Welcome

Conservation Applied Research & Development (CARD) Webinar
Performance-Based Procurement Pilot

Mary Sue Lobenstein
R&D Program Administrator
marysue.Lobenstein@state.mn.us
651-539-1872

Anthony Fryer
Conservation Improvement Program (CIP) Coordinator
anthony.fryer@state.mn.us
651-539-1858
Speaker Introductions

Scott Hackel
Principal and Director of Engineering
Seventhwave
shackel@seventhwave.org

Ken Potts
Project Manager
Mayo Clinic
Potts.Kenneth@mayo.edu

Patrick Smith
Research Fellow
CSBR
smit2059@umn.edu
Webinar Basics

- Attendees in listen-only mode
- Type your questions into Question Box
- Questions addressed at end
- Webinar recorded & archived online
- Handout: webinar slide deck
• Purpose to help Minnesota utilities achieve 1.5% energy savings goal by:
  
  • *Identifying new technologies or strategies to maximize energy savings*;
  
  • *Improving effectiveness of energy conservation programs*;
  
  • *Documenting CO₂ reductions from energy conservation programs.*

  Minnesota Statutes §216B.241, Subd. 1e

• Utility may reach its energy savings goal
  
  • Directly through its Conservation Improvement Program (CIP)
  
  • Indirectly through energy codes, appliance standards, behavior, and other market transformation programs
CARD RFP Spending by Sector thru mid-FY2017

- 8 Funding Cycles
- Nearly 380 proposals
- 92 projects funded
Real performance in real buildings
WHAT IF... we started with the owner? And focused primarily on aligning performance with overall project goals?
WHAT IF… we overcame the dual-model system and its theoretical baseline approach?

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Assembly U-factor</th>
<th>Proposed</th>
<th>Description</th>
<th>Assembly U-factor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td></td>
<td><strong>Description</strong></td>
<td><strong>Assembly U-factor</strong></td>
<td></td>
</tr>
<tr>
<td>* Describe the Baseline above-grade exterior wall construction (for example: steel-framed with R-13.0 (R-2.3) cavity insulation and R-7.5 (R-1.3) continuous insulation).</td>
<td></td>
<td>* Describe the Proposed above-grade exterior wall construction and Appendix A Table referenced (for example: 6” (150mm) steel frames spaced 24” (610mm) on center with R-21 cavity insulation and R-10 (R3.7) continuous insulation per Table A3.3).</td>
<td></td>
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</tr>
<tr>
<td>* New above-grade walls: steel-framed with U-factor from appropriate Table 5.5 per Table G3.1#5(b).</td>
<td></td>
<td>* Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Existing above-grade walls: existing conditions per Table G3.1#5(f).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>steel-framed with R-2.3 cavity insulation with a U-factor of 0.705</td>
<td>U-0.705</td>
<td>Exterior insulated wall</td>
<td></td>
<td>0.26</td>
</tr>
<tr>
<td>steel-framed with R-2.3 cavity insulation with a U-factor of 0.705</td>
<td>U-0.705</td>
<td>Non insulated wall</td>
<td></td>
<td>3.75</td>
</tr>
</tbody>
</table>
WHAT IF… we overcame the dual-model system and its theoretical baseline approach?
WHAT IF... the energy budget for a project were set at the same time as the financial budget?

WHAT IF... construction teams were given freedom to trade off better commissioning in place of more expensive systems?
Webinar overview

- Performance based procurement
- SB2030 Energy Standard
- Pilot study
- Outcomes
- Utility energy efficiency program opportunities
- Context and conclusions
Performance based procurement
Corporate Average Fuel Economy (CAFE) Standards
ALL NEW BUILDINGS

CODE-COMPLIANT

“SUSTAINABLE” OR CERTIFIED

PERFORMANCE TARGET

ZERO ENERGY

FUTURE PROOF
DEVELOP RFP DOCUMENTS

MISSION CRITICAL:
Meet building program requirements
Standard of care for ventilation
Energy performance of 50 kBtu/gsf annually
Measurement and verification plan
Energy Star certified

HIGHLY DESIRABLE:
Energy performance of 40 kBtu/gsf annually
Natural ventilation
Provide high quality natural daylight
Automatic fault detection and diagnostics system

IF POSSIBLE:
Zero energy ready
Zero energy building (DOE/EE-1247 definition)
Focus on high impact decisions

Energy Cost Savings ($/ft²·yr)

- Lighting
- Plug Loads
- Cooling Efficiency
- Daylight Harvesting
- Glass U-Value
- Glass Area
- Glass SHGC
- HVAC Controls
- Infiltration
- Exterior Shading
- Heating Efficiency
- Wall Insulation
- Hot Water Efficiency
- Exterior Lighting
- Roof Insulation
- Demand Ventilation Controls
SB2030 Energy Standard
SB 2030

- The SB2030 initiative was passed by the Minnesota legislature in the 2008 session.

- The purpose is “to establish cost-effective energy-efficiency performance standards for new and substantially reconstructed commercial, industrial and institutional buildings that can significantly reduce carbon dioxide emissions by lowering energy use ...”

- These standards have become the energy use requirements for state-bonded projects through the B3 Guidelines.
SB 2030: Increasing performance targets

- Increasing reductions from 2003 baseline
- Target steps every five years
- Reduction requirement for renovations lower
Target setting for SB 2030—creates a 2003 baseline

- Needs to reflect building program parameters that affect energy consumption
- Need to be able to be run during predesign to set a preliminary target
- Need to accommodate shifting design and operations changes
SB 2030 Energy Standard Tool v.2.x

Used to define space types in building, includes:

- Air flow requirements
- Process, lighting, plug and other loads
- Process, lighting, occupancy and plug-load scheduling

Runs these parameters through:

- Minnesota climate using a DOE 2.2 model
- A 2003 Average building (built off of the 1989 energy code)

Standard is set with a 70% reduction from that modeled baseline
Pilot study
Research method

**Case study format**

Pilot projects
- Private sector
- Public sector, SB 2030-required projects

Targeting projects early in the design but far enough along to have completed Design Development during study period

**Assessment intended to determine opportunities and barriers to AP implementation**
Stakeholder feedback

- There is room to coordinate MN utility programs and SB2030
- Advancing codes pushes on utility programs
- Owners want processes to align with their design and procurement practice
- Energy modeling is perceived as a potential barrier for PBP in the state
- Iterative tools are improving
Feedback from energy modelers

- Modeling starting typically in Schematic Design
- Primary influence on mechanical selection
- 10%–20% of projects undergo an energy charrette
- Engaged and sophisticated owners improved the process.
- Energy modeling community believes itself to be strong, though small in Minnesota
- Tools are streamlining iterative modeling - though expert interpretation is still necessary, particularly for aggressive energy targets like SB 2030
Outcomes
Owner perspective

Concerns

- Budgets
- Procurement schedule
- Competing org. goals

Opportunities

- Reduce uncertainty
- Align team goals
- No negative budget impact

Image courtesy of Structured Development and CallisonRTKL.
Mayo Clinic, Rochester, MN

- A leading **Academic Medical Center** committed to the highest quality care for each patient every day
- Medical Practice – Education – Research
- 34,000 employees
- 21 million square feet
Environmental Stewardship

- Sustainable design, construction & operations strategies
- Environmentally responsible purchasing & waste management
- Energy conservation & management
Existing Generose Building
Generose Expansion
Performance Goal

122 kbtu/sf target

- Existing program and trend data: 153 kBtu/sf
- Proposed program
- Industry benchmarks
  - Inpatient: 205 kBtu/sf
  - Outpatient: 95 kBtu/sf
Design approach

Rochester, MN

- Climate Zone 6A
- Conditioned Atrium
- Window Wall Ratio
Year One: 2019

- **Standard Curtainwall:**
  - Capital: $8,300,000
  - Ops: $302,000

- **Triple-Glazed Curtainwall:**
  - Capital: $8,800,000
  - Ops: $281,000

- **Curtainwall + Rainscreen:**
  - Capital: $7,500,000
  - Ops: $267,000
Design solution
Design solution
## Energy impacts (in kBtu/ft²/yr)

<table>
<thead>
<tr>
<th></th>
<th>Target EUI</th>
<th>Est. EUI¹</th>
<th>Est. saving (%)</th>
<th>Savings benchmarked to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayo Clinic Generose Expansion</td>
<td>122</td>
<td>110</td>
<td><strong>31%</strong></td>
<td>Portfolio median</td>
</tr>
<tr>
<td>Metro Transit BLRT Maint. Facility</td>
<td>120</td>
<td>83</td>
<td><strong>61%</strong></td>
<td>SB2030</td>
</tr>
<tr>
<td>Aeon Towerside</td>
<td>40</td>
<td>TBD</td>
<td><strong>38%</strong></td>
<td>Portfolio median</td>
</tr>
<tr>
<td>Higher Ground (St. Paul)</td>
<td>81</td>
<td>77</td>
<td><strong>36%</strong></td>
<td>SB2030</td>
</tr>
<tr>
<td>Washburn Center for Children</td>
<td>55</td>
<td>55</td>
<td><strong>31%</strong></td>
<td>SB2030</td>
</tr>
<tr>
<td>UMTC Health Sciences ELC</td>
<td>90</td>
<td>66</td>
<td>-</td>
<td>N/A</td>
</tr>
</tbody>
</table>

¹ Design EUI estimated based on in-progress design at time of this publication.
Energy efficiency program opportunities
Opportunity: Engage with the owner

Align values
- Obtain buy-in
- Facilitate owner discussion

Improve customer satisfaction
Opportunity: Focus on real performance
...while maintaining flexibility in design
Challenges

- Performance based procurement focuses on the owner or customer rather than design team
- Alignment and timing of customer engagement
- Evaluation framework may need adjustment
Program design: overcoming challenges

**Identify** the right customer for PBP

**Connect** with customers early in planning
- Leverage utility account managers
- Explore local planning commission approvals
- Connect with local city council members
- Offer energy charrettes
- Provide cash bonus for early applications
Program design: being cost effective

**Estimated savings**
- 1.2 to 3.3 kWh/ft$^2$
- 0.008 Dth/ft$^2$
- 0.0002 to 0.0007 kW/ft$^2$

**Estimated program costs**
- Technical assistance $0.03 to $0.09/ft$^2$
- Customer rebates $0.16 to $0.43/ft$^2$
- Program administration $0.02 to $0.07/ft$^2$
- Total program cost $0.21 to $0.56/ft$^2$
SB 2030 opportunities
SB 2030 opportunities

- SB 2030 could be aligned better with the ideal PBP process
- In B3v3.0 the OPR definition was updated, requiring an energy standard to be set early as part of owner requirements, streamlined by the improved Energy Standard Tool
- Improving owner commitment and drive
- Formalizing process from design and owner groups
SB 2030 opportunities

Clarification of outcomes and process

Both positive and negative results

Clarity at early project phases the mandatory nature of the goals

- Improves focus of design on energy efficiency
- Reduces likelihood of re-design later
- Allows opportunity for owner buy-in
Linking PBP and SB 2030

PBP and SB 2030 have structural similarities
- Both include an EUI performance target
- Both set target as owner requirement

PBP a useful tool to meet SB 2030

Need to:
- Push energy analysis earlier
- Align substantiation
Context / Conclusions
How can PBP fit with the future of codes and municipal policy?
Performance-based procurement

Benchmarking

CREDIT: Institute for Market Transformation
Takeaways

- Significant benefit in shifting focus in both public and private sectors to real energy performance targets.
- SB2030 can and will be improved to improve compliance, and align with CIPs.
- When connecting with the right owners, both impact and influence can be significant.
Questions?

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Send us your questions using GoToWebinar question box
Conservation Applied Research and Development

Funds projects to identify new technologies or strategies to maximize energy savings, improve the effectiveness of energy conservation programs, or document the carbon dioxide reductions from energy conservation projects.

Background

The Next Generation Energy Act of 2007 (the Act) established energy conservation as a primary resource for meeting Minnesota’s energy needs while reducing greenhouse gases and other harmful emissions. The Act also established a savings goal of 1.5 percent of annual retail electricity and natural gas sales for all utilities in the state. The utilities may reach this annual goal directly through its utility Conservation Improvement Program (CIP) and, indirectly, through energy codes, appliance standards, behavioral and other market transformation programs.

To help utilities reach their energy savings goal, the Act authorizes the commissioner to assess utilities $3,600,000 annually for grants applied research and development projects:

- $2,600,000 for the Conservation Applied Research and Development (CARD) program through which Commerce awards grants in a competitive Request for Proposal (RFP) process.
- $500,000 for the Center for Sustainable Building Research to coordinate activities related to Sustainable Building 2030 (SB2030)
- $500,000 for the Clean Energy Resources Teams (CERTs) for community energy technical assistance and outreach.

For Reports use CARD Search Quick Link

For Webinars use CARD Webinars & Videos Quick Link

Webinar Recording & Final Report available in few weeks

R&D Web Page (https://mn.gov/commerce/industries/energy/utilities/cip/applied-research-development/)
Thanks for Participating!

**Upcoming CARD Webinars:**

- **Dec 7:** Ongoing commissioning in out-patient medical clinics
- **Dec 14:** Evaluation of moisture & heat transfer furnace retrofit
- **Dec 19:** Evaluation of liquid cooling technology for data centers
- **Jan 4:** Assessment of low income CIP programs in Minnesota

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**Commerce Division of Energy Resources e-mail list sign-up**

If you have questions or feedback on the CARD program contact:

Mary Sue Lobenstein

*marysue.Lobenstein@state.mn.us*

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