Building Retro-Commissioning Picture Show

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May 4, 2007

Region VI Chapter Regional Conference (CRC) 2007
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Learning Objectives

- Understand the motivation and methods for accomplishing Retro-Commissioning (R-Cx)
- Appreciate the value of R-Cx by considering 3 case studies
- Recognize some typical issues uncovered by Retro-Commissioning

What Will Be Covered

- The Retro-Commissioning Process
- Case Studies
  - School
  - Office
  - Church
- Interesting Findings from Other Projects

What is Retro-Cx?

The process of optimizing the performance of an existing building

Why Do Retro-Cx?

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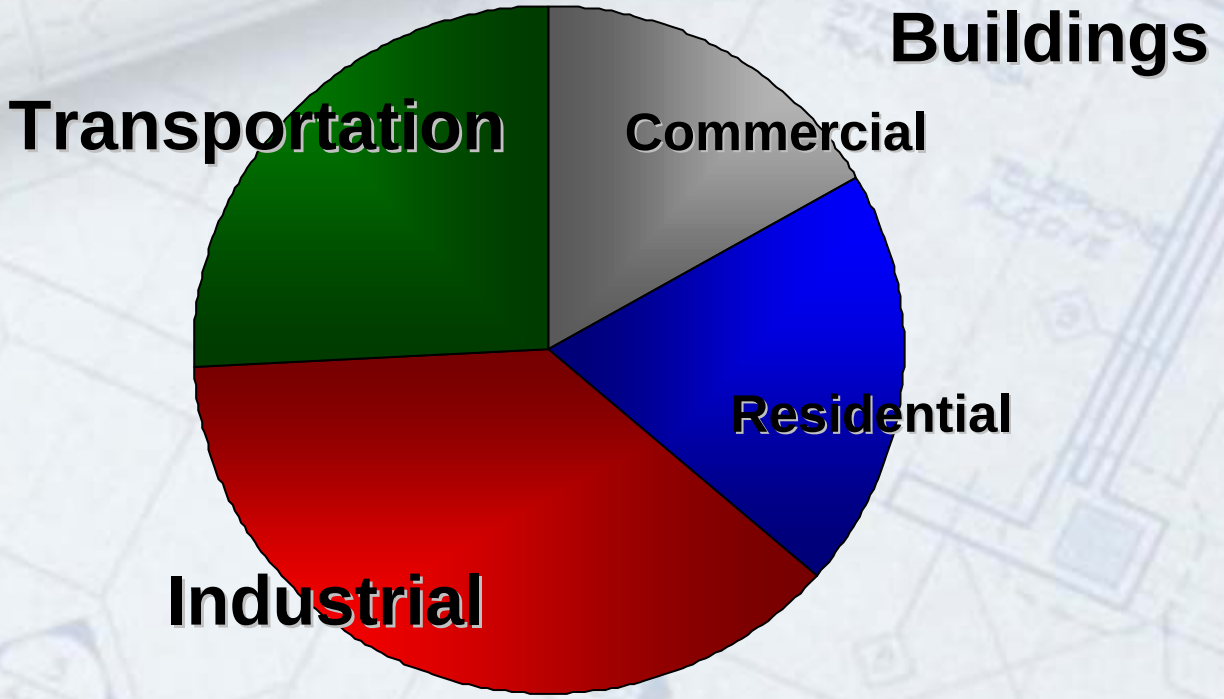
Environmental Impact of Buildings

U.S. Energy Consumption by Sector – 2000
98.5 Quadrillion Btu



- *65.2% of total U.S. electricity consumption*
- *~36% of total U.S. primary energy use*
- *30% of total U.S. greenhouse gas emissions*

When is Retro-Cx Appropriate?

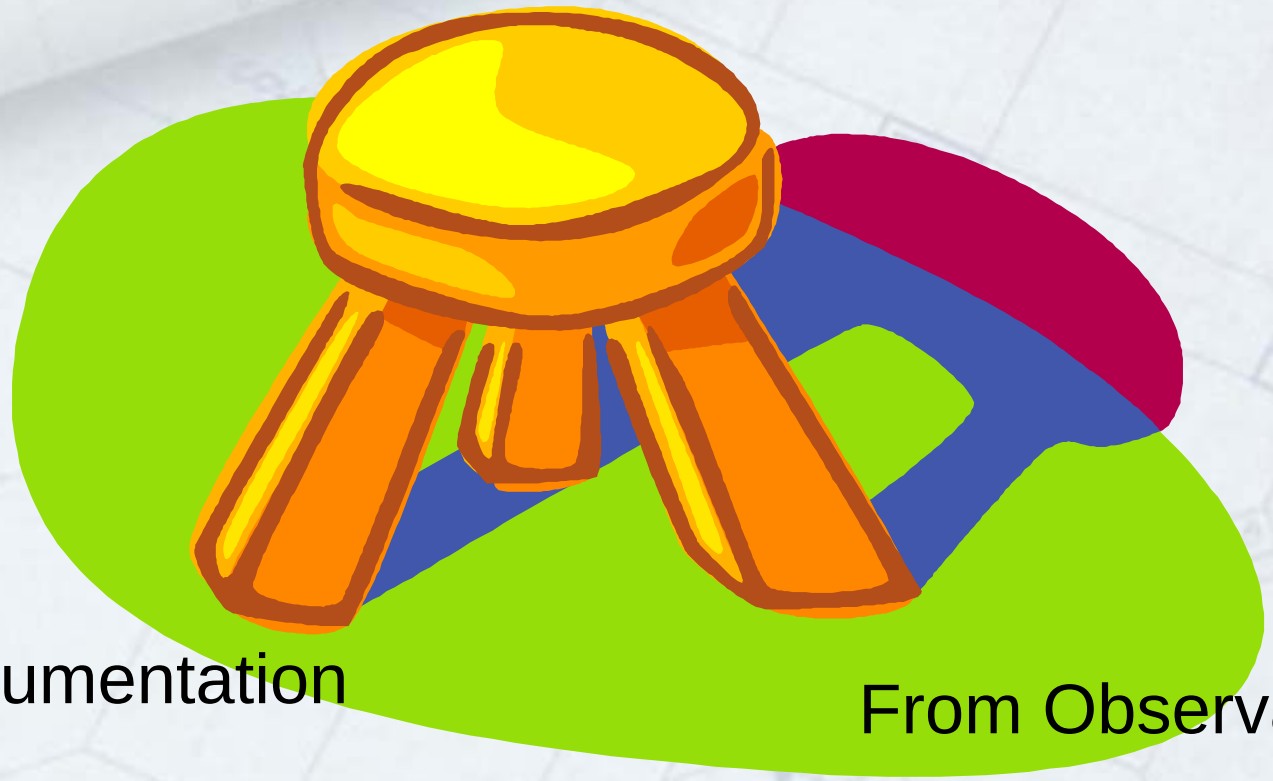
When there is a good chance of success!

Approach - Overview

1. Gather Information
2. Identify improvements
3. Monitor implementation
4. Functional testing
5. Update documentation & train operators
6. Final report

1. Gather Information

From Stakeholders



From Documentation

From Observation

Deliverables

- *Operational Intent*
  - Narratives of facility functional use
  - Verifiable performance criteria
  - Stakeholder requirements for
    - usability, operability, maintainability, functionality

- *Basis of Operation*
  - Documents current building operation
    - Installed equipment database
    - Control sequences

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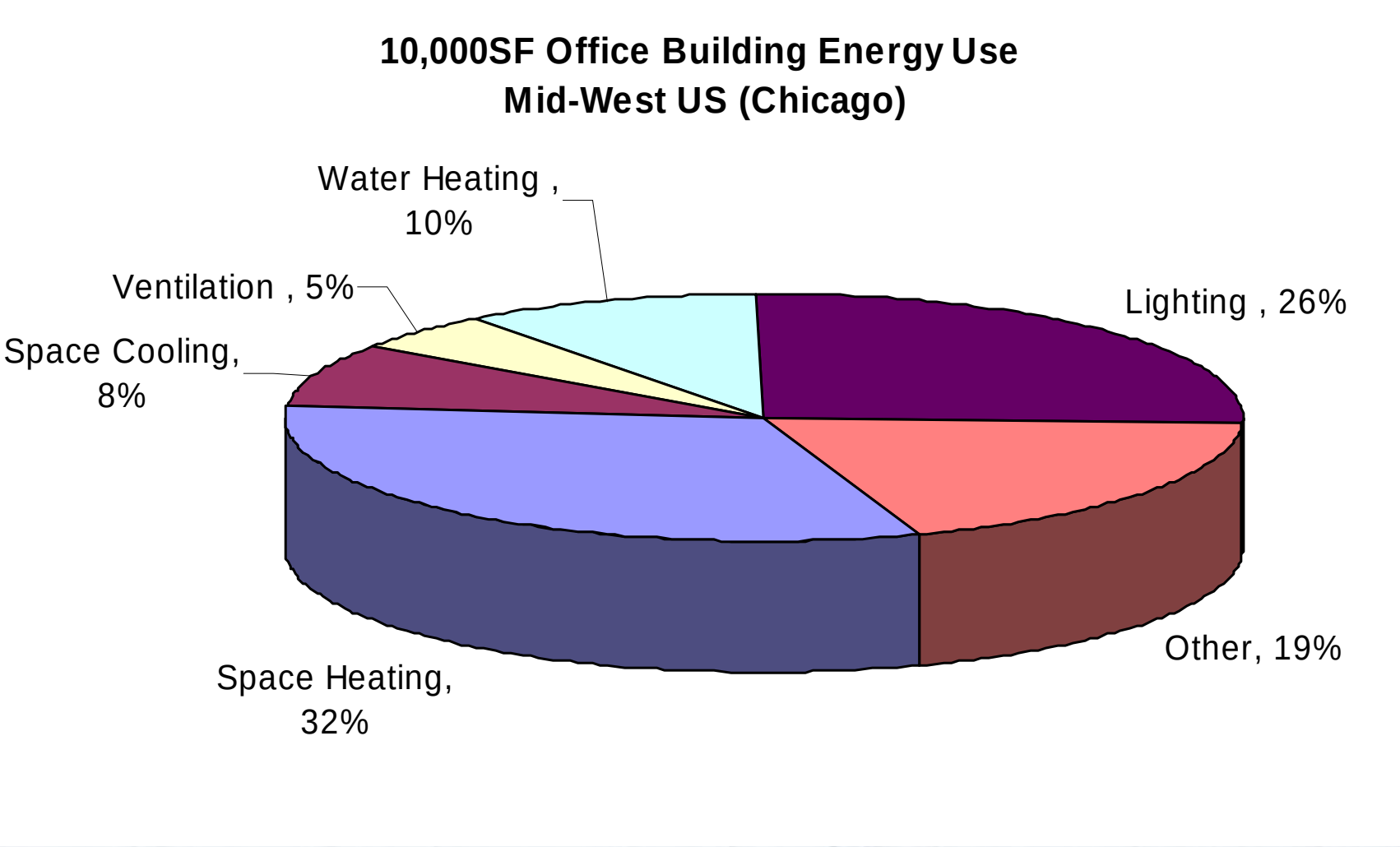
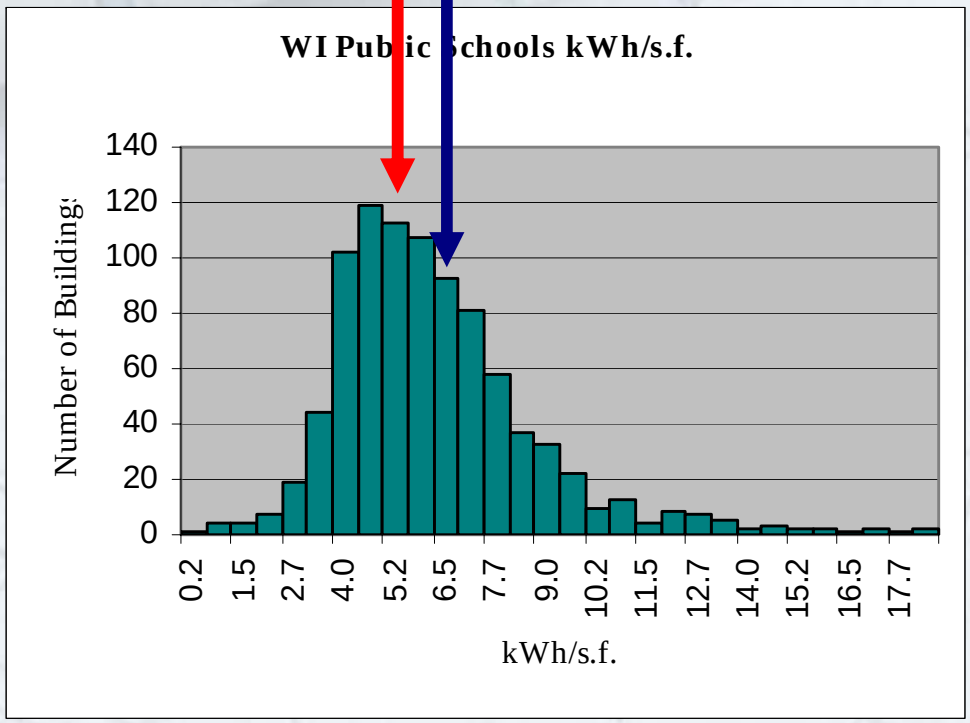
Building Energy Usage



School Energy Use

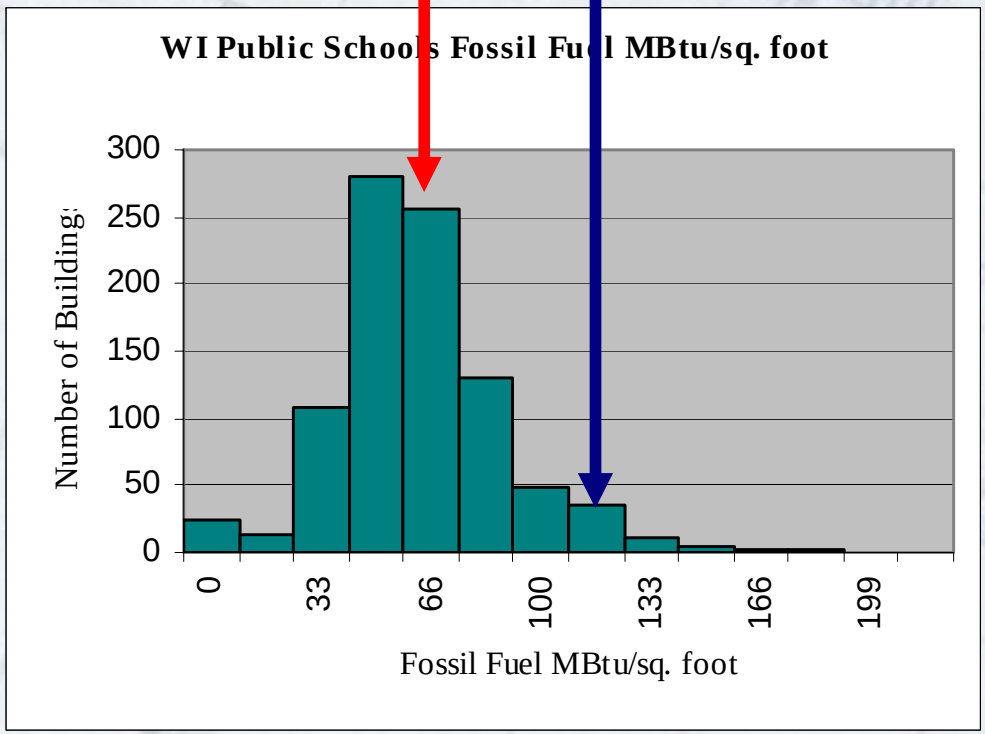
District Avg.

This school



District Avg.

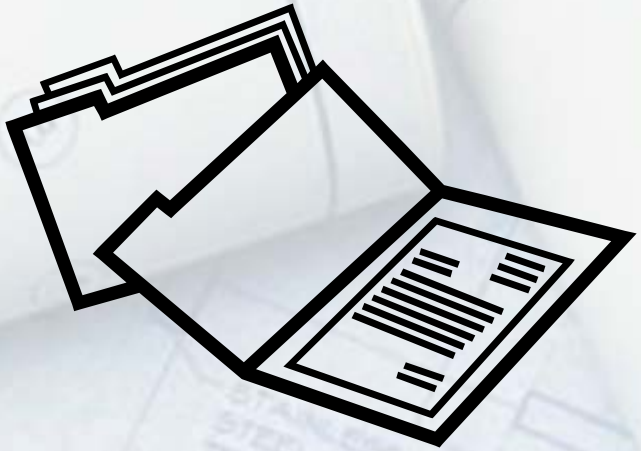
This school



Identify Improvements

- Can the system meet your requirements?
  - If so, tune the system to meet your needs
    - Examples: Calibrate sensors, adjust control sequences, repair or replace equipment
  - If not, re-design the system as required
- Costs and savings for each improvement
  - Prioritize

Deliverable



- *Facility Optimization Study*
  - Narrative and technical evaluation of each improvement opportunity
  - Estimate of project costs
  - Analysis of utility savings and other benefits
  - Includes:
    - Discussion of documentation improvements
    - Discussion of training needs

3. Monitor Implementation

- Cx provider's role varies depending on
  1. Needs of the client
  2. Number and complexity of improvements
  3. Type of improvements

Approach - Overview

- ☑ 1. Gather Information
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- ☐ 4. Functional testing
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- ☐ 6. Final report

4. Functional Testing

- Cx provider's role varies
- Verify the performance of Cx systems
- May use statistical sampling

5. Documentation & Training

- Update documentation
  - Drawings
  - O & M manuals
  - Operating sequences
  - Equipment database
  - Maintenance schedules
- Schedule training

6. Final Report

- Based on the *Facility Optimization Study*
  - Includes discussion of implemented projects and testing

Common Problems Identified

- Time clocks disabled
- Control sequences not optimized
- Energy Management Systems not understood or fully utilized
- Controls/sensors/actuators out of calibration
- Ventilation excessive
- Documentation & training inadequate

THANK YOU

This concludes the ASHRAE & AIA
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Please visit the website
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Questions or Comments?

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