Campus Operators Reflect on Using Guideline 22 and Standard 90.1 for Chiller Plant Monitoring

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PHH, State

- Explain the importance that Chiller plant monitoring can have on energy performance
- Describe how ASHRAE resource can help establish a chiller plant monitoring plan

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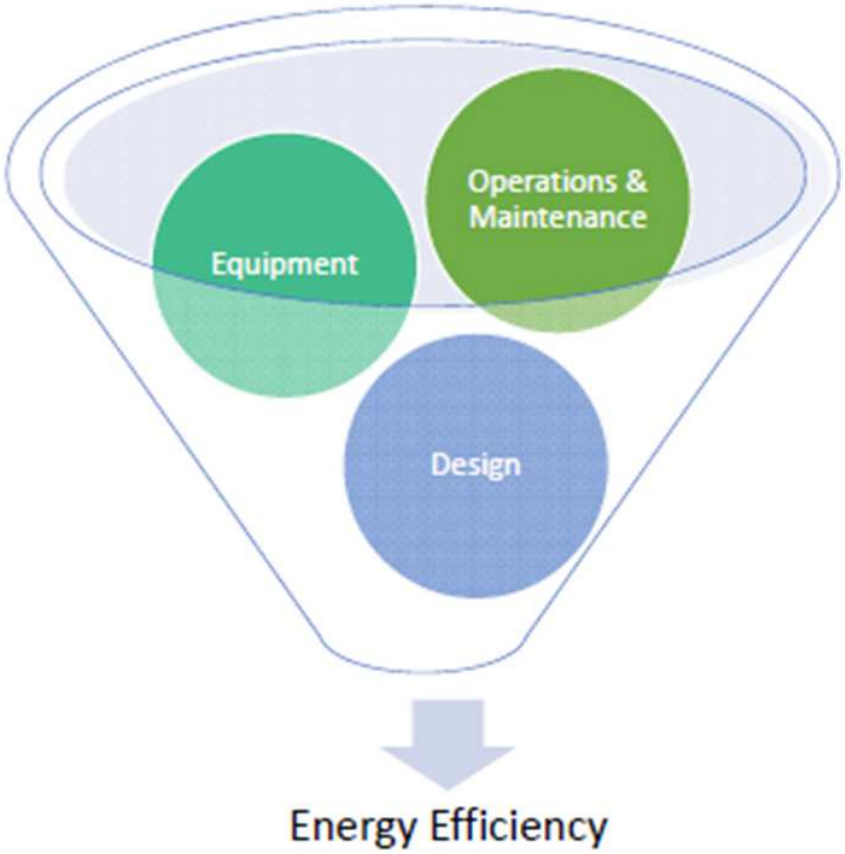
Overview

- Background
- Keys to Success
- Key Drivers for data
- Does data make a difference?
- Profiles

Chiller Plant Metering

- Background – Managing Hospital and Healthcare Facilities
  - Currently Managing Patient Care Facilities at MD Anderson Cancer Center Houston, TX
  - 4.4 Million s.f. of facilities that provide world class leading edge cancer care
  - Utilities are a significant facility expense
  - Member of ASHRAE 90.1 worked on Chiller Plant Metering Addendum

Keys to Success



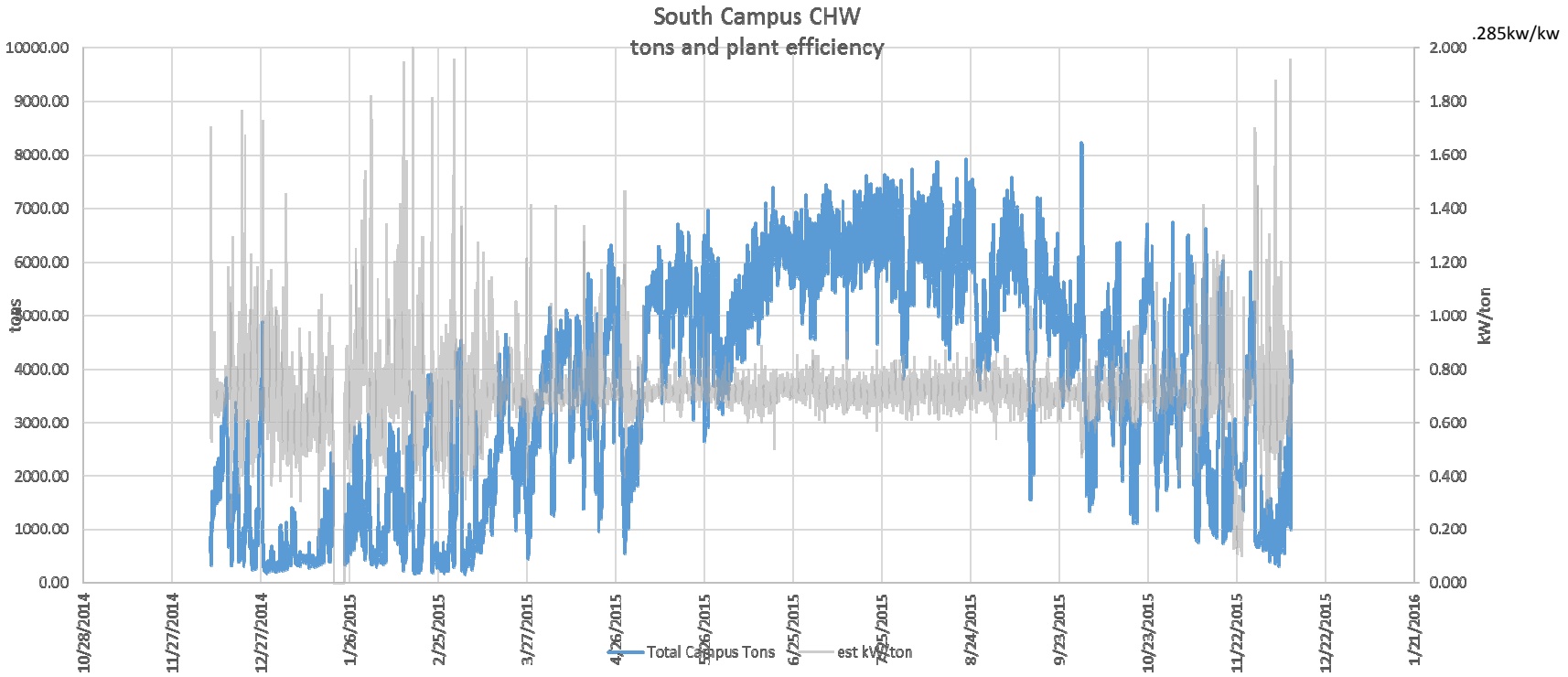
Key Drivers for Data

- Equipment is including performance data more readily (IoT)
- Most components of electric chiller plants currently have available data (speed drives (pumps and fans), chillers) I began using this data in 1997
- Data can provide feedback to help operators understand impact of operating decisions on performance (Trends very helpful)
- Data can help identify performance issues
- M&V plan important to success

Does Data make a Difference

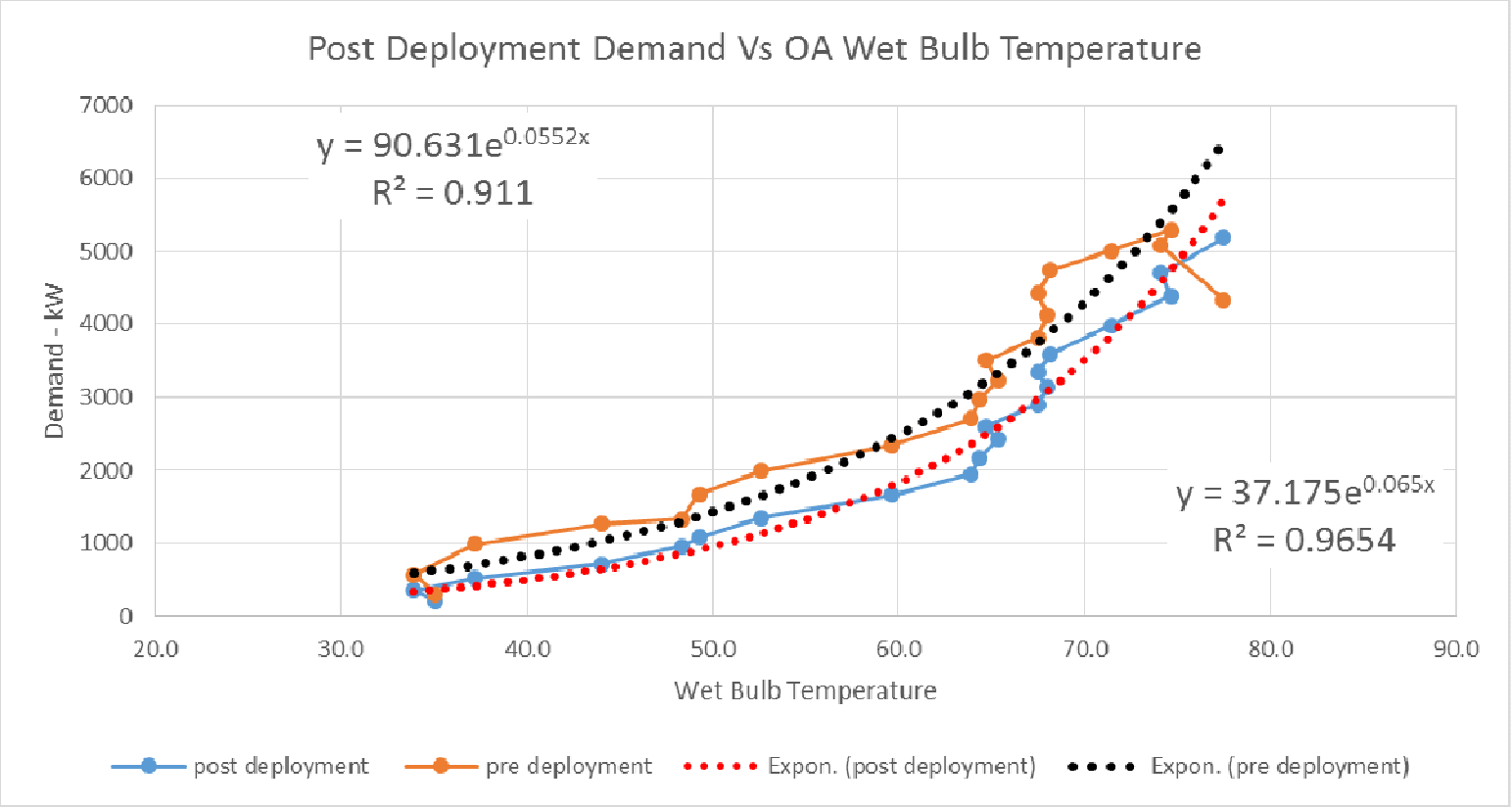
- Experience in managing conservation programs for over 30 years
  - Data trends are important to analyze performance and provide feedback
    - Weekly and Monthly trends of major energy consuming equipment
  - Meet with operators to review performance
  - Provide training as needed
  - Need to unlearn past practices (pneumatic and early digital control systems)
  - ASHRAE Guideline 22 provides guidance on chiller plant monitoring

35,168 kw



.285kw/kw

Improvement in Profile



.23 kw/kw

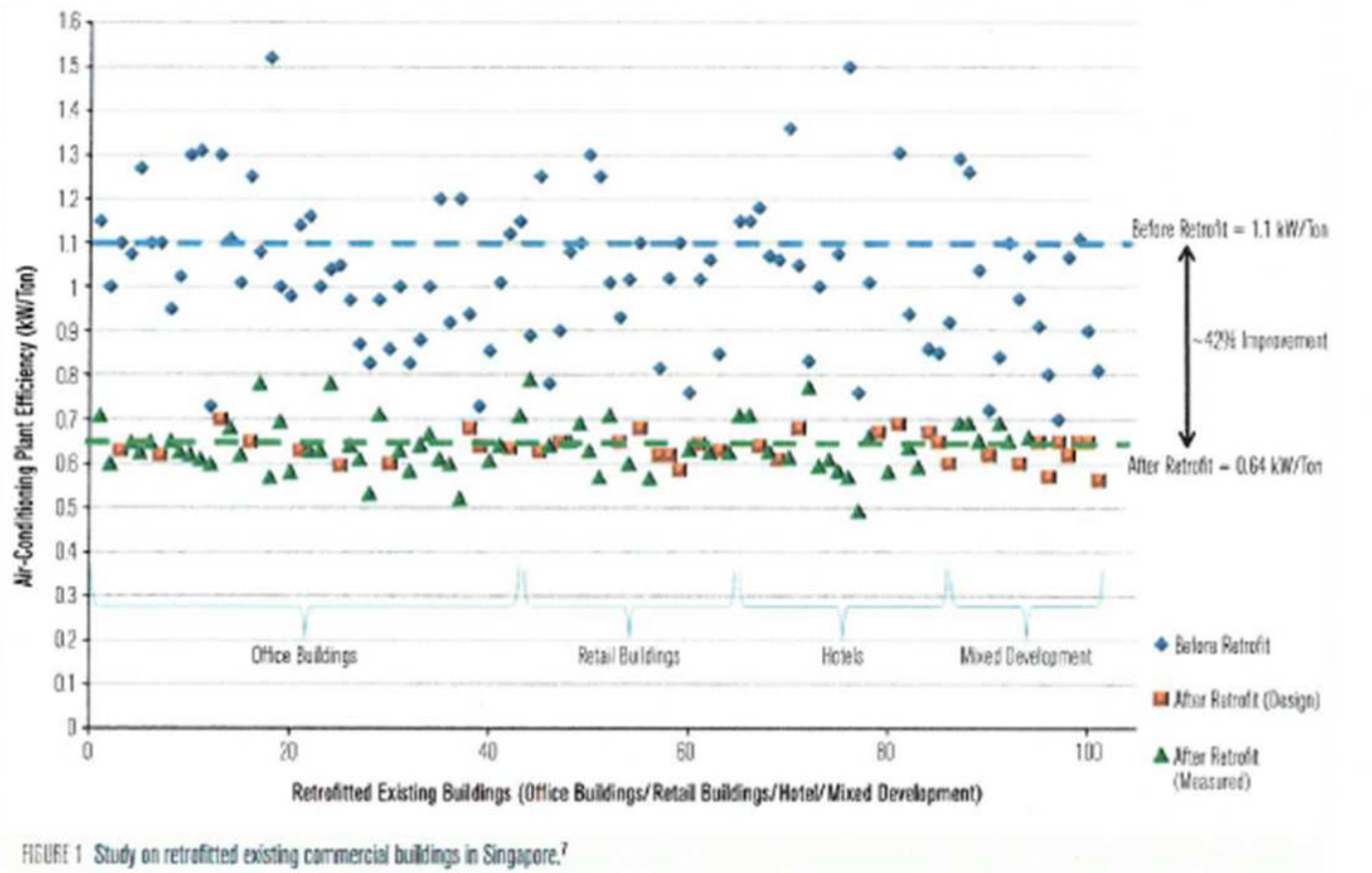


FIGURE 1 Study on retrofitted existing commercial buildings in Singapore.[7]

Source: Singapore's Green Mark System Improving Commercial Building Energy Performance, ASHRAE Journal November 2016

TABLE 2 Simple payback periods for a sample of chilled water plant upgrades

CHILLER PLANT TYPE AND UPGRADE DESCRIPTION	COOLING LOAD (TON)	INITIAL EFFICIENCY (KW/TON)	FINAL EFFICIENCY (KW/TON)	PERFORMANCE IMPROVEMENT (%)	FINANCIAL RETURN ON INVESTMENT SIMPLE PAYBACK
Mixed Commercial District: Controls Upgrade & Partial Equipment Replacement	6,000	0.96	0.75	22%	1 Year
Single Office Building: Controls and Optimization	1,750	0.81	0.67	16%	1.4 Year
Retail Building: Complete Plant Replacement	900	1.02	0.60	41%	8.6 Year
Office Building Complex: Complete Plant Replacement	750	0.91	0.59	35%	8.2 Year

Courtesy of Measurement and Verification Pte Ltd and BCA.

Source: Singapore's Green Mark System Improving Commercial Building Energy Performance, ASHRAE Journal November 2016

Conclusions

- Use of data and trends can improve energy performance
- Training operators and staff generates significant return on investment.

- Questions?

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