

Low Cost, High Impact Energy Reduction in Existing Campus Buildings

Matt Stevens

Energy Management & Optimization

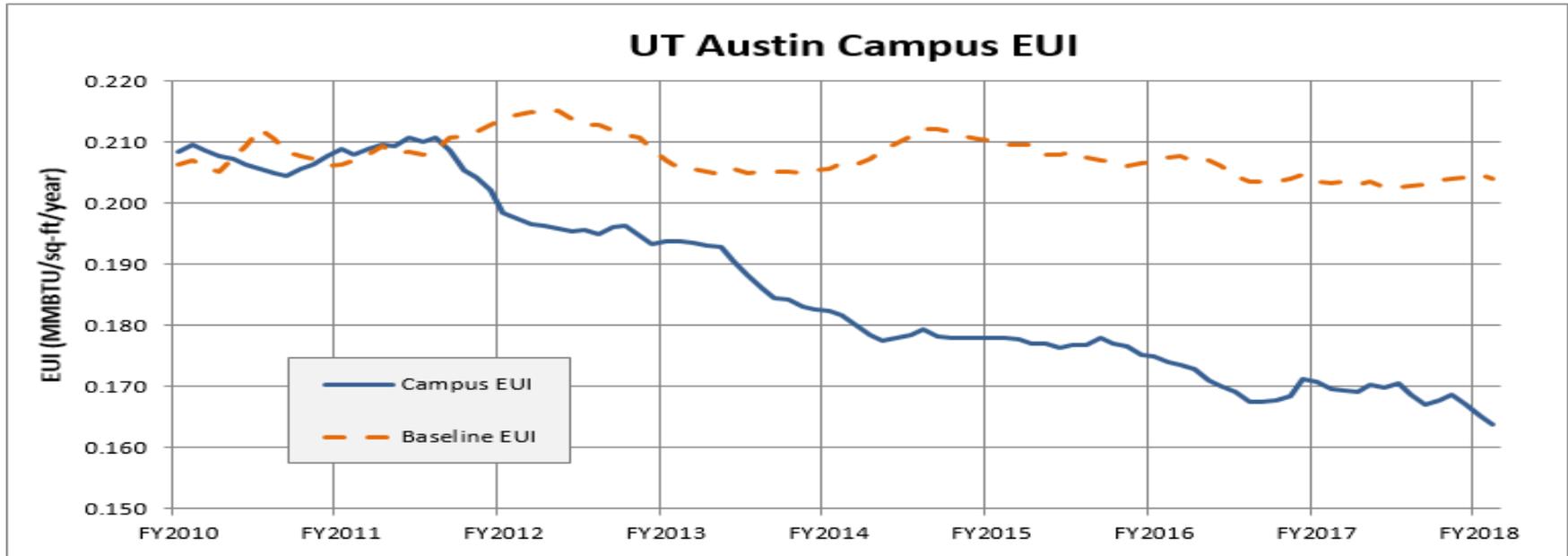
Utilities & Energy Management

University of Texas at Austin

Energy Management & Optimization

- 6 person team formed in 2012
- Goal
 - 2% annual energy use (EUI) reduction on campus
- Why?
 - Additional needed generation capacity and infrastructure due to campus growth
- How – Demand side strategies
 - Building energy conservation measures
 - Existing building commissioning projects
 - Maintenance needs
 - Behavior change initiatives

Energy Management & Optimization



George I. Sanchez Building (SZB)

- College of Education
- Built in 1975
- 5 Floors
- 261,914 gross square feet
- Academic
 - Offices
 - Classrooms
- 10 air handlers
 - District chilled water and steam coils
 - BAS
 - Digital control at air handler
 - Pneumatic in the zones
- 2 server rooms cooled by building AHU cold decks



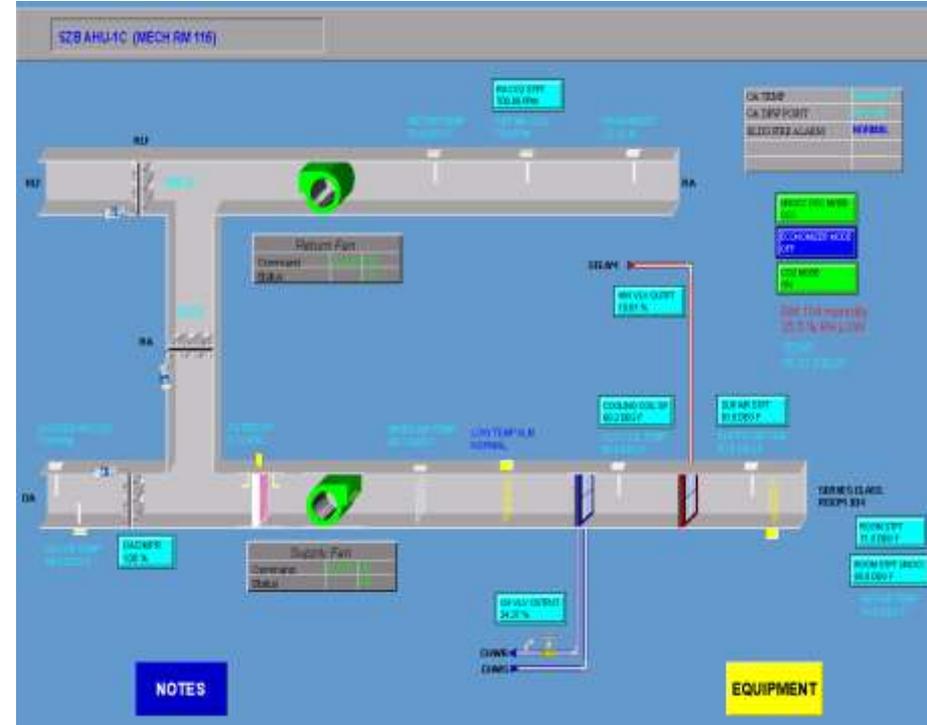
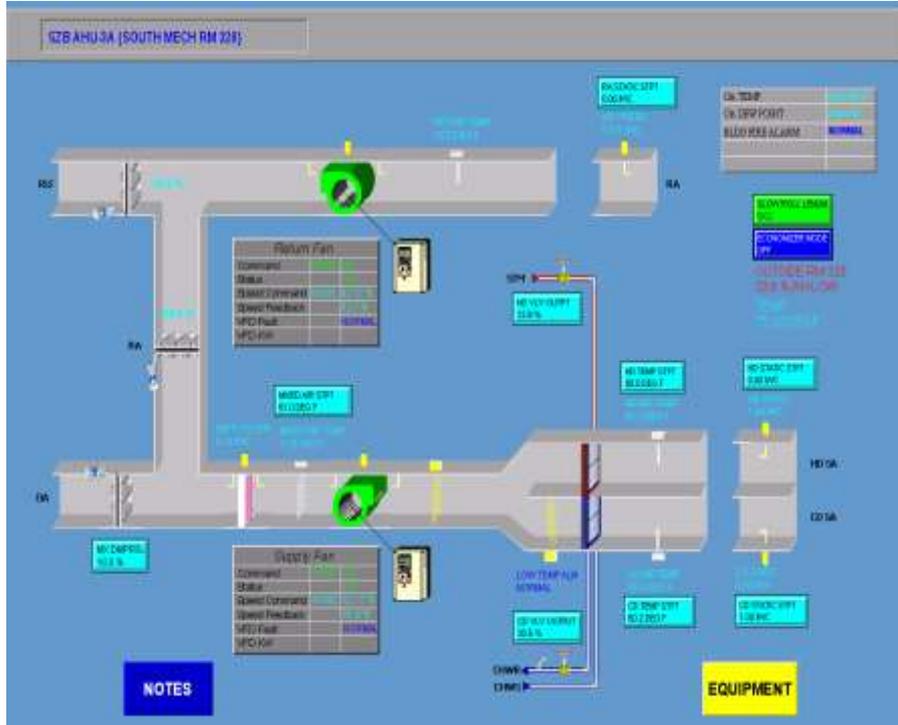
SZB Energy Use

	Fiscal Year 2015	Fiscal Year 2016
MMBtu	33,406	32,290
Site EUI (kBtu/f²)	129	123
Cost (Full-burdened)	\$532,781	\$519,008

AHU Schematics

9 Single Fan, Dual Duct

1 Single Fan, Dual Coil

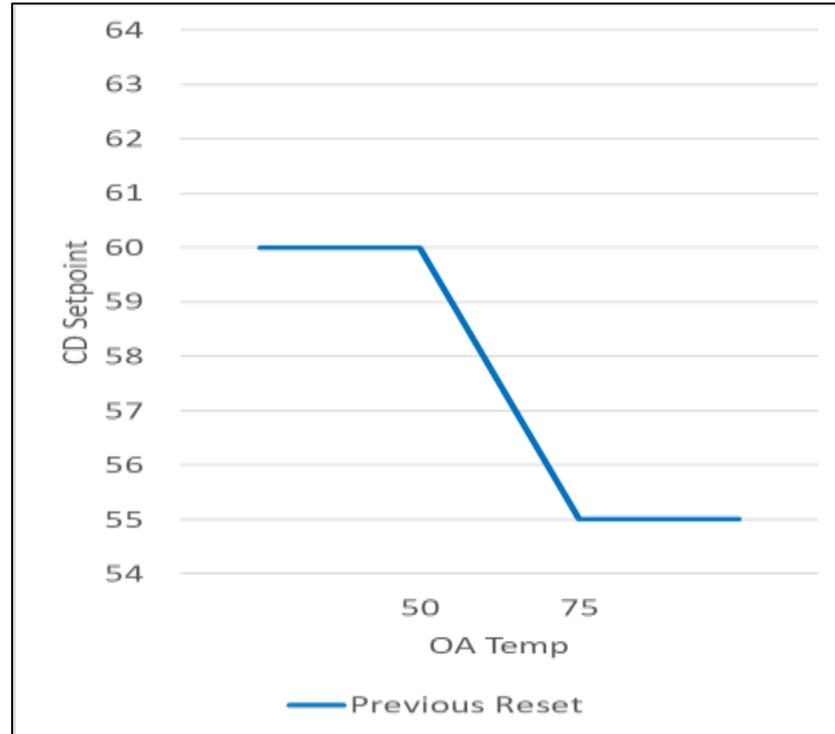


Digital Zone Humidity/Temp Sensors

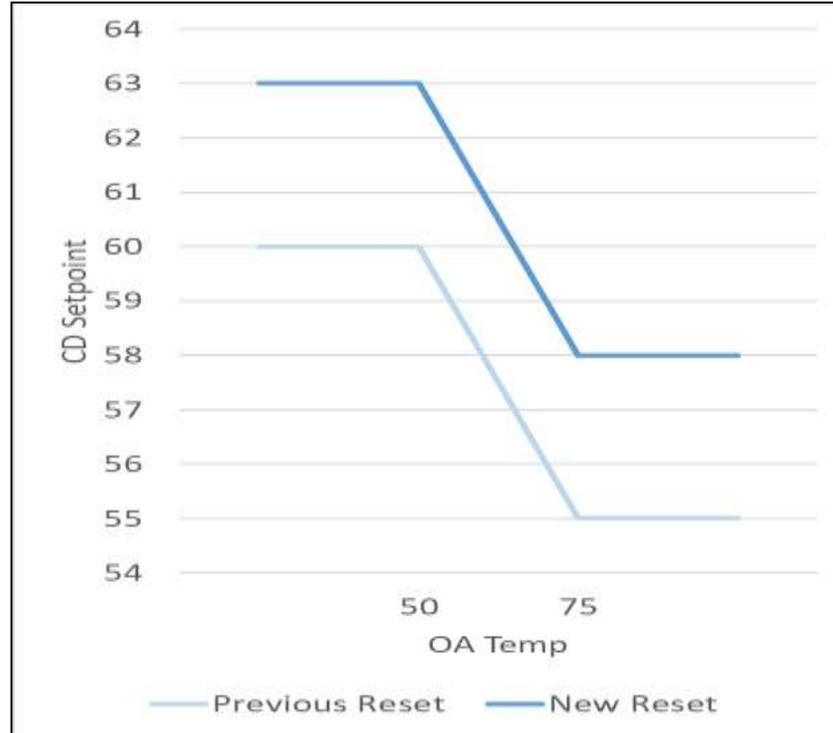
- Installed in common areas served by 8 AHUs
 - All except for two that provide cooling to server rooms
- Used internal labor
- Costs
 - Materials: \$3145
 - Labor: \$3597
 - Total: \$6742
- Timeline
 - February 2017: Preliminary Sequencing
 - September 2017: Sensor Installation Complete
 - November 2017: Finalized Sequencing Complete



AHU Cooling Setpoints

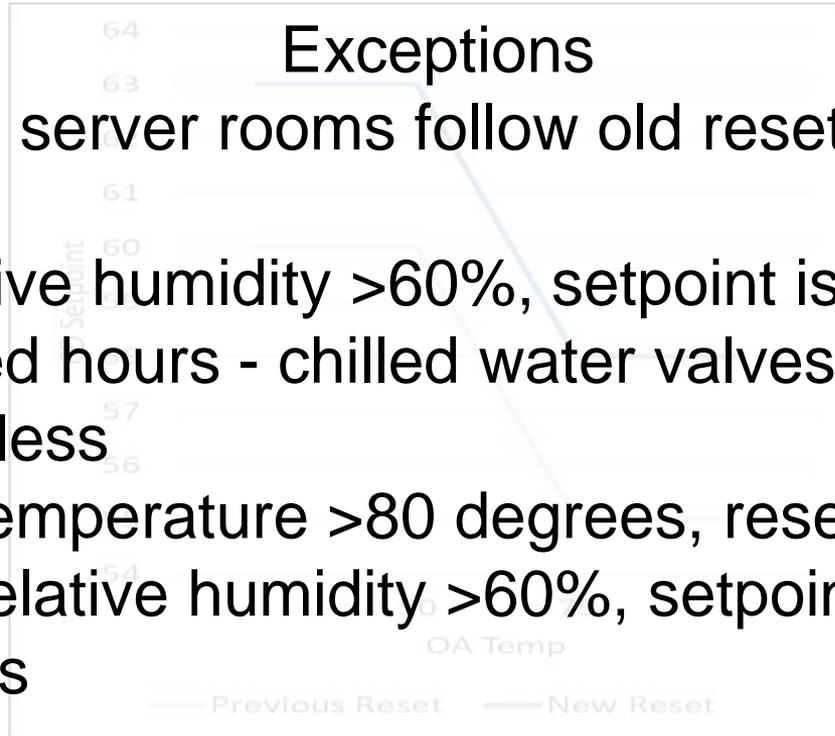


AHU Cooling Setpoints

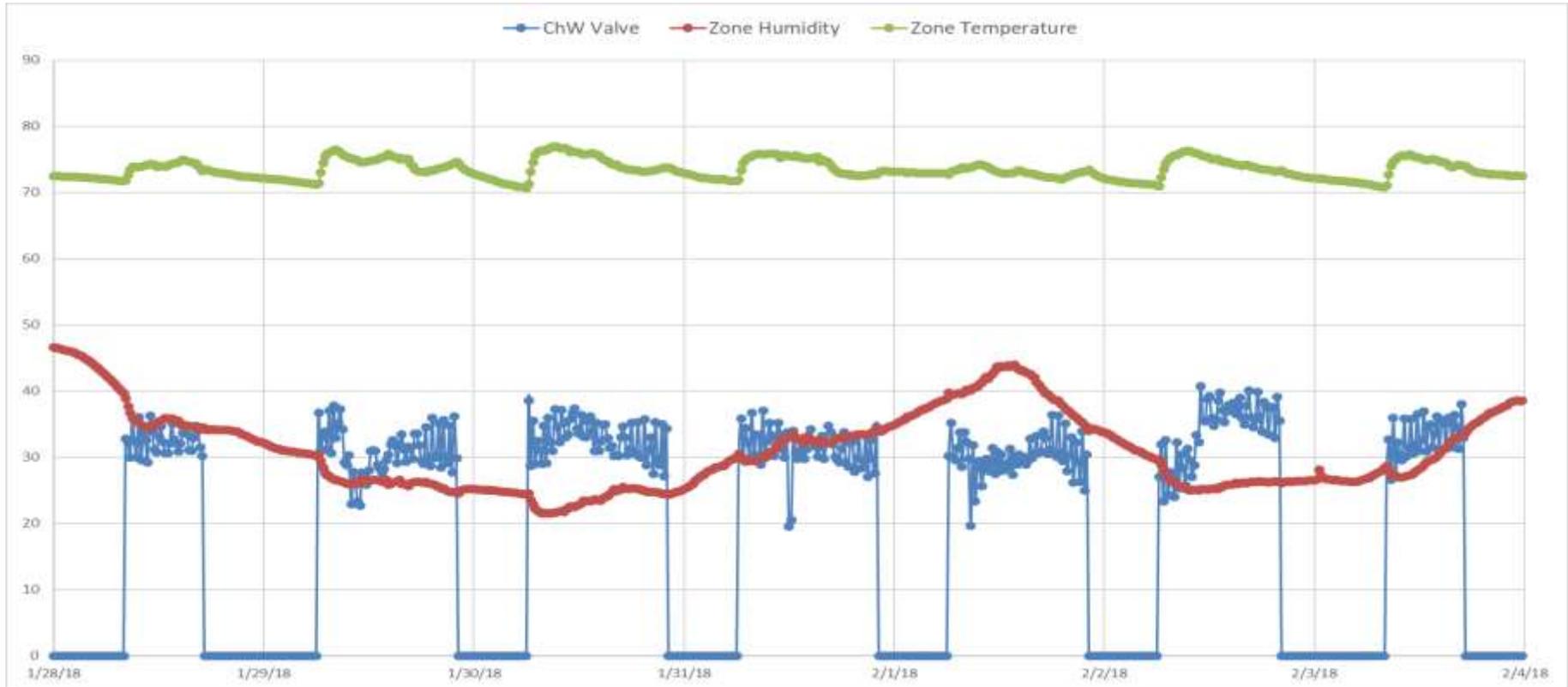


AHU Cooling Setpoints

- AHUs with server rooms follow old reset (55-60 degrees)
- Zone relative humidity >60%, setpoint is 55 degrees
- Unoccupied hours - chilled water valves commanded closed, unless
 - Zone temperature >80 degrees, reset is followed
 - Zone relative humidity >60%, setpoint is 55 degrees

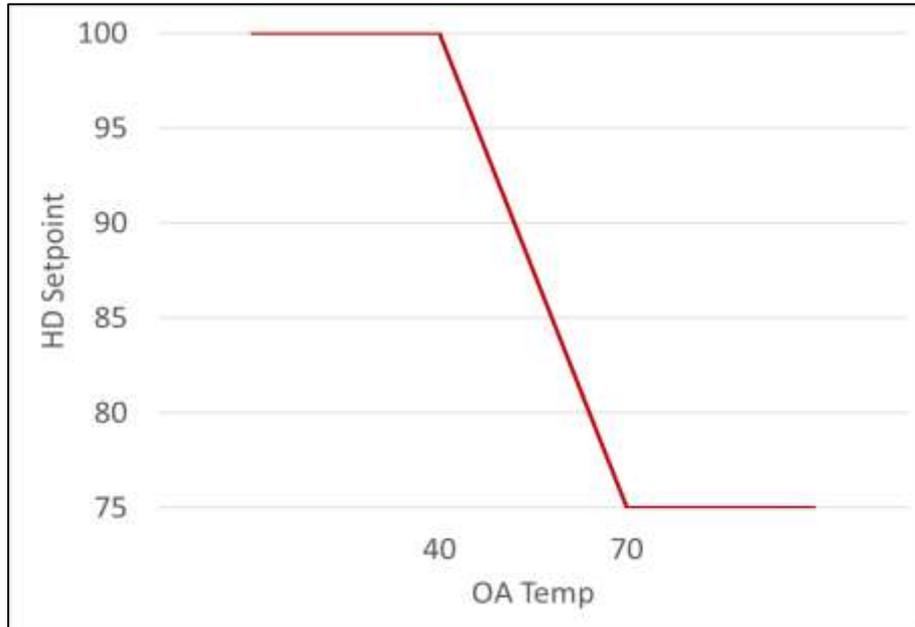


Chilled Water Valve Trend



AHU Heating Setpoints - Occupied

Single fan, dual duct



Single fan, dual coil

Reheats to single zone setpoint (71 degrees)

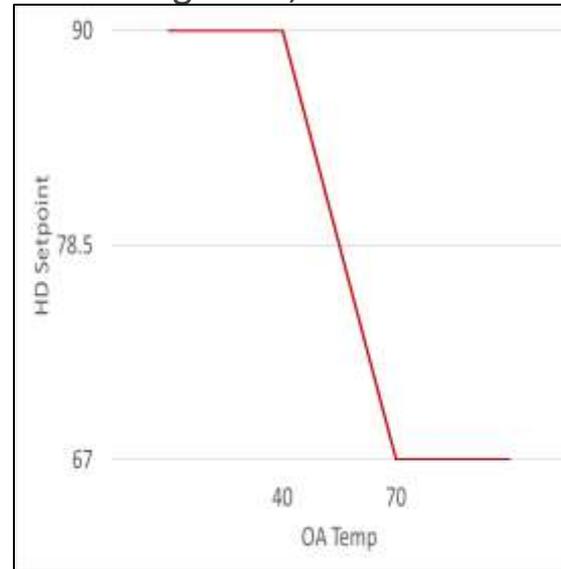
AHU Heating Setpoints - Unoccupied

Zone Temp > 60° or OAT > 38°

Steam valves closed

Zone Temp < 60° or OAT < 38°

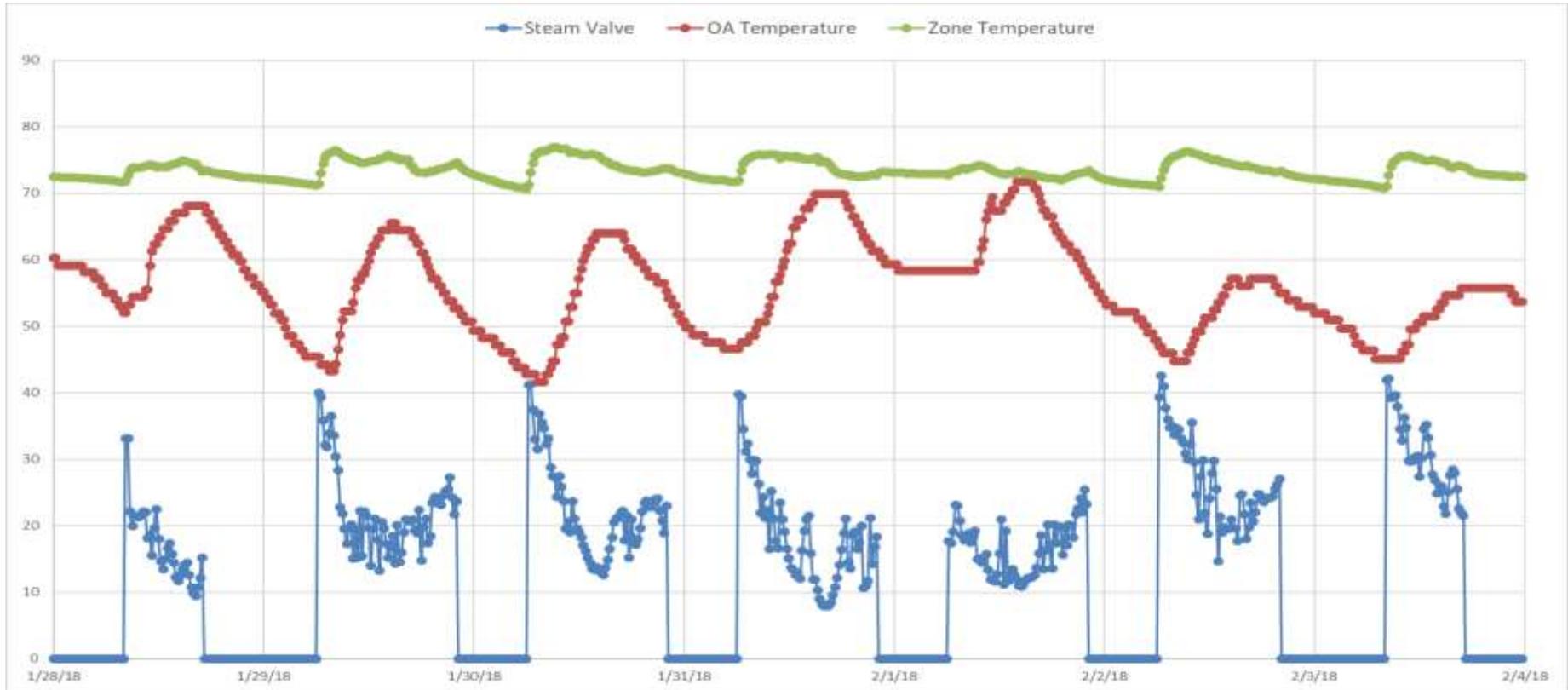
Single fan, dual duct



Single fan, dual coil

Reheats to single zone occupied setpoint – 5°
(66 degrees)

Steam Valve Trend



AHU Fan Speeds – Unoccupied

- Supply fans with VFDs (6)– commanded to 30%
 - Exception: Supply fans control to regular occupied static pressure for two air handlers that have server room zones
- Supply fans without VFDs (2) – commanded off
 - Exception: When chilled water or steam valve commanded open due to humidity or temperature conditions, supply fans are commanded back on
- Return fans commanded off

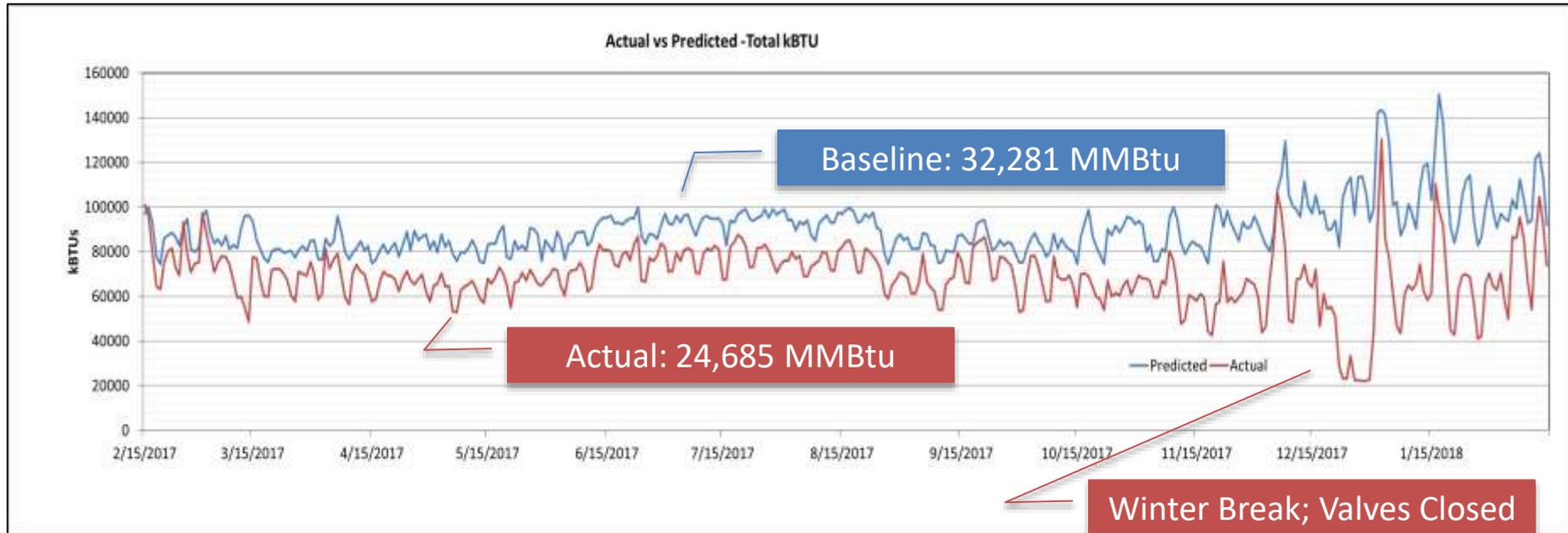
AHU Ventilation

- Occupied
 - AHU serving auditorium
 - Demand controlled ventilation (Zone CO₂ Sensor)
 - Outside air damper opens and closes from minimum (20%) up to 100% to maintain levels below 700 ppm
 - All other AHUs
 - Outside air dampers open to minimum (10%)
 - Removed economizer sequences from single fan, dual duct systems
- Unoccupied
 - All outside air dampers commanded closed

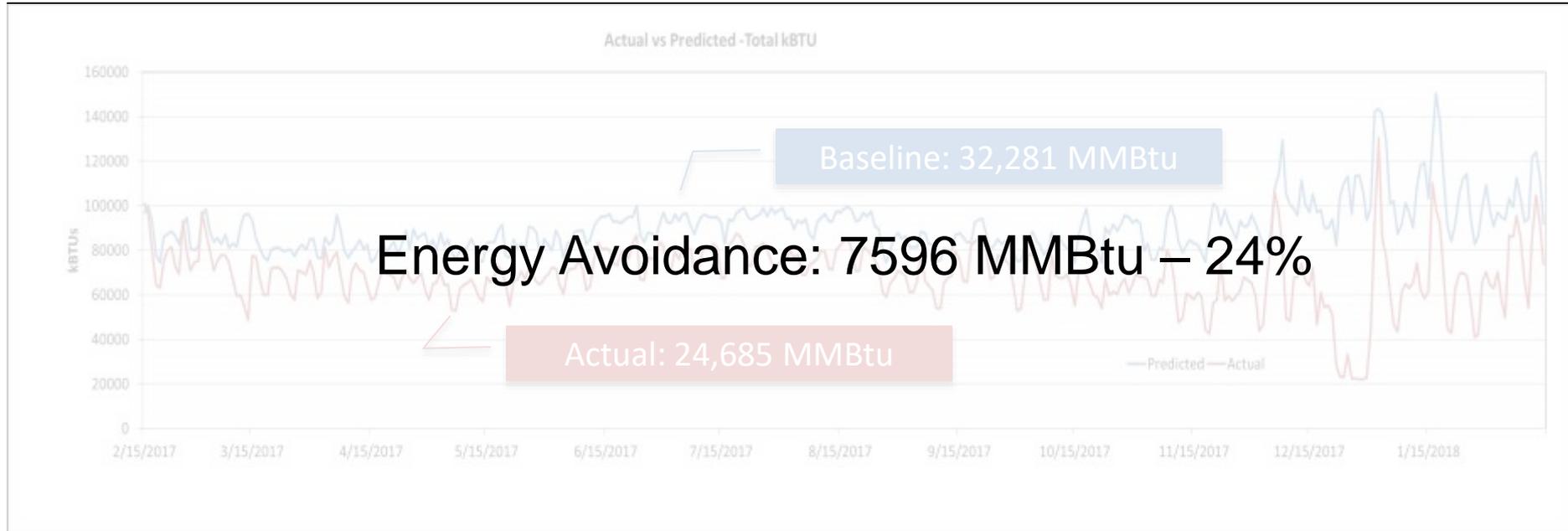
ChW Pump – Differential Pressure Reset

- Demand Controlled
 - If all air handler ChW valves are under 85% open, then reduce the differential pressure setpoint by 0.5 psi
 - If any air handler ChW valve is above 95%, then increase the differential pressure setpoint by 0.5 psi
 - Minimum: 10 psi; Maximum: 20 psi

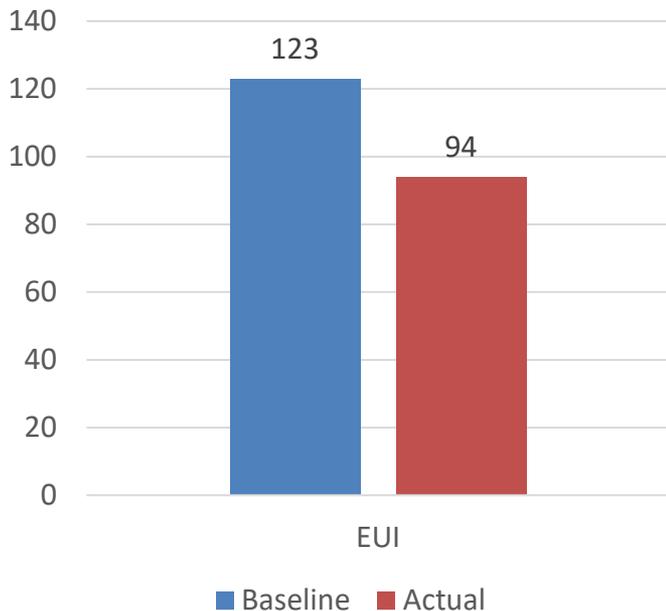
Measurement & Verification



Energy Avoidance – A Year In



Energy Avoidance – A Year In



Avoided Fuel Cost: \$38,267

Simple Payback ~ 2 months

Thanks!

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