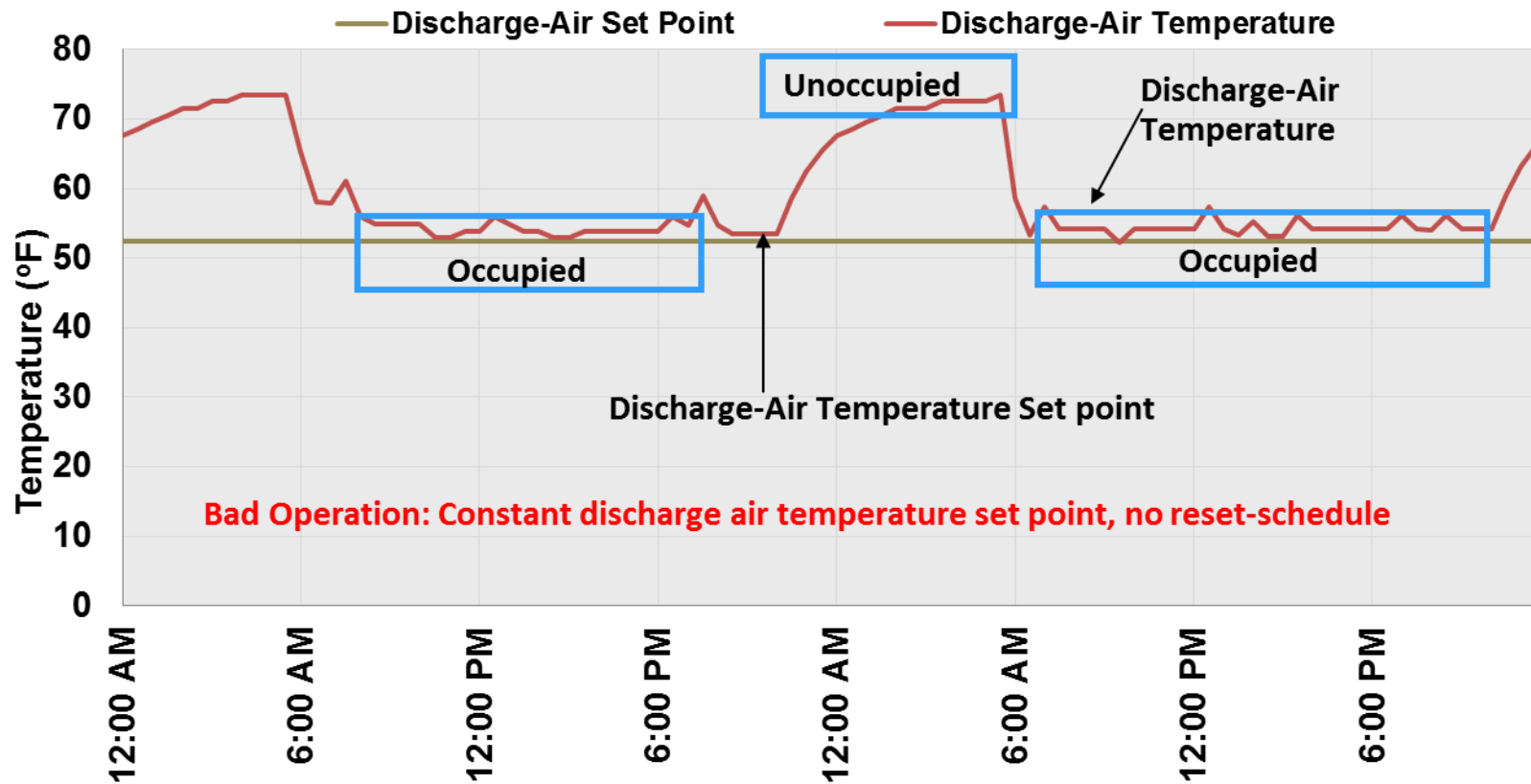
Cooling

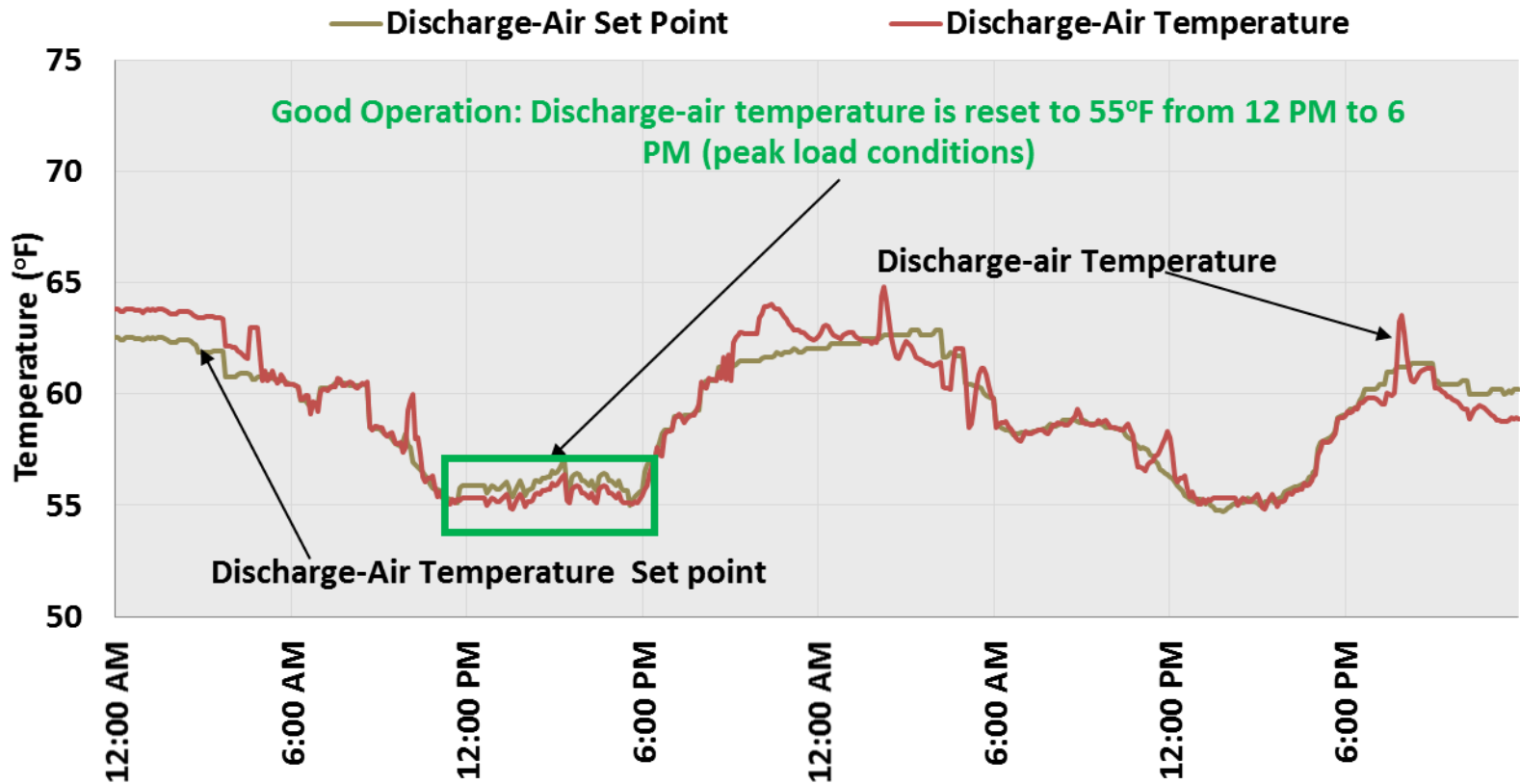


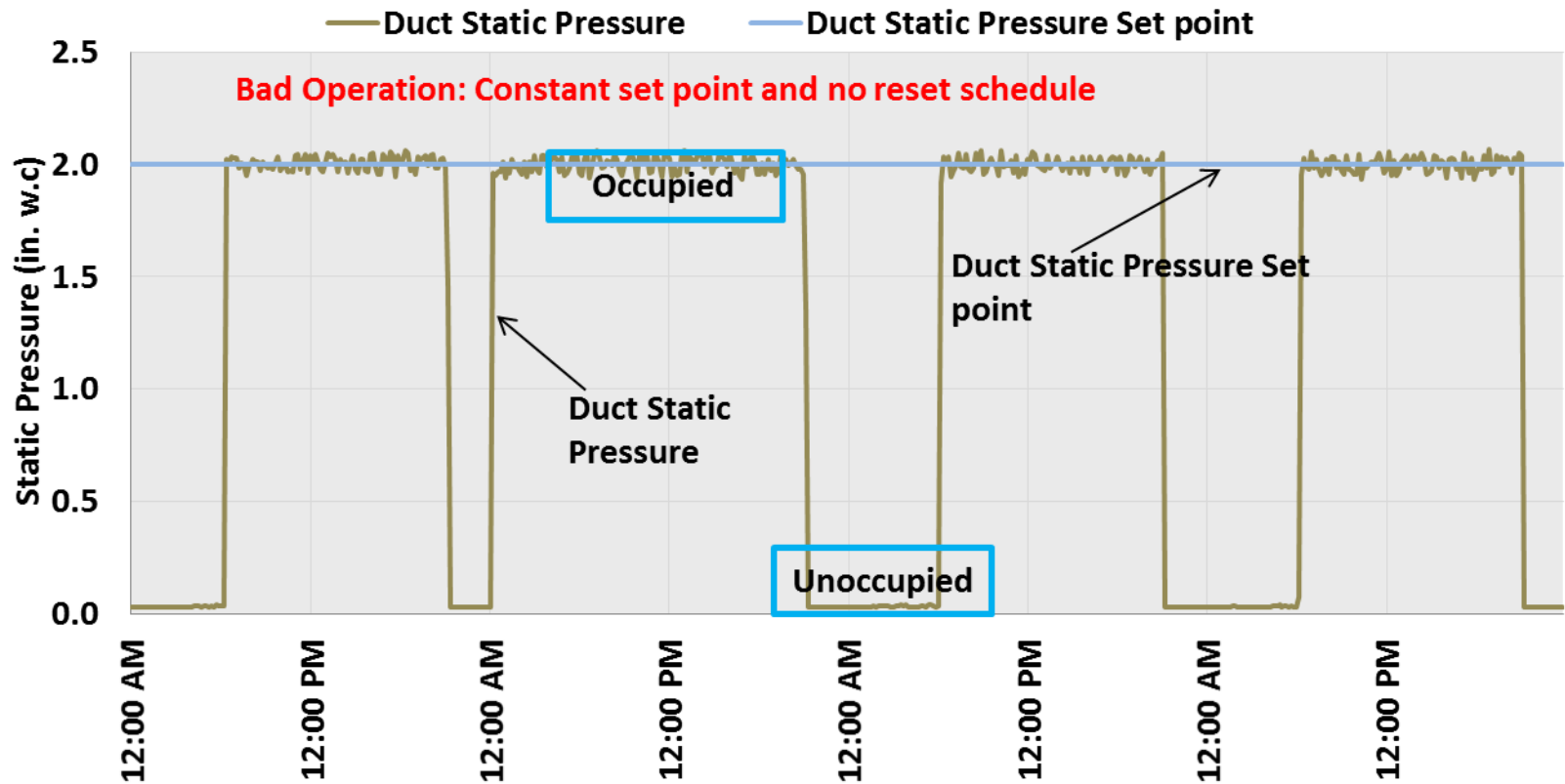
Heating

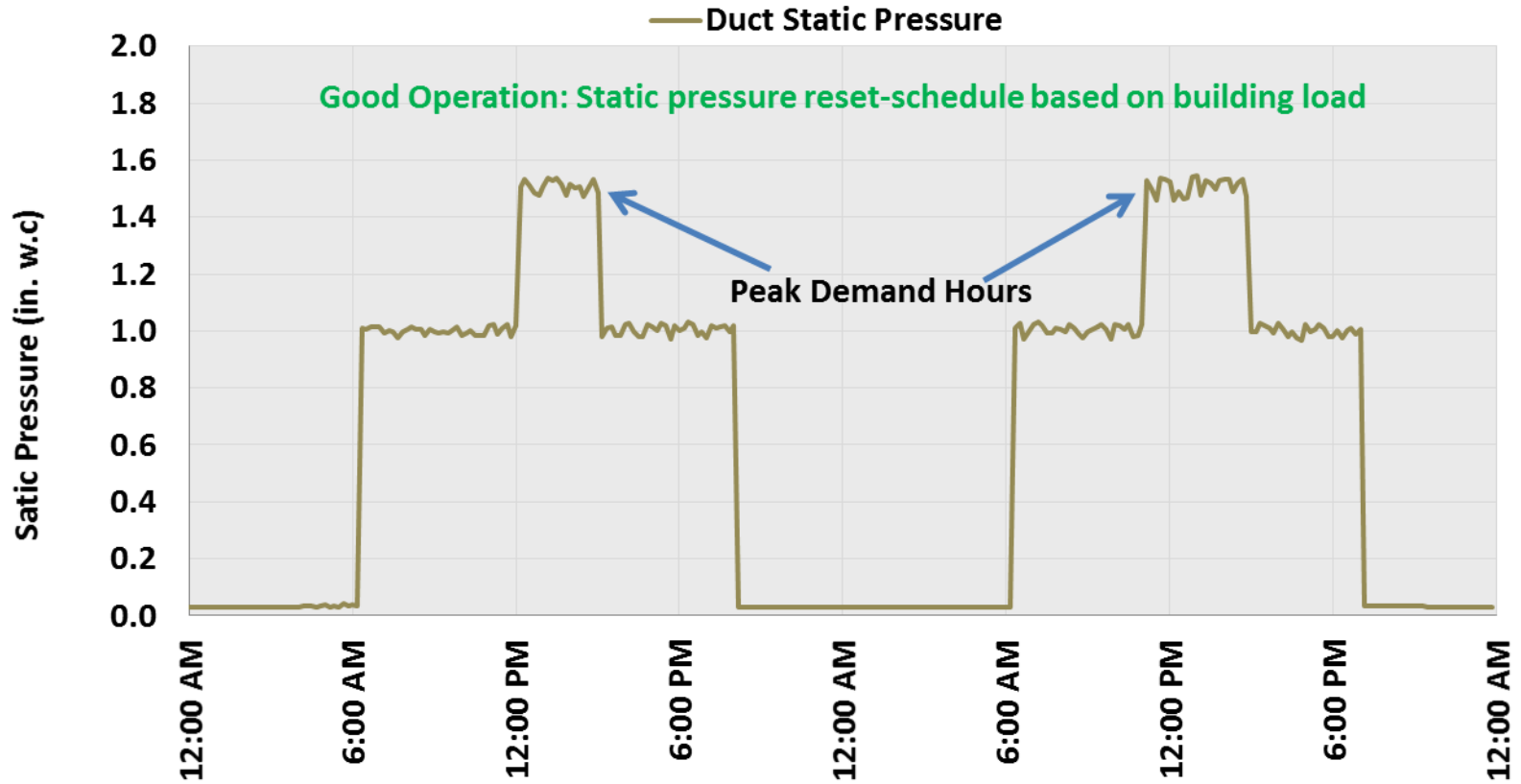


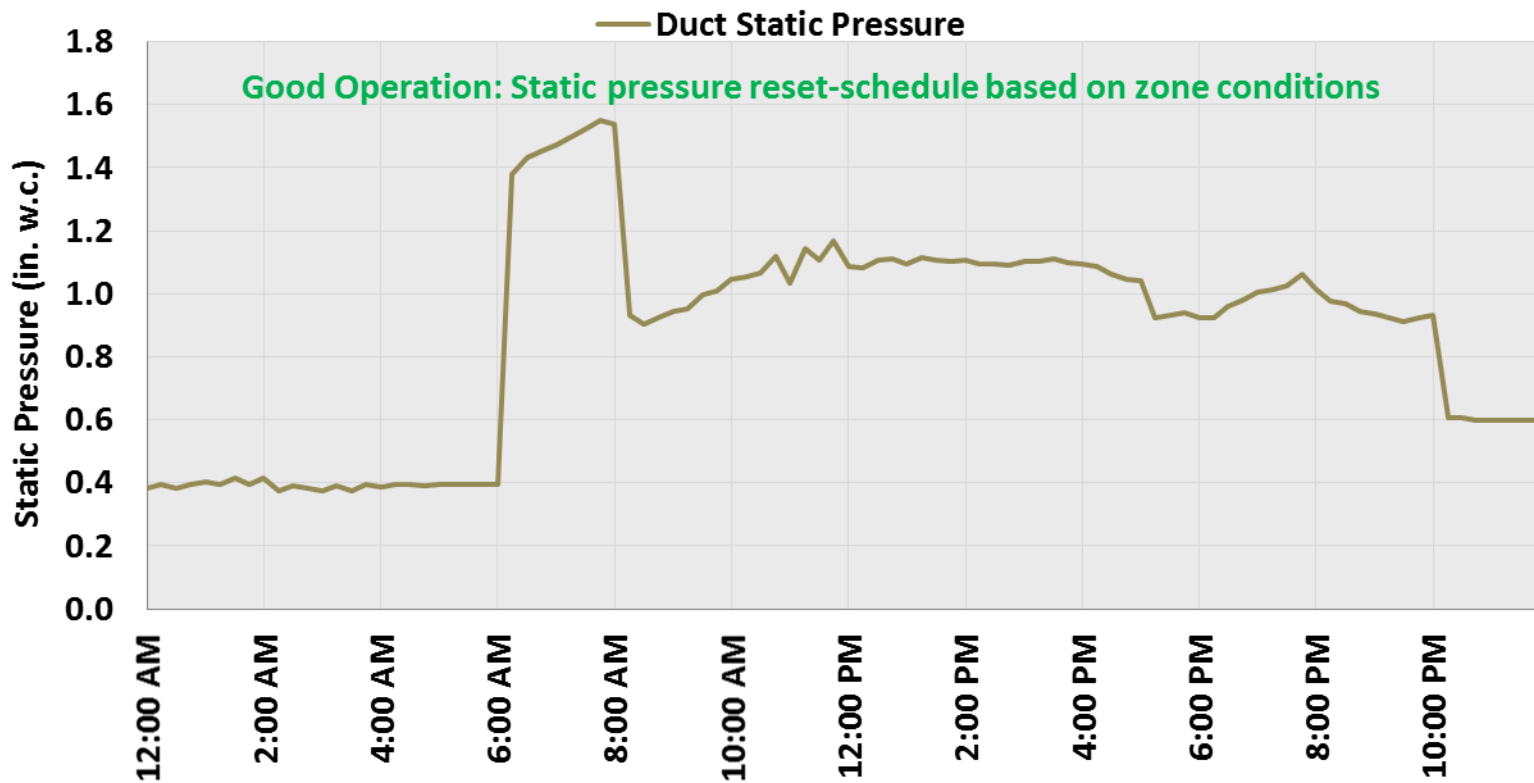
Fan










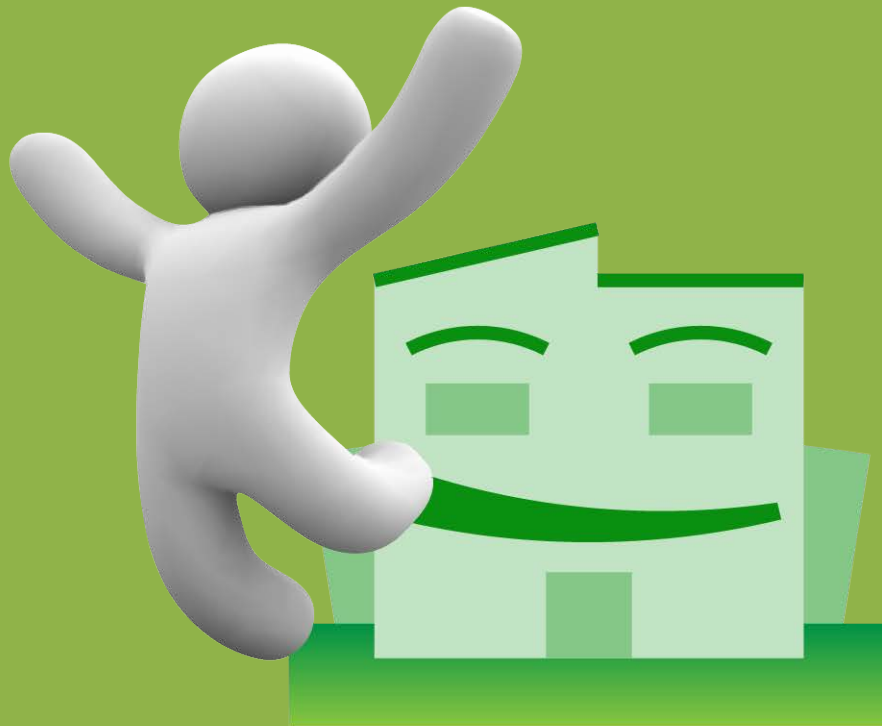
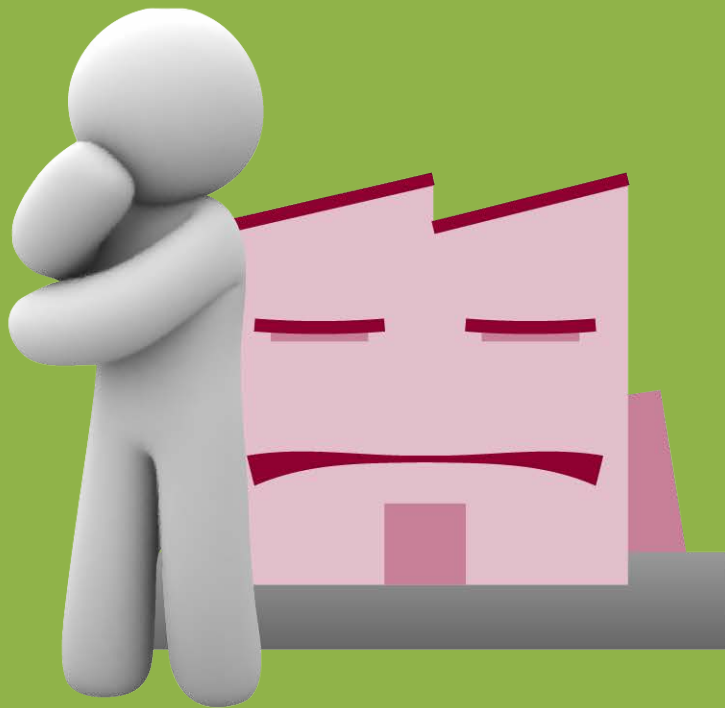




The background of the slide features a stylized, green-tinted image of a city skyline. Overlaid on this are vertical columns of binary code (0s and 1s) that resemble digital rain or data streams, creating a high-tech, urban atmosphere.

Key gaps and best practices in control system deployment and operations

00100 10
01101 10



00100 10
01101 10



Other Reasons Why Building Operations Suffer

- Lack of monitoring and self-awareness
- Lack of initial commissioning
- Limited hands-on training options
- Shortage of experienced workforce
- Reduced operating budgets

Common problems with building operations

Common Opportunities

Lack of Reset Strategies

- Discharge temperature and duct static pressure in AHUs
- Chilled/hot water temperature reset
- Differential pressure reset on chilled/hot water distribution loop

Lack of Use

- Occupancy-based controls for common areas
- One or more faulty sensors or sensors in the wrong location
- Night setbacks
- Photo sensors in the wrong location

Common Opportunities

Improper Settings

- Heating/cooling set points
- Outdoor air during warm-up
- Dead bands
- Automatic lighting controls

Improper Schedules

- AHUs and fans
- Exhaust fans during warm-up

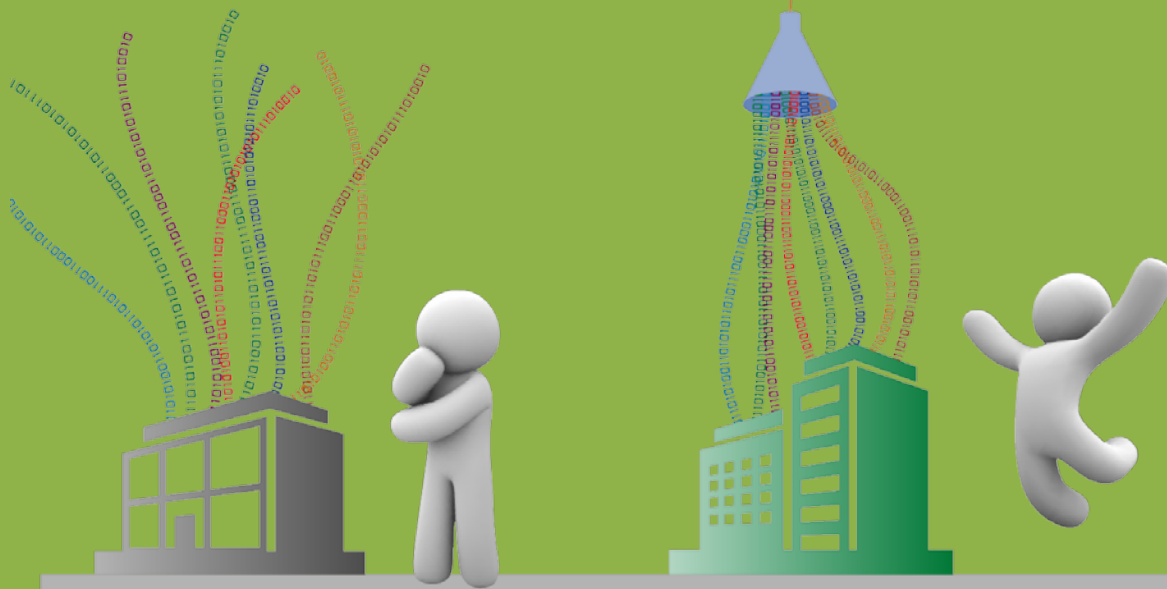
Building analytics basics

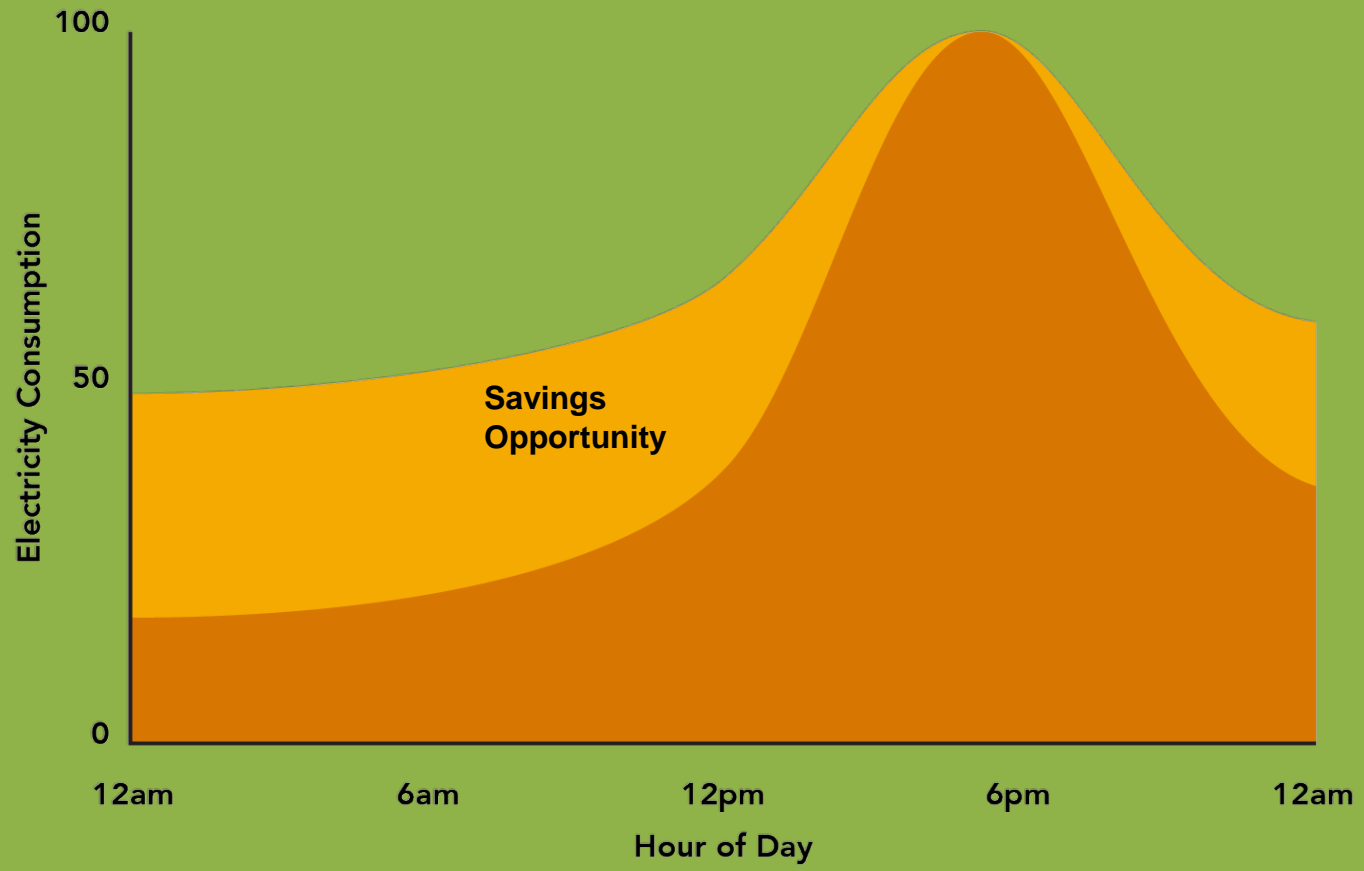
Outdoor Air Damper on
Air Handling Unit 10 is
stuck open (100%)

Economizer Controls
are not working on Air
Handling Unit 13

Air Handling 1 does not
appear to be using
Static Pressure Reset

The Delta-T on the
Chilled Water Loop is
Low (5°F)





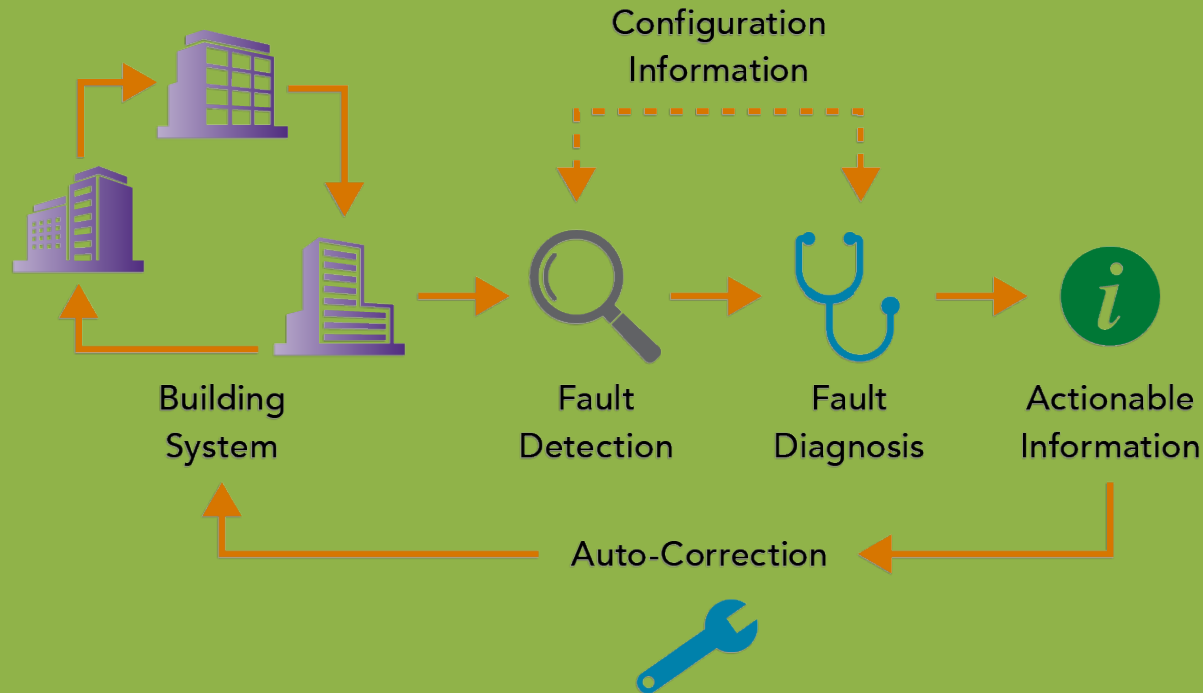
Beyond Benchmarking ...

Beyond benchmarking of whole building data, building automation systems provide a rich source of “raw” data that can be used to create:

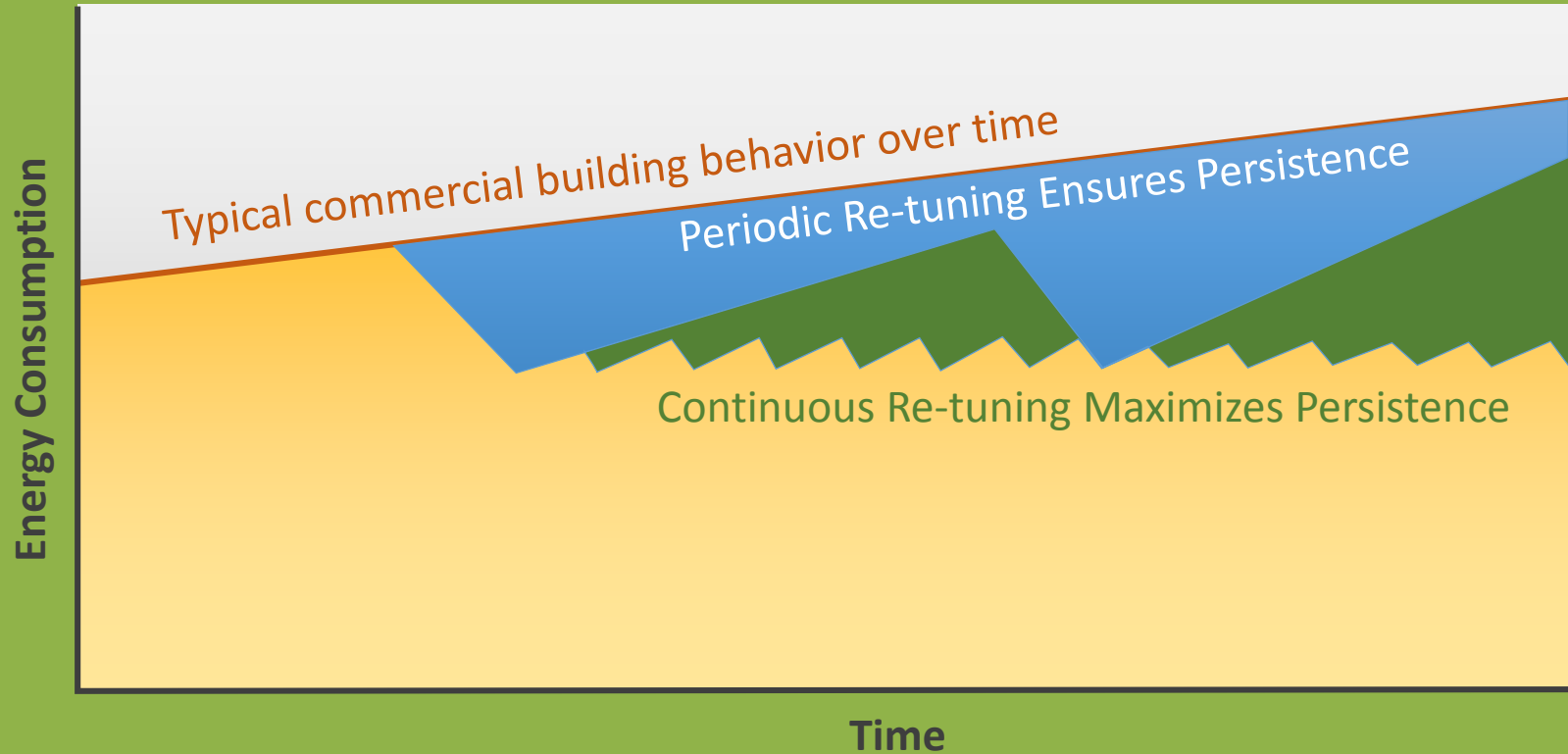
- Actionable information (i.e., identify operational problems)



Automated Fault Detection, Diagnostics and Self-Correction



Life Cycle of Existing Building-Commissioning

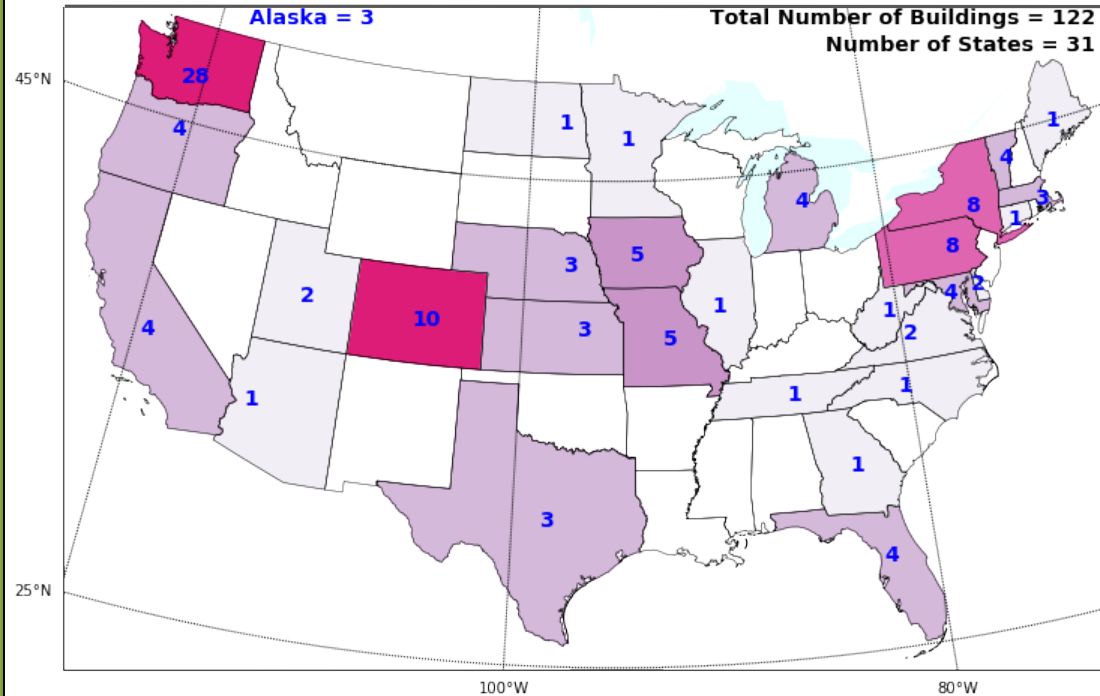


Take Control Using Analytics to Drive Building Performance: A Case Study – What to Expect

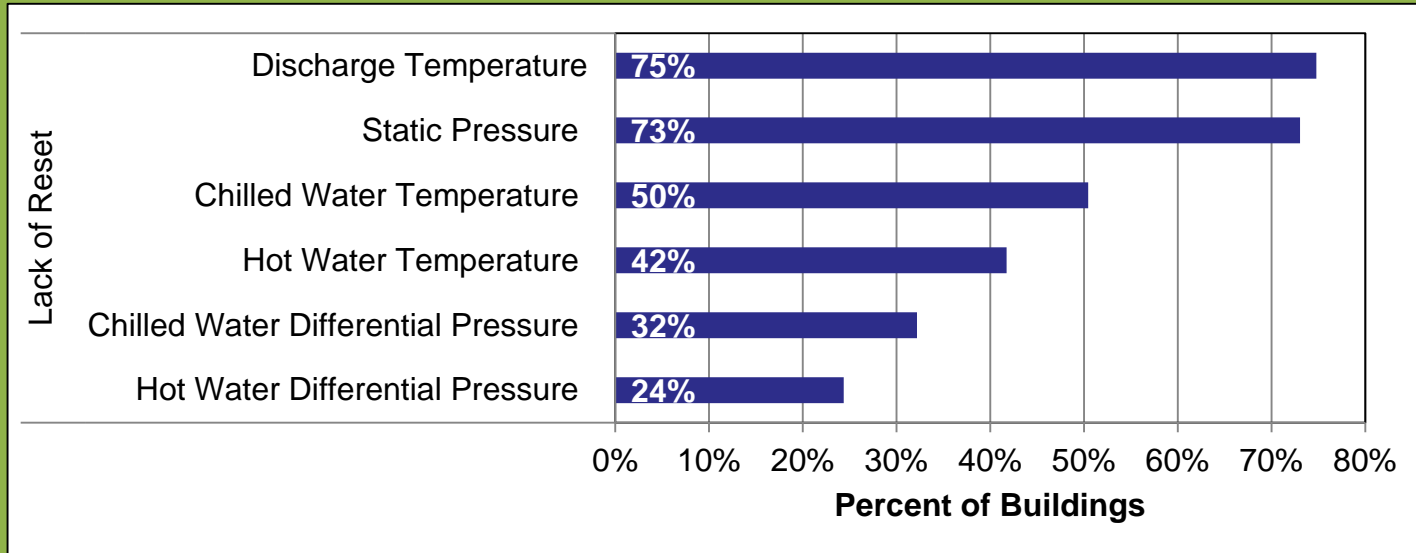


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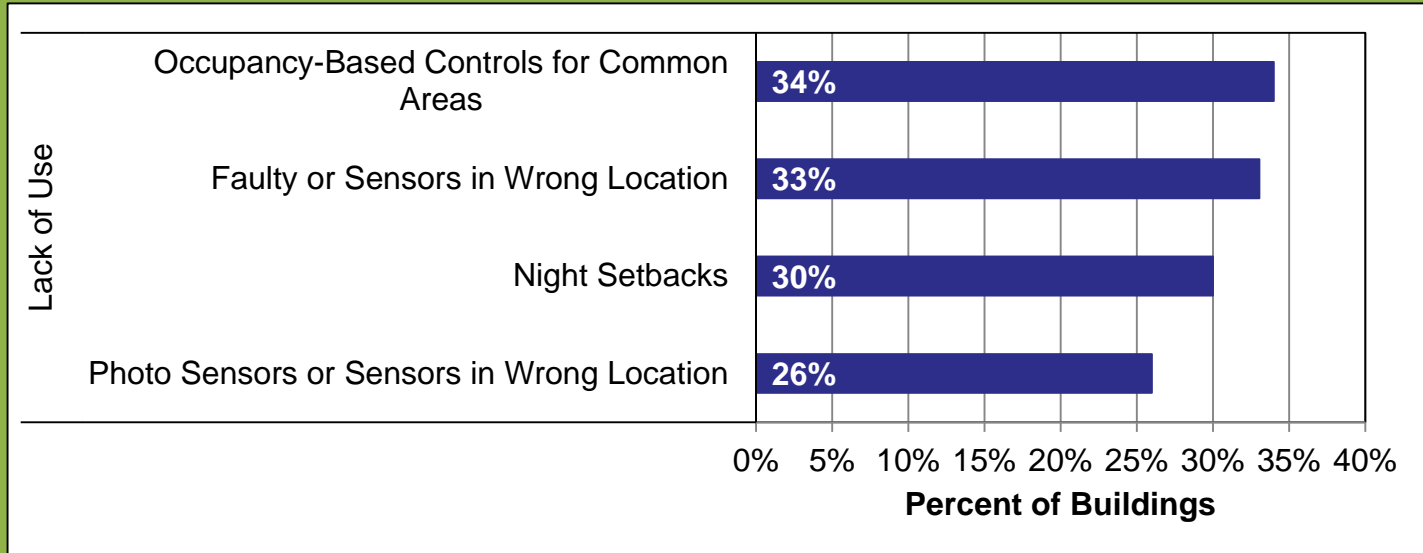
Distribution of Buildings by State



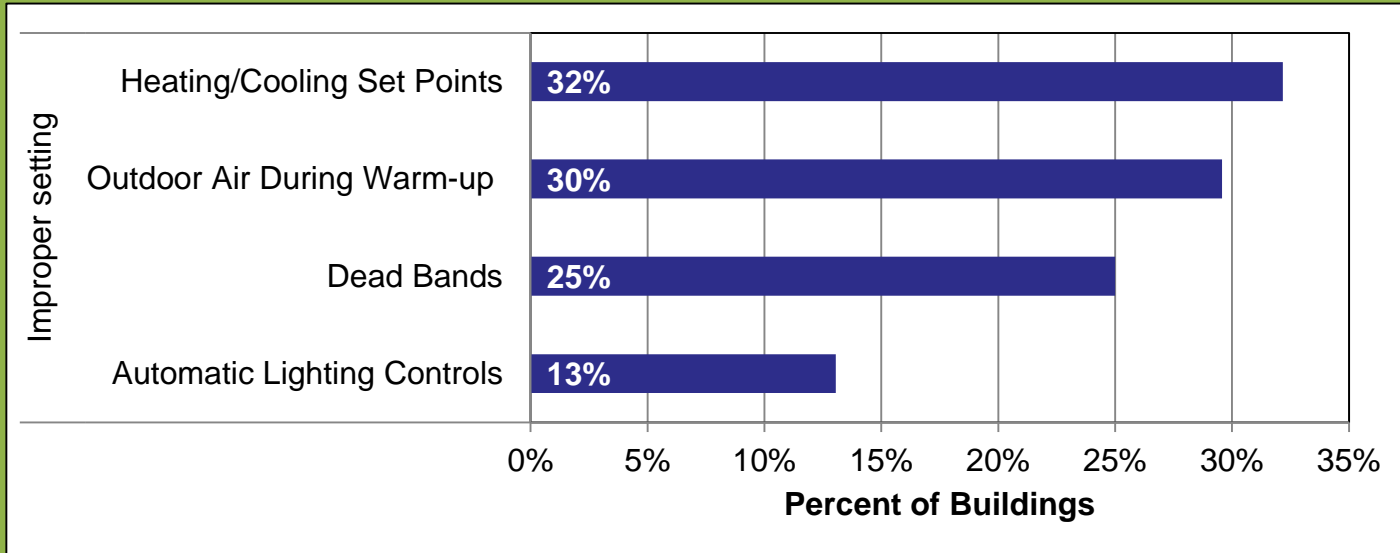
Lack of Reset Strategies



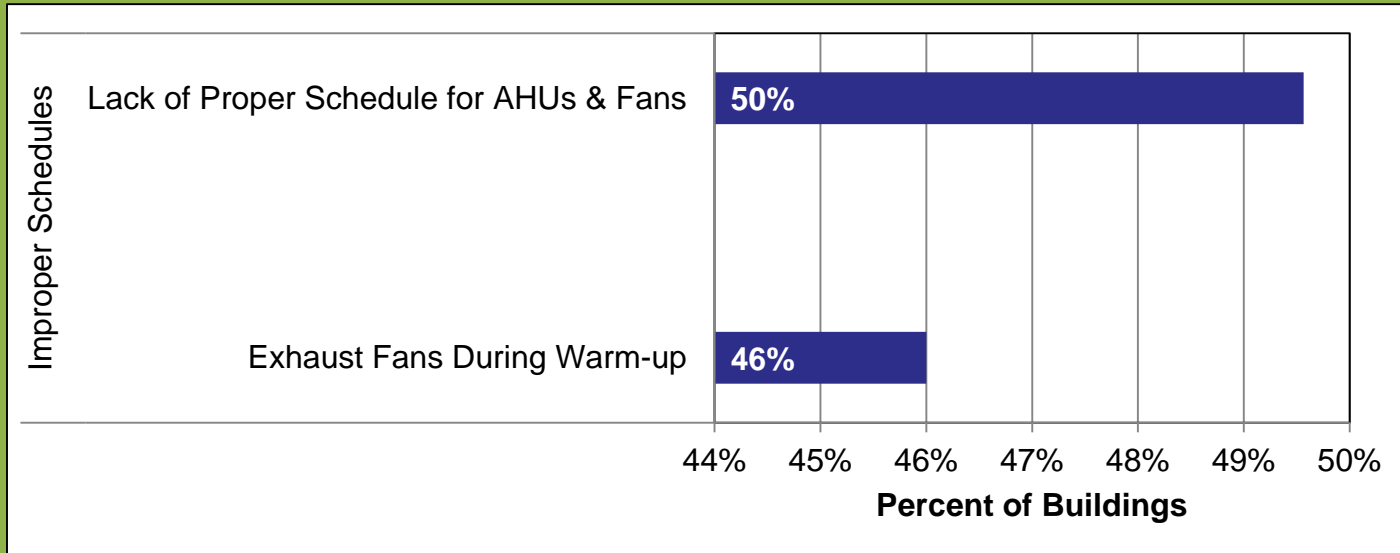
Lack of Use



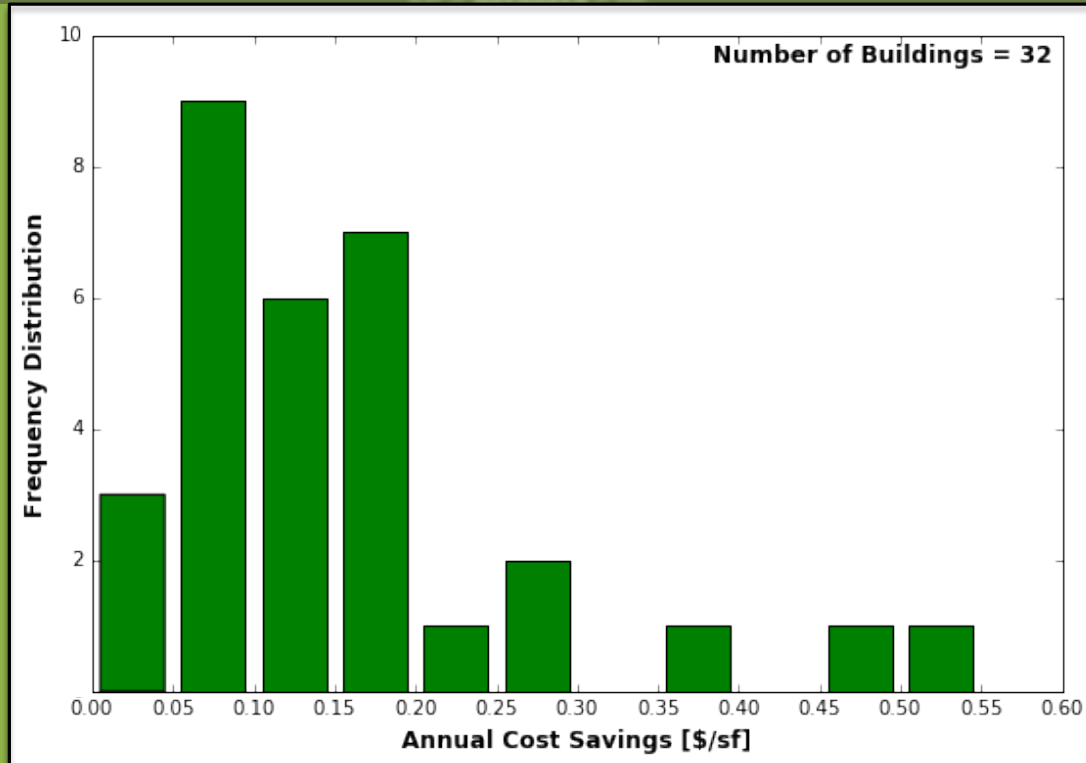
Improper Settings



Lack of Proper Schedules



Distribution of Buildings by State

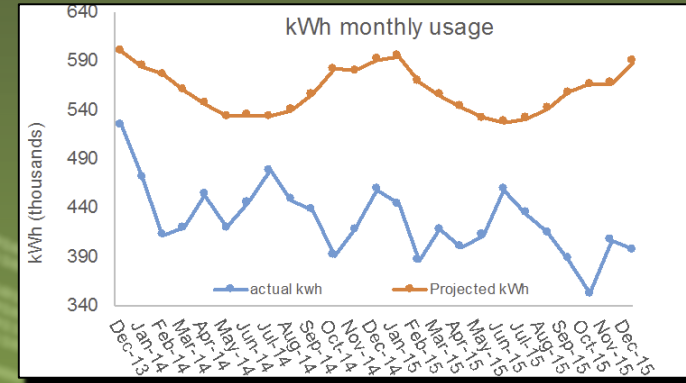


Median Savings
13%

Mean Savings
17%

Building in Atlanta, GA

- Implemented night setback for air temperature and pressure
- Reduced interior zone reheat
- Reduced overcooling or overheating
- Reduced reheat during summer/cooling season for exterior zones
- Implemented discharge air reset
- Eliminated zones that were out of control, oscillating between heating and cooling



Building in TX

- Relocated outdoor air temperature
- Reviewed and removed all the overrides
- Recalibrated pneumatic devices
- Replaced gaskets on all dampers
- Implemented discharge air temperature reset
- Updated building automation system code
- “Optimized” the start and stop times
- Adjusted the static pressure of AHUs

