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

Cumulative Electric Savings, MWh


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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
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

Two mixing dampers can create inefficiency and comfort issues.
Existing System AHU - 2

Supply Fan
Variable
Supply Fan
Stuck in
constant volume

Stuck in a fixed position

Outside Air
Filter
Preheat Coil
Variable Volume Supply Fan

Supply Air

VAV Box A
Zone A

VAV Box B
Zone B

VAV Box C
Zone C

Building Boundary

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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

Note 24/7 operation
AHU-1 Post-Retrofit

Supply fan shuts down

SF kW (Avg. 5.27)

OUTSIDE AIR TEMP

SF SPEED (%)
AHU-2 Pre-Retrofit

Note 24/7 operation
Combined AHU-1/AHU-2 Results

Nor'wester Facility
Before / After Comparison of Supply Fan Motor Electrical Demand

Baseline Operation ("Before")
Post Retrofit Operation ("After")

Fan Motor kW

6:00 AM  2:20 PM  10:40 PM  7:00 AM  3:20 PM  11:40 PM  8:00 AM  4:20 PM  12:40 AM

AHU-2

AHU-1
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!