Introduction to Energy Efficient Design

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Better Performing Buildings™

Outline

- Current State of Energy Systems Design
- Implications for Energy Conservation
- Costs
- Barriers to Improvement

Introductions

- Presenters
- Attendees
- Minnesota Power Representatives

Current State of Energy Systems Design

- "Efficient Design" vs. "Energy Efficient Design"
- Designer Selection Process
  - Architects Selected by Owners
  - Engineers selected by Architects
  - Fixed fee
  - Commodity perception
  - Necessary evil

Current State of Energy Systems Design

- Project Design Team
  - Architect
  - Engineers
  - Owner's Project Manager/Representative
  - Future Users
  - Construction Manager (optional)
  - Future Building Operators (optional)

Current State of Energy Systems Design

- Engineering Design Process
  - Building and space types definition by Architect
  - Energy systems schematic design narrative
    - Based on last "similar" project
    - Corporate standard template
  - Design Development
    - Block load calculations
    - Coordination with Architect for space requirements
    - Rough lay-out of equipment and major distribution routes

Current State of Energy Systems Design

- Engineering Design Process (cont'd)
  - Construction Documents
    - Delay as long as possible due to ever-changing Architectural plans
    - Detailed load calculations
    - Final equipment selections, layout, and distribution sizing
    - Corporate standard specifications
      - O&M training requirements
      - O&M documentation requirements
      - Punchlist & Closeout

Current State of Energy Systems Design

- Engineering Design Process (cont'd)
  - Operations & Maintenance Planning
    - Design engineers with little or no systems operations experience
    - Industry standard boilerplate O&M training requirements
    - Industry standard boilerplate O&M documentation requirements

Current State of Energy Systems Design

- Engineering Design Process (cont'd)
  - Bid Document Addenda
    - Final coordination details
    - Control system design
  - Low Bidder Selected

Current State of Energy Systems Design

- Project Timeline

- Owner Schedule Constraints
  - Financing
  - Domino affect of relocating people
  - End of leases

Current State of Energy Systems Design

- Objective of Design Process?
  - Drawings and specifications for use in bidding
  - Not so much concern about what comes next

Current State of Energy Systems Design

- Summary
  - Minimal or no analysis of alternate systems
  - Architectural-Engineering integration limited to space requirements
  - Minimal or no systems operations and integration consideration
  - No meaningful, enforceable operations and maintenance planning

Implications for Energy Conservation

- Minimum Energy Code Compliance
- Common Systems Potentially Familiar to Building Operators
  - Most likely to be operated as intended – just by chance, not by planning
- Frustrated Energy-Conscious Owners
  - Inadequate or non-existent design phase comparative systems analysis
- Design Engineers Familiar with Equipment & Systems
  - Lower risk of design errors, change orders, and/or post-construction troubleshooting

Costs

- Design Fees
- Procurement & Installation Costs
- Troubleshooting Costs
- Remediation Costs
- Energy Costs

Barriers to Improvement

- Commodity Design Engineering Fees
- Design Engineers Unfamiliar with New Systems
- Rushed Design Process
- Lack of Experience Evaluating Energy System Options
- Lack of Experience Operating Building Systems
- High Risk/Low Reward for Innovative Design

Preconference Workshop Agenda

- Lighting & Lighting Controls Design
- HVAC & Controls Design
- Case Studies
- Lessons Learned & Best Practices