

FEDERAL UTILITY PARTNERSHIP WORKING GROUP SEMINAR

November 2-3, 2016
Bellevue, WA

PSE Welcome

David Mills – VP Energy Operations



PSE Overview & Highlights

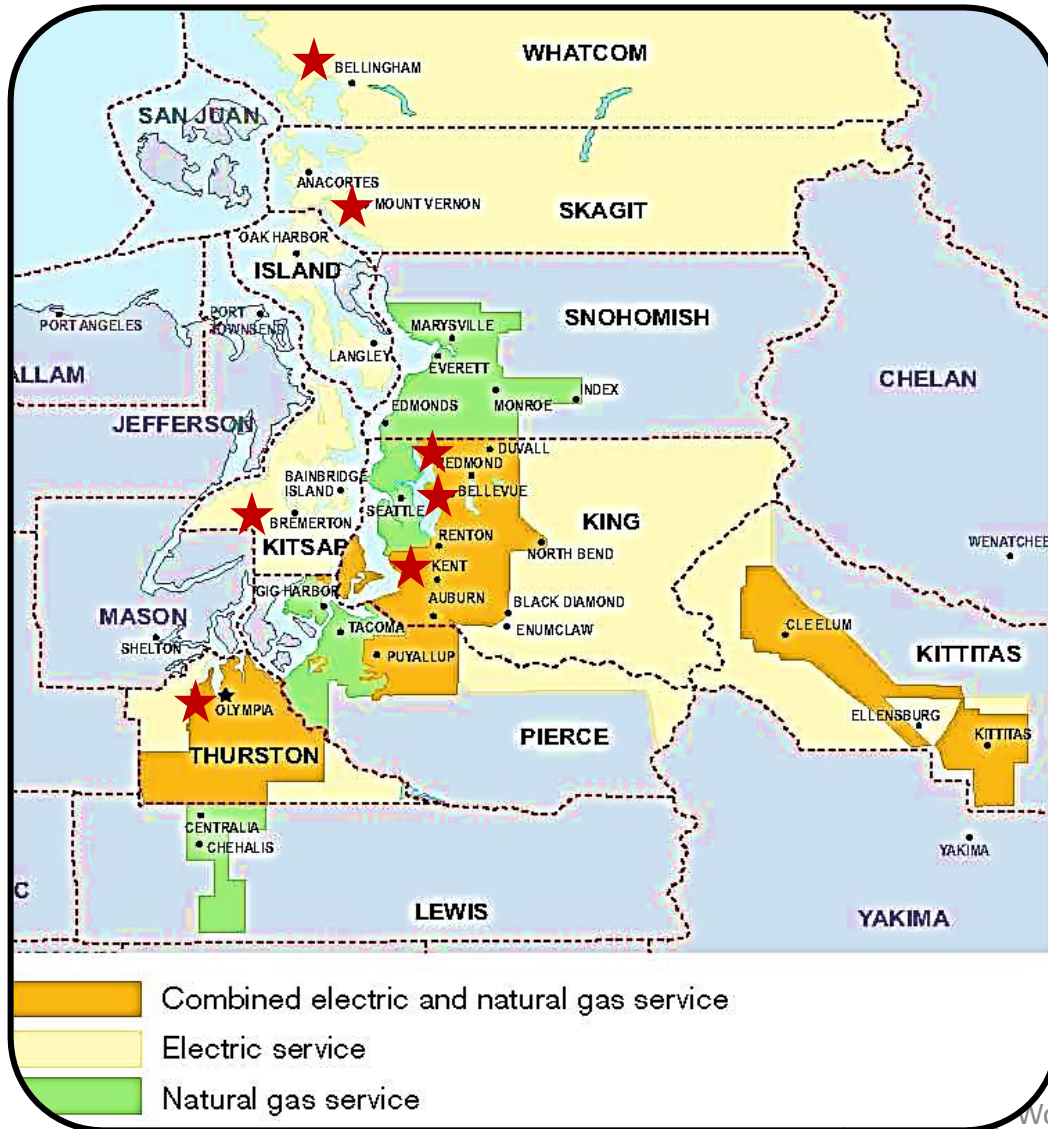
Dan Myers
(Sr. Energy Management Engineer)

Jeff Petersen
(Consulting Energy Management Engineer)

Puget Sound Energy

- Washington's oldest energy company - Dates back to 1873, Seattle Gas Light Company (earliest PSE predecessor)
- Serves over 1.1 million electric and 790,000 gas customers
- Electric lines: Seattle to D.C. 8 times
- Gas lines: once around earth, at equator
- Second-largest utility owned wind power in the U.S.

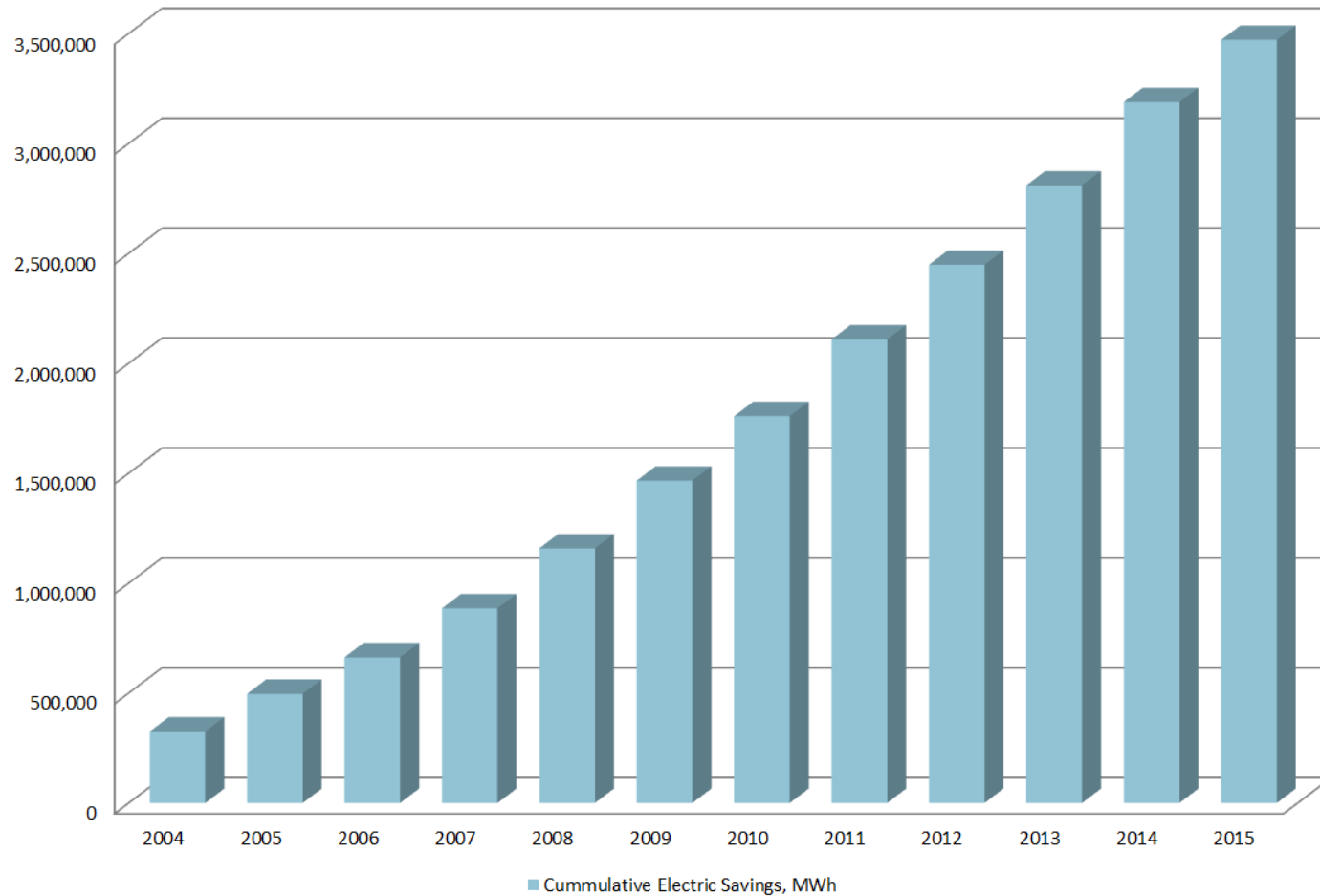
PSE Service Territory & Programs



PSE Energy Efficiency Department

- Responsible for ~\$100 million annual budget
- Over 120 staff, including 30 energy engineers
- Provides over 1,600 grants annually
- Dozens of EE Incentive programs
- Local presence for improved customer service
- Trusted resource and partner for various types of customers

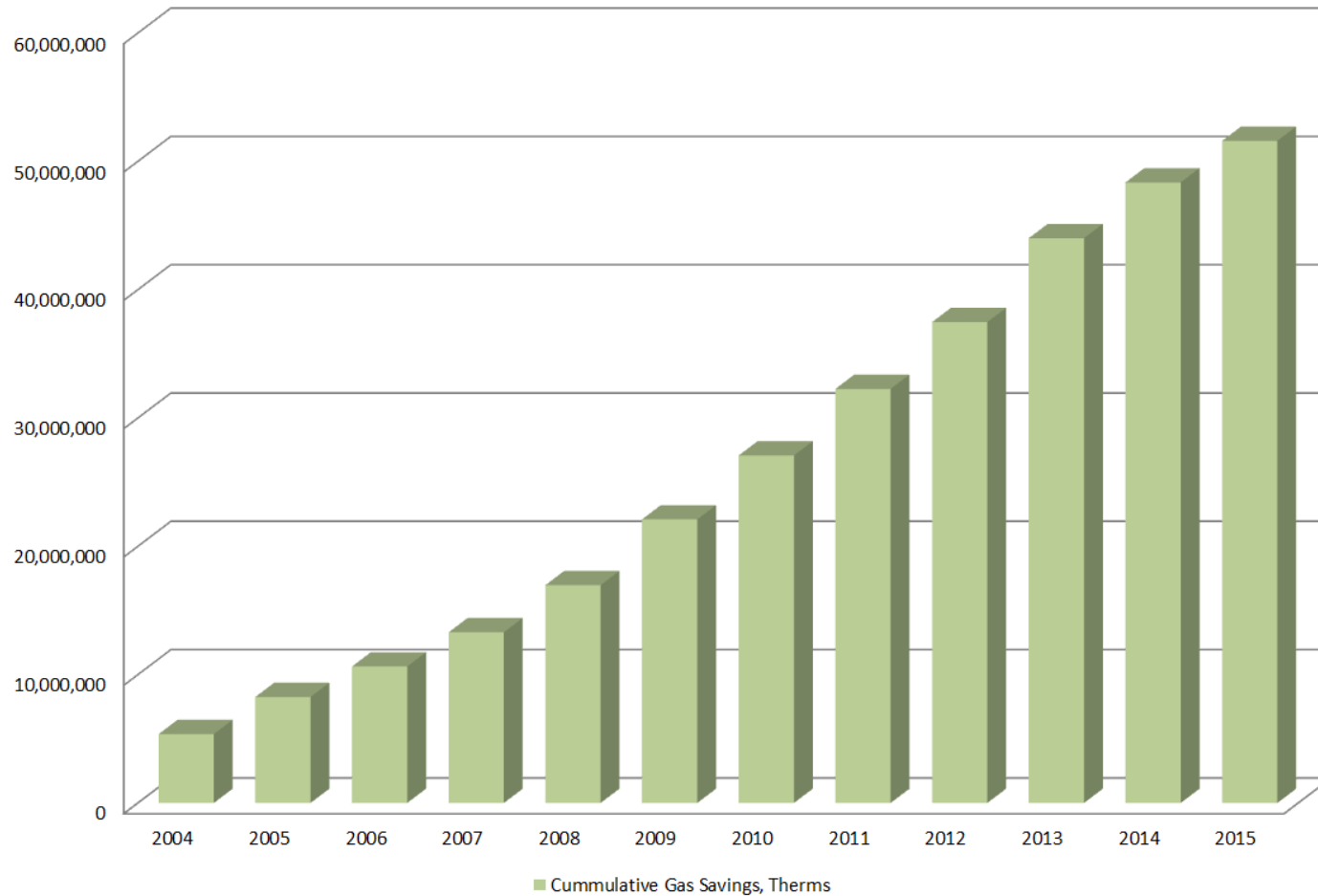
PSE Energy Conservation Program Savings - Electric



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PSE Energy Conservation Program Savings - Gas



PSE EE Project Summary for WA State Capitol Campus

- Since 2001, PSE has been involved in over 40 Energy Conservation Projects that resulted in:
 - 13,644,160 kWh electric savings
 - 158,015 therms of gas savings
 - \$2,575,915 PSE grant amount
- New Goal “The Greenest State Campus in the nation”

PSE's Renewable Energy

- PNW's largest utility producer of renewable electricity
- Solar power: Wild Horse (500kW)
- Wind power: Wild Horse, Hopkins Ridge and Lower Snake River (773MW)
- <https://www.youtube.com/watch?v=1-34fAzB4AA>

We believe in:

- Customer's energy partner of choice
- Core mission : Provide Safe, Dependable and Efficient Services
- Corporate Ethics: Doing the right thing!

Ready to help federal customers through UESC!

PSE Project Highlights in Federal Facilities

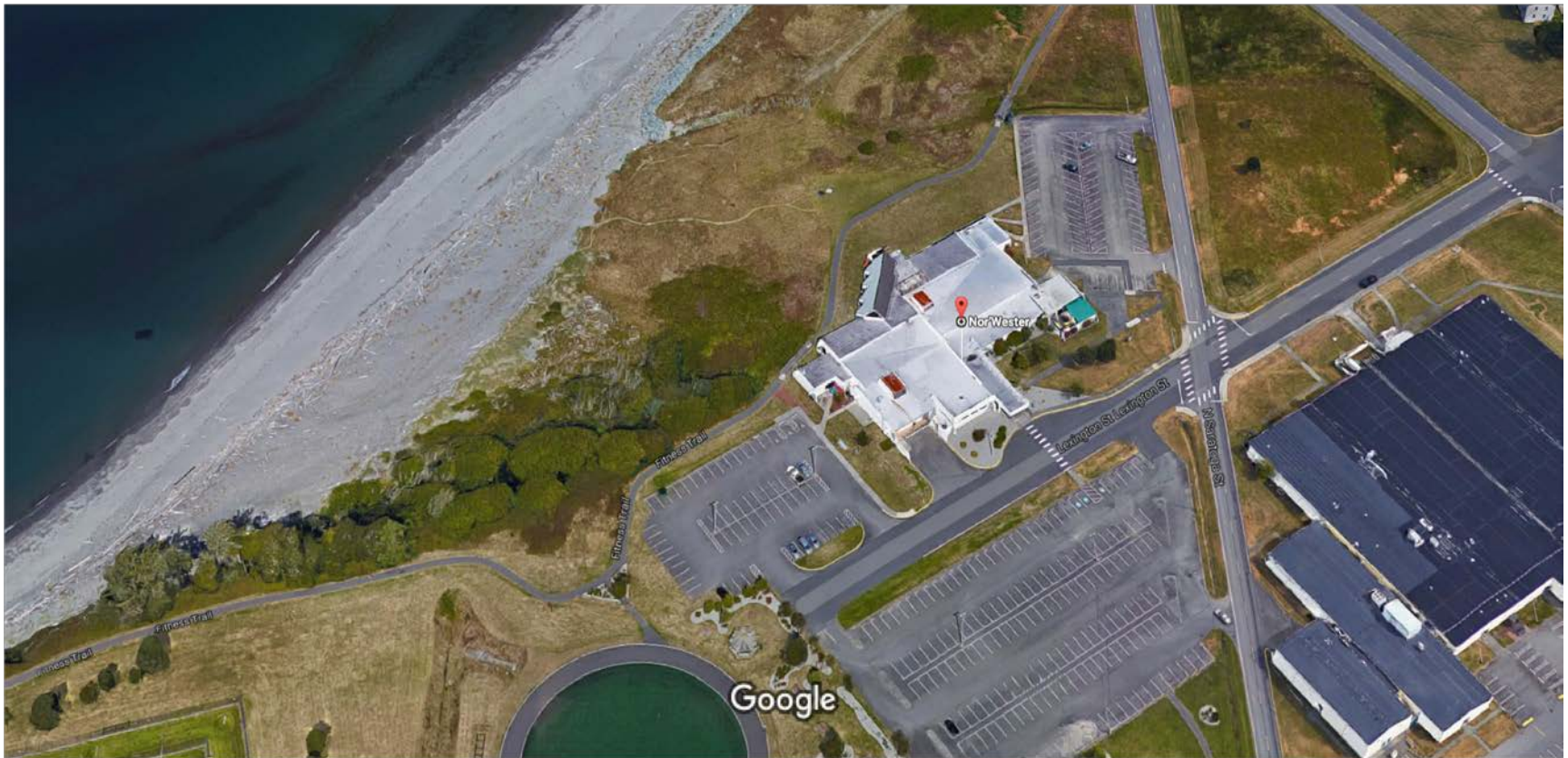
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PSE's Energy Efficiency Project Experience with the Federal Government

- PSE BOA started 8/1997 & ran through 9/2011
- Worked with US Navy facilities:
 - Naval Undersea Warfare Center – Keyport
 - Naval Air Station – Whidbey Island
 - Bremerton Naval Hospital
 - Naval Magazine – Indian Island
- Completed over 30 projects
 - Total project costs over \$12,500,000
 - Energy savings over 18,000,000 kWh's & 735,000 therms
 - Utility Incentives over \$2,500,000
- Hired Resource Efficiency Managers (REM's) for the Navy
 - Standard practice for military installations

Project Highlight - NAS-Whidbey Nor'wester



Existing System Challenges – Energy

- **30+ year old facility with numerous remodels and several changes of use.**
 - Physical spaces updated to accommodate each change of use with minimal consideration given to the main HVAC systems
 - Combination of open and closed offices and large multi-use areas
- **Two different HVAC system types served the building**
 - AHU-1 - Constant air volume multizone – 25,000 CFM
 - AHU-2 – Large rooftop variable air volume system serving part of the building
 - Both systems served the same spaces in some cases
 - Building pressure control problems
 - Stuck open outside air dampers (AHU-2)
 - Stuck open heating coil valve (AHU-2)
 - Inlet guide vane air volume control (AHU-2)
 - Compromised steam pipe insulation due to broken condensate return system
 - 24-hour/day operation (Both AHU's)

Existing System Challenges - Comfort

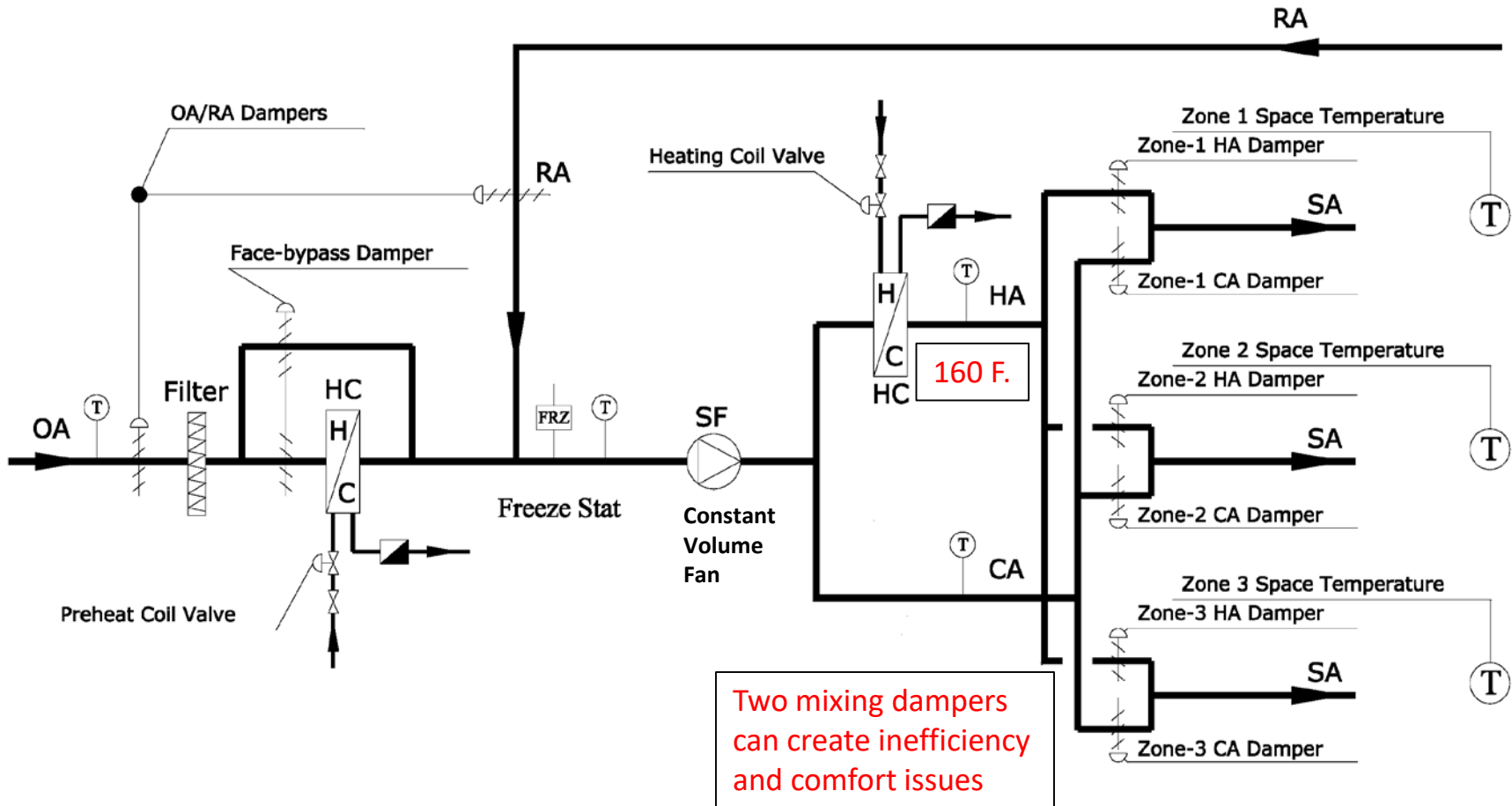
- **Poor Temperature Control/Comfort Complaints**

- Steam coil used for hot deck air temperature created 160 F. discharge temperatures at times
- Space temperatures exceeding 80 F
- Portable heaters in use in a number of spaces
- Improper air flows for the zone size
- Erratic air flow in the building creating drafty or stuffy conditions
- Two separate control systems serving the same space created rapid temperature swings

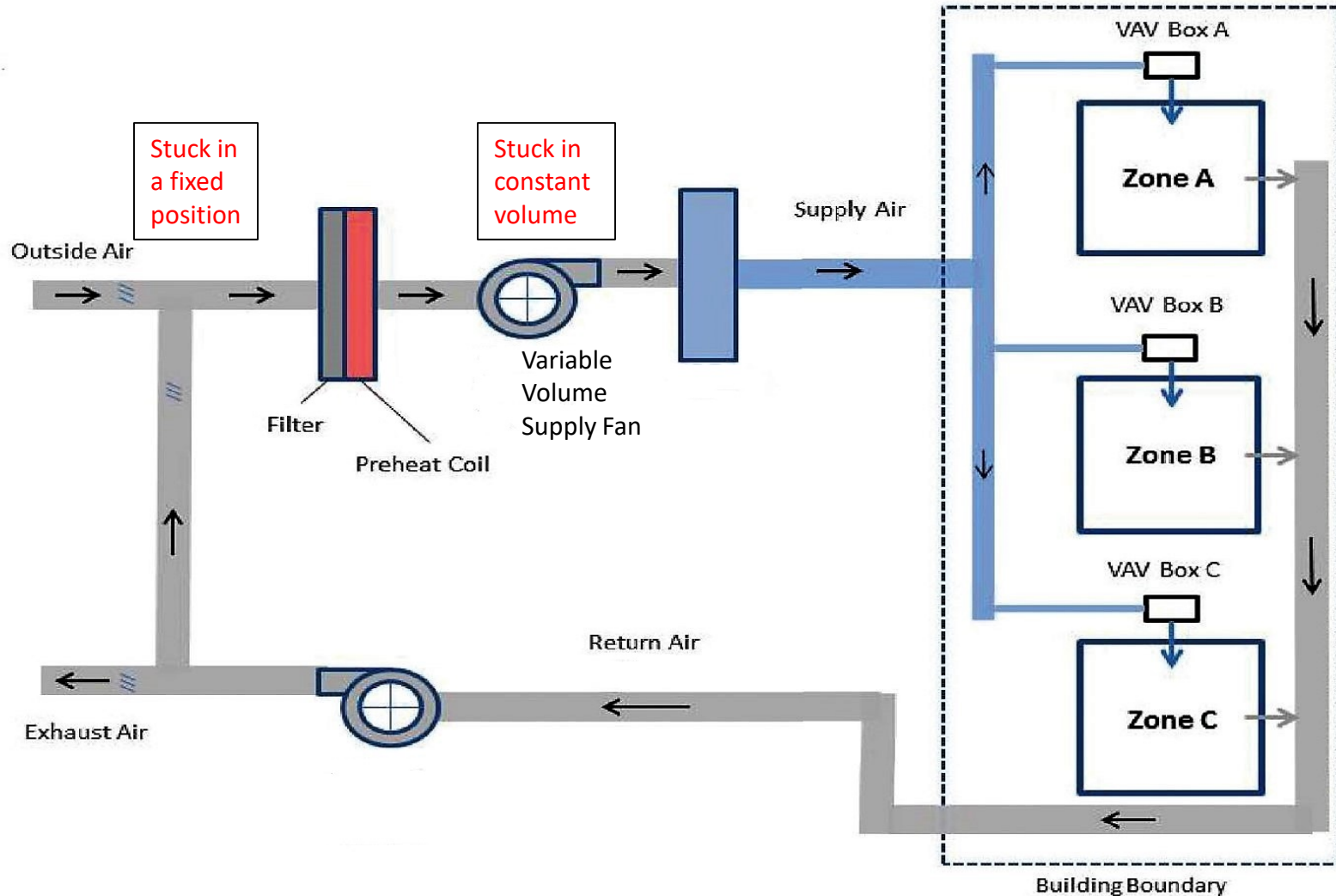
- **Unsafe mechanical space conditions**

- Failed insulation caused excessive temperatures to occur in the basement mechanical room
- Steam and condensate leaks in the mechanical room caused mold growth in the mechanical room

Existing System – AHU-1



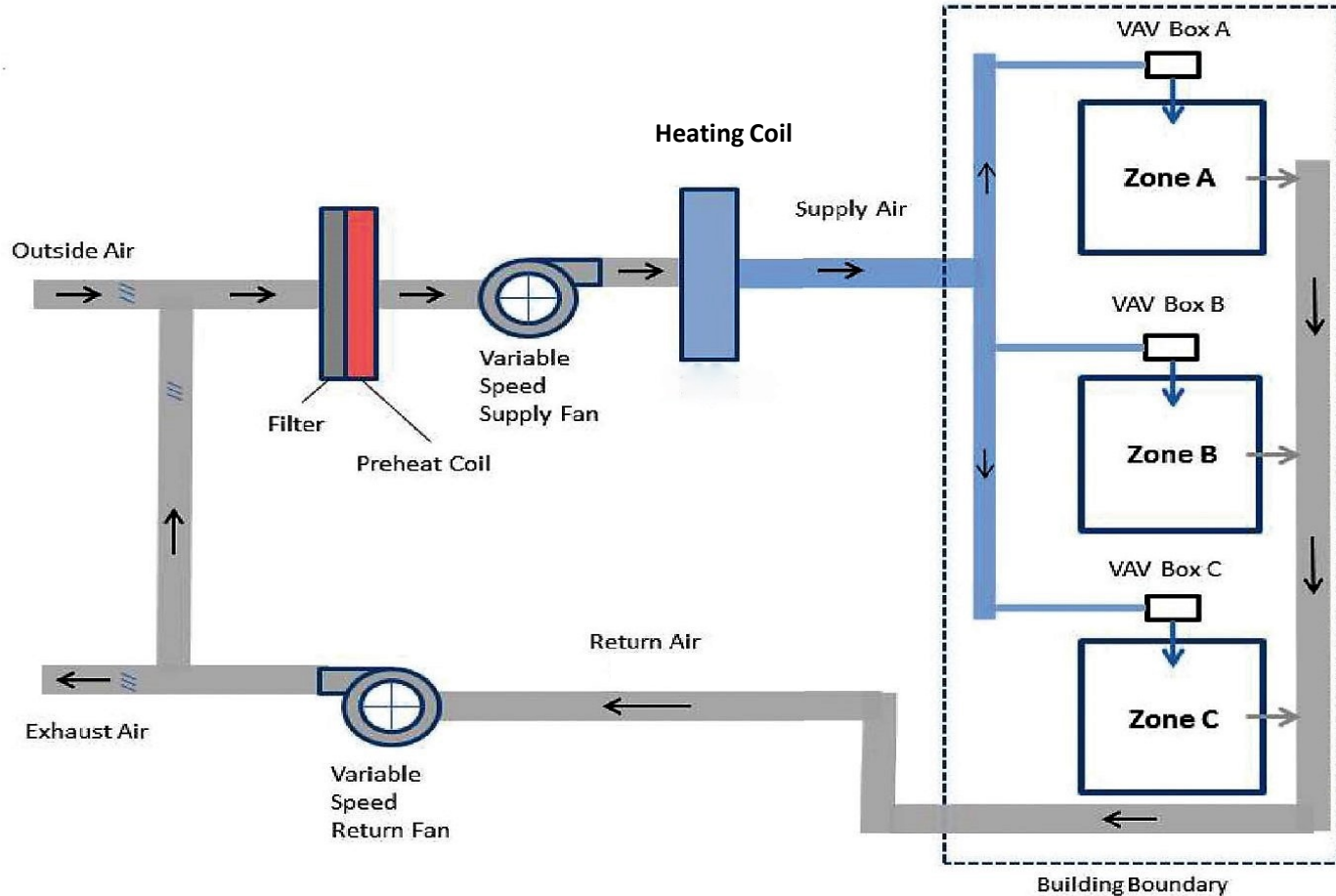
Existing System AHU - 2



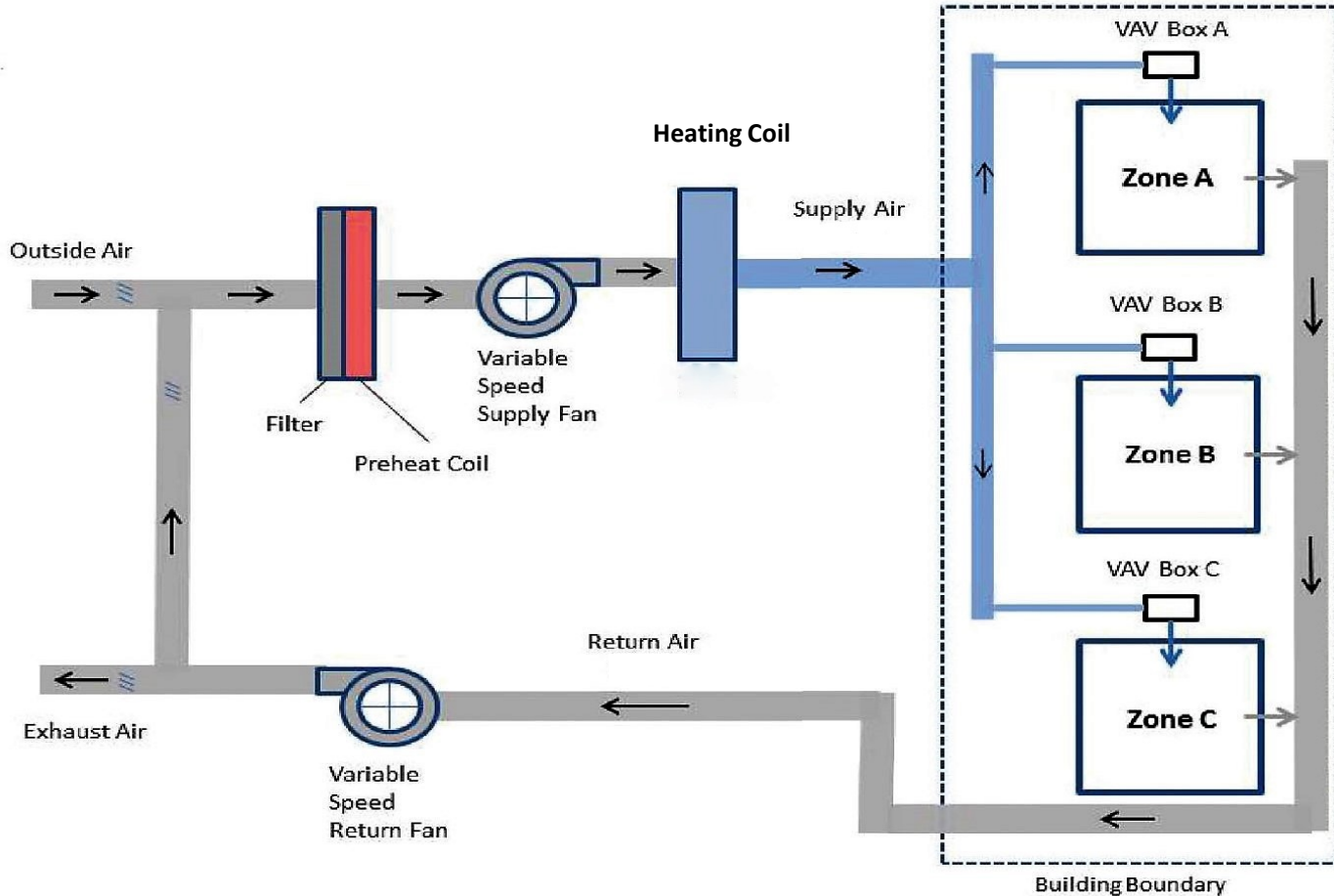
HVAC/Steam System Solutions

- Convert existing AHU-1 from constant air volume to variable air volume
 - Better air flow control
 - Better building pressure control
 - Energy efficiency through fan speed control
 - Re-zone spaces for single system conditioning where possible
 - Add DDC system with demand controlled ventilation
- Repair of existing maintenance issues
 - AHU-2 outside air dampers made operable
 - Stuck AHU-2 hot water valve replaced
 - Variable speed drives added to both air handling units
- Commissioning and air balance of the entire building
 - Ensure proper air flow to the spaces to minimize stuffiness and drafty conditions
 - Ensure the spaces are adequately conditioned – proper air quantity and temperature
- Replace two separate steam heat coils with a single hot water system
 - Combine 2 separate independently controlled steam systems to one steam to hot water converter
 - Less fluctuation in supply air temperature for both units

AHU-1 Re-configured System



AHU-1 Re-configured System



Post Installation

AHU-1 Supply Air Plenum



Ductwork sized for proper air flow

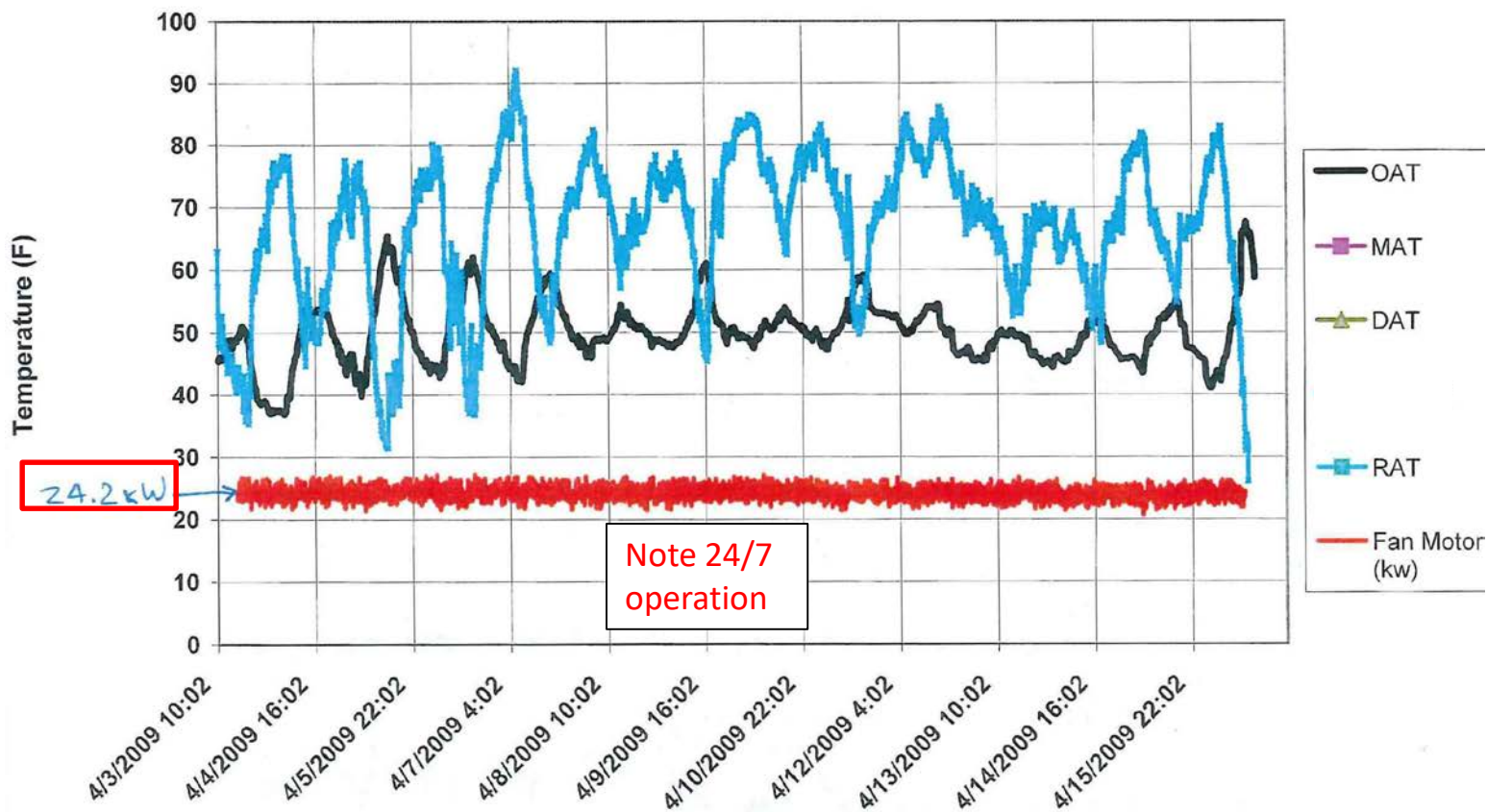
Dampers located closer to zones they serve

AHU-1/2 combined steam to hot water converter

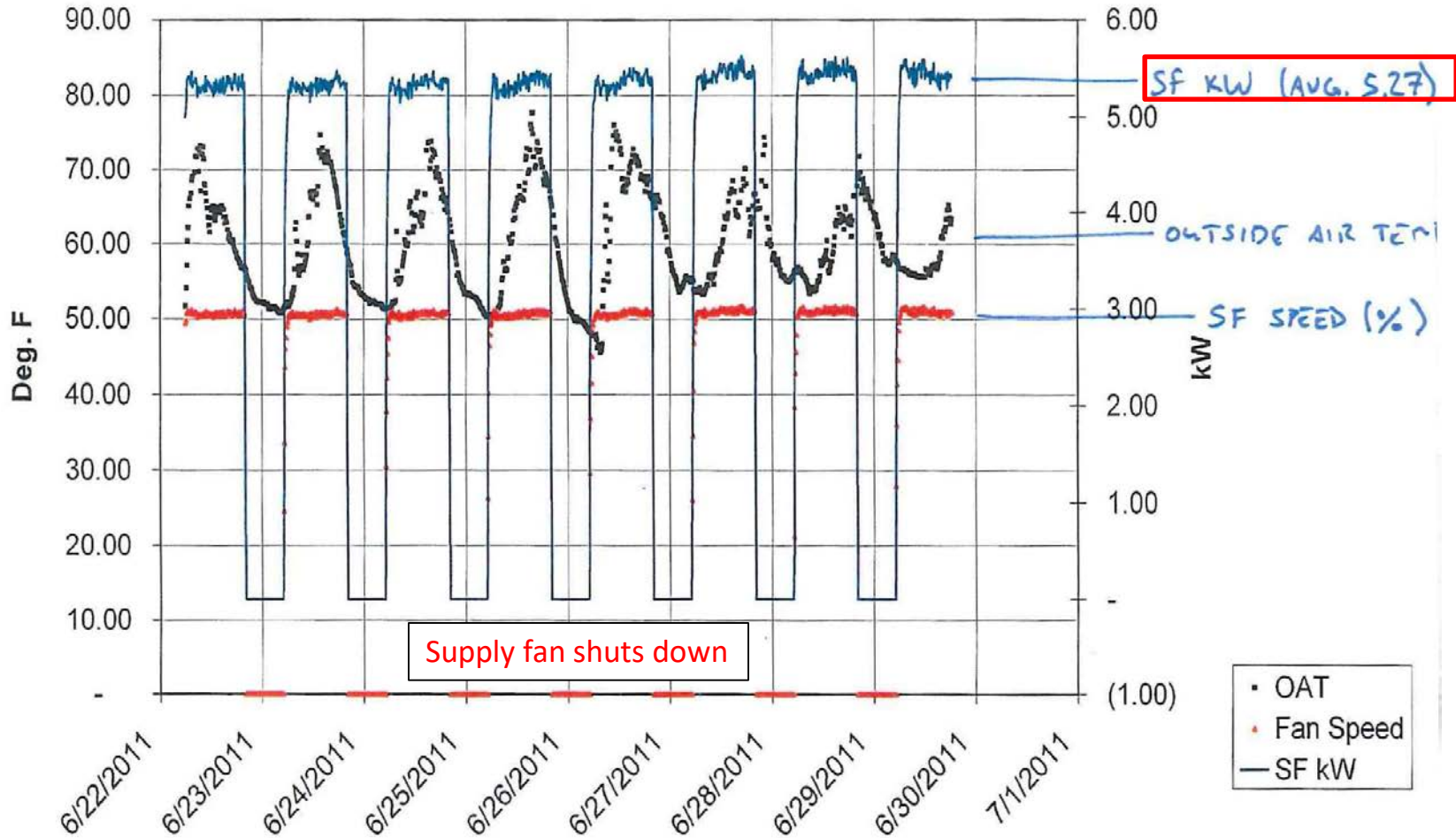


AHU-1 Pre-Retrofit

NASWI - Norwester (2556) AHU-1 (Basement Mech Rm) (EXISTING)

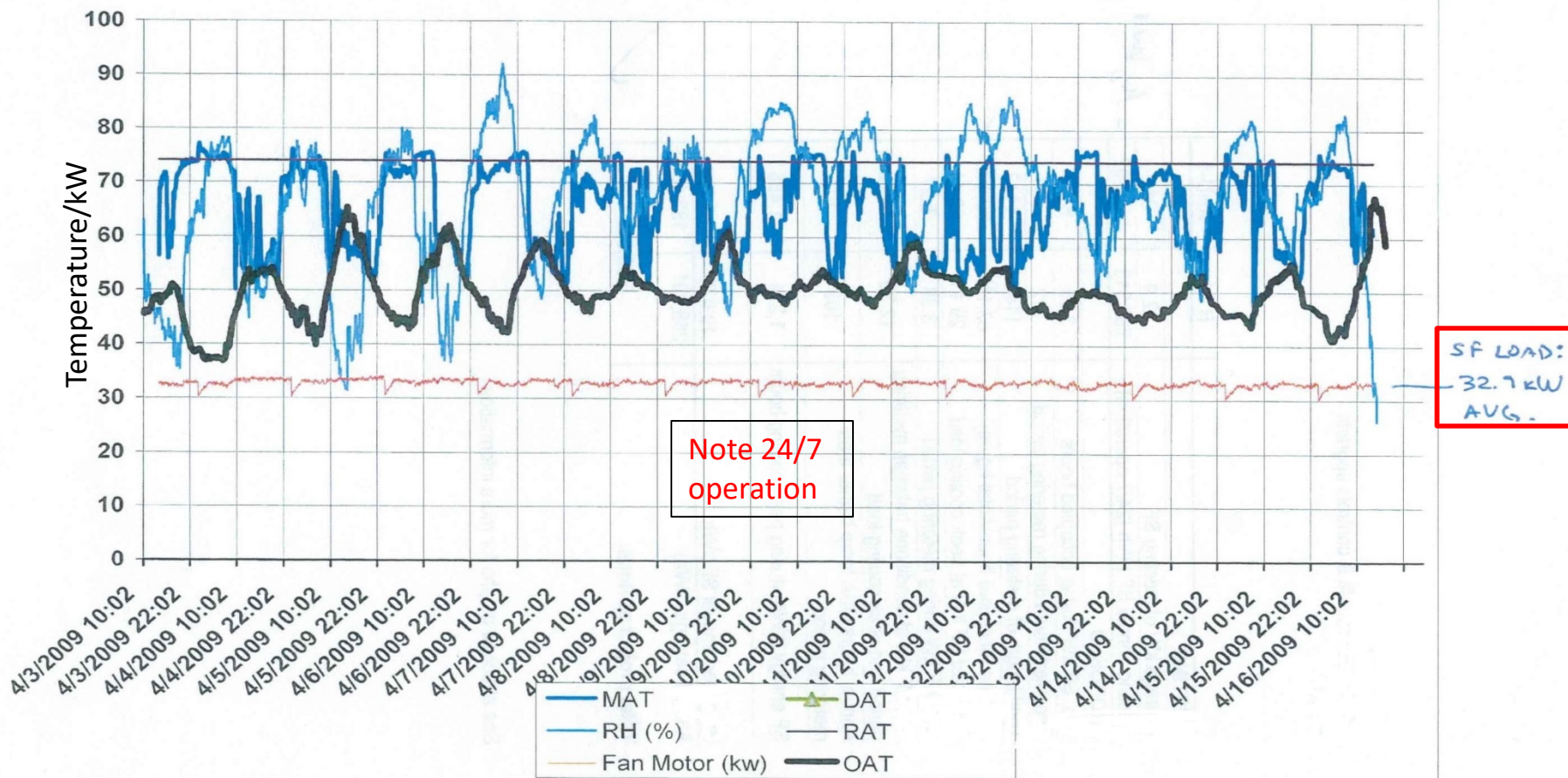


AHU-1 Post-Retrofit

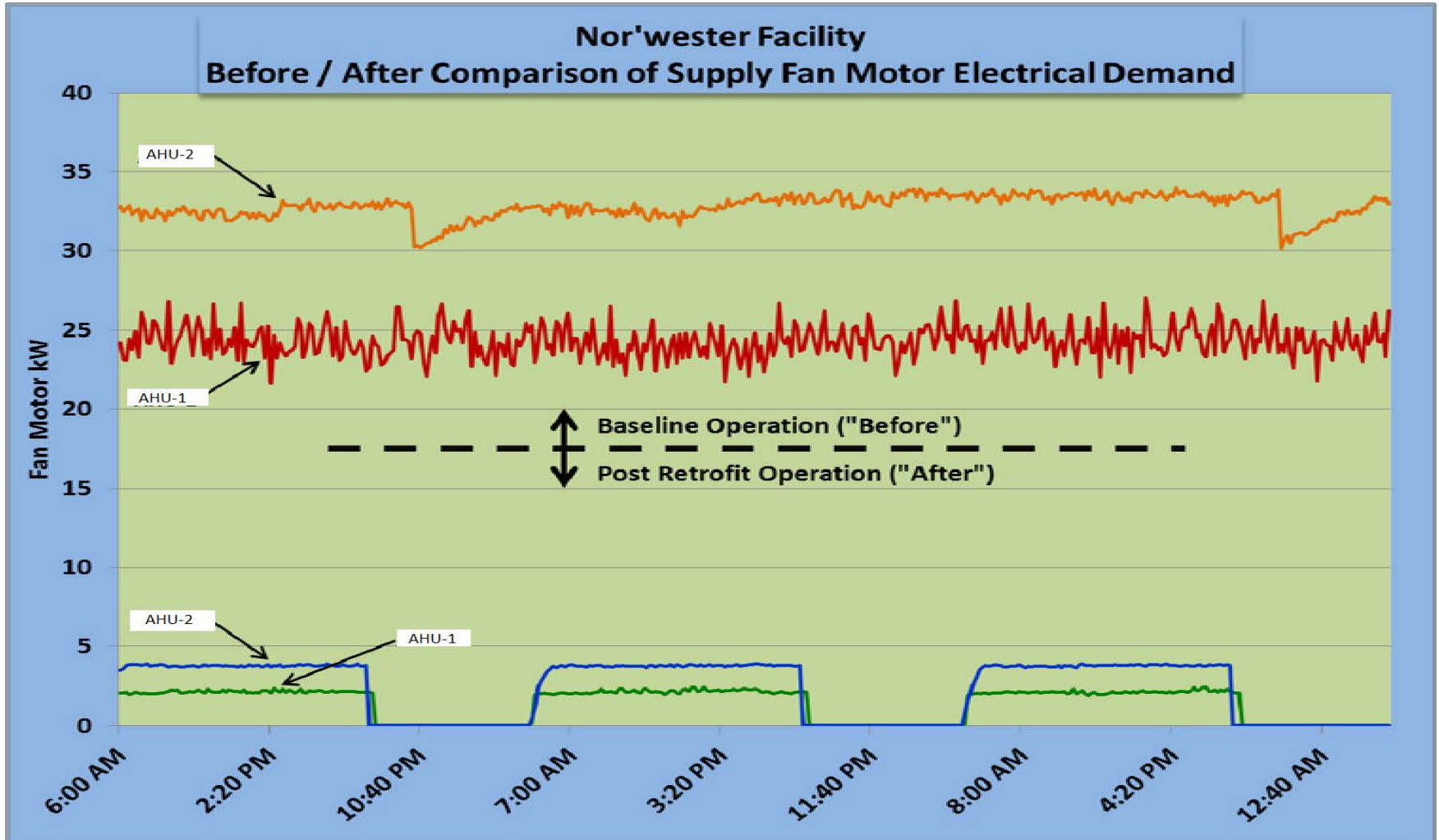


AHU-2 Pre-Retrofit

NASWI - Norwester (2556) RTU (EXISTING)



Combined AHU-1/AHU-2 Results



Project Economics

- Project cost: \$364,000
- Electric savings: 430,000 kWh
- Therm savings: 15,160 therms
- Energy cost savings: \$34,450
- Simple payback: 9.2 years
- Utility incentive: \$225,279
- Simple payback after incentive: 3.5 years

Thank You!

