Welcome

Conservation Applied Research & Development (CARD) Webinar

mn.gov/commerce
Statewide Commercial Behavior Segmentation and Potential Study

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Webinar Basics

• Attendees in listen-only mode
• Sent your questions to us using the Question Box
• Address all questions at the end of the presentation
• Webinar is being recorded
• Slide deck can be downloaded as a handout
• 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
CARD RFP Spending by Sector thru mid-FY2017

- 8 Funding Cycles
- Nearly 380 proposals
- 92 projects funded

- Commercial (36), 37.6%
- Residential 1-4 unit (15), 18.7%
- Multi-sector (21), 25.3%
- Agricultural (6), 3.1%
- Multifamily 5+ unit (4), 6.6%
- Industrial (10), 8.6%
ILLUME
Statewide Commercial Behavior Segmentation and Potential Study

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This Work Supported By:

[Logo]

Mn Commerce Department
Energy Resources
AGENDA

- INTRODUCTION
- METHODOLOGY
- STATEWIDE RESULTS
- MEASURE-LEVEL RESULTS
- SEGMENT RESULTS
- WRAP-UP
INTRODUCTION
PROJECT OVERVIEW

The project measured the human and technical potential of behavior change among small and medium businesses (SMB) across key end uses. To meet study goals, the project:

1. Estimated the achievable energy savings potential of behavior changes in the commercial sector by measure, segment, utility and statewide.

2. Created a statewide commercial customer segmentation to group small and medium business (SMB) customers based on similar behavior-change opportunities.
SURVEY METHODOLOGY

Survey of SMBs fielded June through early October

- 1,440 valid respondents
- Sample stratified on:
  - Number of employees – Very small (1-9 employees), Small (10-49 employees), Medium (50 – 99 employees)
  - Geography- Twin Cities/Greater Minnesota
  - Six business types plus “other” category

- Covered: 1) business practices; 2) building details; 3) responsibility for purchases, maintenance and utility bills; and 4) end-use details
BUSINESS SEGMENTS

- Food Service
- Office
- Warehouse and Wholesale
- Grocery and Convenience
- Retail
- Education
OPPORTUNITY INCIDENCE

Broad list first established of 26 measures.

Survey included 15 high and medium priority measures.

Narrowed to 10 based on:

- Applicability
- Opportunity
<table>
<thead>
<tr>
<th>HVAC</th>
<th>Lighting</th>
<th>Power Management</th>
<th>Refrigeration</th>
<th>Kitchen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermostat set-backs</td>
<td>Lighting optimized to occupancy</td>
<td>Equipment power management</td>
<td>Refrigerated display case air leakage</td>
<td>Kitchen exhaust fan</td>
</tr>
<tr>
<td>HVAC regular maintenance</td>
<td>Lighting optimized to daylight</td>
<td>Computer power management</td>
<td>Refrigeration maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrigeration lighting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ILLUME
ENERGY MODELING

6 Business segments
3 Building types
2 Building sizes
2 HVAC types
2 Heating fuels
3 Climate zones
10 Measures + baseline

= 5,600 model runs

Electricity

Consumption (kWh/ft²)

Baseline
Setbacks
Savings
EXTRAPOLATION

1,440 survey respondents

79,695 in-scope businesses
TOTAL SAVINGS BY SEGMENT

Electricity (kWh) Savings
- Total Electric Achievable Savings: 245 M kWh
- 80 M
- 52 M
- 25 M
- 15 M
- 13 M

Natural Gas (therms) Savings
- Total Gas Achievable Savings: 7.8 M therms
- 4 M
- 2 M
- 0.5 M
- 0.5 M
- 0.5 M
- 1 M
- 0.4 M

Customer Bill Savings
- Total Customer Bill Savings: $26.6 M
- $10.84 M
- $6.94 M
- $2.54 M
- $1.63 M
- $1.79 M
- $4.82 M

Segments:
- Food Service
- Retail
- Education
- Grocery/Convenience
- Wholesale
- Office
CUSTOMER BILL SAVINGS BY COUNTY

Regions that are the most densely populated have the greatest savings potential.
MEASURE-LEVEL RESULTS
TOTAL SAVINGS BY MEASURE

**Electricity (kWh) Savings**
- Total achievable electricity savings: 245.7 million kWh

**Natural Gas (therms) Savings**
- Total achievable electricity savings: 7.8 million therms

**Customer Bill Savings**
- Total achievable bill savings: $28.6 million
MEASURE SAVINGS AND INCIDENCE

(Circles are proportional to aggregate savings potential within segment.)
CROSS-UTILITY THERMOSTAT OPPORTUNITIES

- Minnesota Power
- Ottertail
- Xcel
- All municipals
- GRE Co-ops
- Non-GRE Co-ops

Also has gas t-stat Opportunity*

No gas opportunity

*excludes Xcel when Xcel is the electric utility
SEGMENT RESULTS AND APPROACHES
PROGRAM TYPES

Feedback Programs
Diagnostic Programs
Community-based Programs
Energy Champions
Competitions
## Major Attributes of Program Types

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Franchise</th>
<th>Pays Utility Bills</th>
<th>Local responsibility</th>
<th>Small Staff Size</th>
<th>Owner Occupied Building</th>
<th>Multi-tenant Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitions</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Community-based</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Energy Champions</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Feedback</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Diagnostics</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
WHERE IS THERE OPPORTUNITY TO MAKE BUSINESSES MORE ENERGY EFFICIENT?

kWh Savings

- 32.98 M
- 19.12 M
- 19.50 M
- 4.17 M
- 1.43 M
- 1.30 M
- 0.68 M
- 0.63 M

Therm

- 2.52 M
- 1.18 M
- 0.10 M

Utility Bill Savings

- $5.39 M
- $2.88 M
- $1.71 M
- $0.48 M
- $0.12 M
- $0.11 M
- $0.05 M
- $0.06 M

BUSINESS SIZE

- 37% Very small, 1-9 employees
- 49% Small, 10-49 employees
- 15% Medium, 50-99 employees

SALES

- 1% <$1 million
- 32% $1 million - $5 million
- 68% $5 million - $10 million

BUSINESS TYPE

- Open 24/7
- Franchise
- Seasonal Business
- <$1 million
- <$1 million
- <$1 million
FOOD SERVICE

WHICH UTILITY BILLS DOES YOUR BUSINESS PAY?
- Electric Only: 72%
- Natural Gas Only: 22%
- Does not pay utilities: 3%

BUILDING OWNERSHIP
- Rents or leases: 60%
- Owns and occupies: 39%
- Owns but rents to someone else: 3%

BUILDING TYPE
- Free standing, one tenant: 47%
- Mall: 28%
- Multi-tenant Commercial: 25%

WHO PURCHASES AND REPLACES EQUIPMENT?

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Business owner</th>
<th>Facility manager/employee</th>
<th>Property manager/landlord</th>
<th>Corporate/external</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC Equipment</td>
<td>54%</td>
<td>25%</td>
<td>15%</td>
<td>6%</td>
</tr>
<tr>
<td>Overhead Lighting</td>
<td>51%</td>
<td>41%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Computer Equipment</td>
<td>82%</td>
<td>7%</td>
<td>NA</td>
<td>5%</td>
</tr>
</tbody>
</table>
PROGRAM APPROACHES

Food Service

Energy Champions
1. Create startup/shutdown schedule.
2. Engage staff and assign responsibility.
3. Post the startup/shutdown schedule.

Competitions
1. Focus on energy-saving action.
2. Use competition to kick-start long-term behavior change.
3. Reward all new participants.
4. Track communication progress.

Community-based Programs
1. Partnership with industry leaders.
2. Partnership with utilities.
EDUCATION

WHERE IS THERE OPPORTUNITY TO MAKE BUSINESSES MORE ENERGY EFFICIENT?

- kWh Savings:
  - 3.28 M
  - 0.34 M
  - 1.15 M
  - 3.53 M
  - 3.04 M
  - 5.43 M

- Therm Savings:
  - 7.85 M
  - 0.04 M
  - 0.01 M
  - 0.40 M

- Utility Bill Savings:
  - $0.27 M
  - $0.29 M
  - $0.26 M
  - $0.44 M
  - $0.05 M
  - $0.07 M
  - $0.09 M

- Categories:
  - Thermostat Setbacks
  - Equipment Power Management
  - HVAC Maintenance
  - Refrigeration Lighting
  - Refrigeration Maintenance
  - Lighting Optimized to Occupancy
  - Lighting Optimized to Daylight
  - Kitchen Exhaust
  - Computer Power Management
EDUCATION

BUILDING OWNERSHIP

- 42% Rents or leases
- 56% Owns and occupies
- 2% Owns but rents to someone else or have other

BUILDING TYPE

- 70% Free standing, one tenant
- 7% Mall
- 23% Multi-tenant, Commercial
PROGRAM APPROACHES

Education

Leverage existing energy education programs. Consider:
• Targeting energy saving actions
• Encouraging partnerships between teachers and kitchen staff
• Using positive feedback or friendly reminders driven by student body

Energy Champions

Competitions

1. Focus on energy-saving action.
2. Inclusive teams.
3. Communicate with other building users.
4. Keep activities grade appropriate.
5. Combine with other efforts
6. Track and communicate progress.
7. Celebrate success.
<table>
<thead>
<tr>
<th>Category</th>
<th>Food Service</th>
<th>Grocery and Convenience</th>
<th>Office</th>
<th>Retail</th>
<th>Wholesale</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings Potential Utility Bills kWh Thersms</td>
<td>$10.8 million 80.4 million kWh 3.8 million therms</td>
<td>$4.8 million 51.8 million kWh 0.4 million therms</td>
<td>$6.9 million 60.7 million kWh 2.1 million therms</td>
<td>$1.8 million 14.7 million kWh 0.5 million therms</td>
<td>$1.6 million 13.1 million kWh 0.5 million therms</td>
<td>$2.5 million 25.1 million kWh 0.5 million therms</td>
</tr>
<tr>
<td>Measures with Most Opportunity</td>
<td>Thermostat Refrigerator maintenance Refrigerator lighting Thermostat</td>
<td>Thermostat Refrigerator maintenance Refrigerator lighting Thermostat</td>
<td>Thermostat Computer power management Day lighting</td>
<td>Thermostat HVAC maintenance Day lighting</td>
<td>Thermostat Occupancy lighting Day lighting</td>
<td>Thermostat Occupancy lighting Day lighting</td>
</tr>
<tr>
<td>Suggested Behavioral Program Approaches</td>
<td>Prompts Community-based Competitions</td>
<td>Prompts Community-based Competitions</td>
<td>Feedback Competitions</td>
<td>Diagnostic Prompts Community-based Competitions</td>
<td>Diagnostic Feedback</td>
<td>Competitions Add-on to K12 programs</td>
</tr>
<tr>
<td>Equipment Purchase and Maintenance Tends to Be Handled By:</td>
<td>Business owner or employee</td>
<td>Business owner or employee</td>
<td>Property manager (HVAC/Lighting) Business owner (computers)</td>
<td>Business owner or employee</td>
<td>Business owner or employee</td>
<td>Facility manager employee</td>
</tr>
<tr>
<td>Buildings Tend to Be:</td>
<td>Leased or owned; free standing, mall, or multi-tenant</td>
<td>Owned; free standing or multi-tenant</td>
<td>Leased; free standing or multi-tenant</td>
<td>Leased; free standing, mall, or multi-tenant</td>
<td>Leased and owned; free standing</td>
<td>Leased and own freestanding</td>
</tr>
<tr>
<td>Businesses Usually Insible for Utility Bills</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, but 27% do not pay a bill</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, 21% do not bill</td>
</tr>
<tr>
<td>Franchises Common</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Businesses Tend to Be:</td>
<td>Very small (1-9 employees) and small (10-49 employees)</td>
<td>Very small (1-9 employees)</td>
<td>Very small (1-9 employees)</td>
<td>Very small (1-9 employees) and small (10-49 employees)</td>
<td>Very small (1-9 employees) and small (10-49 employees)</td>
<td>Small (10-49 employees) and Medium (50-99 employees)</td>
</tr>
</tbody>
</table>
QUESTIONS?
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 for 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 (SR2030)
- $500,000 for the Clean Energy Resources Teams (CERTs) for community energy technical assistance and outreach.

**Webinar Recording**

Available in a few weeks

**Final Report**

Available late Summer

CARD Web Page (https://mn.gov/commerce/industries/energy/utilities/cip/applied-research-development/)

mn.gov/commerce
Thanks for Participating!

Upcoming CARD Webinars:

• **August 17:** Expanding New Construction Design Assistance to smaller utilities statewide

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