



Welcome

Conservation Applied Research & Development (CARD)
Webinar



Ongoing Commissioning in Outpatient Medical Facilities



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Webinar basics 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



Minnesota Applied Research and Development Fund

- 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.*

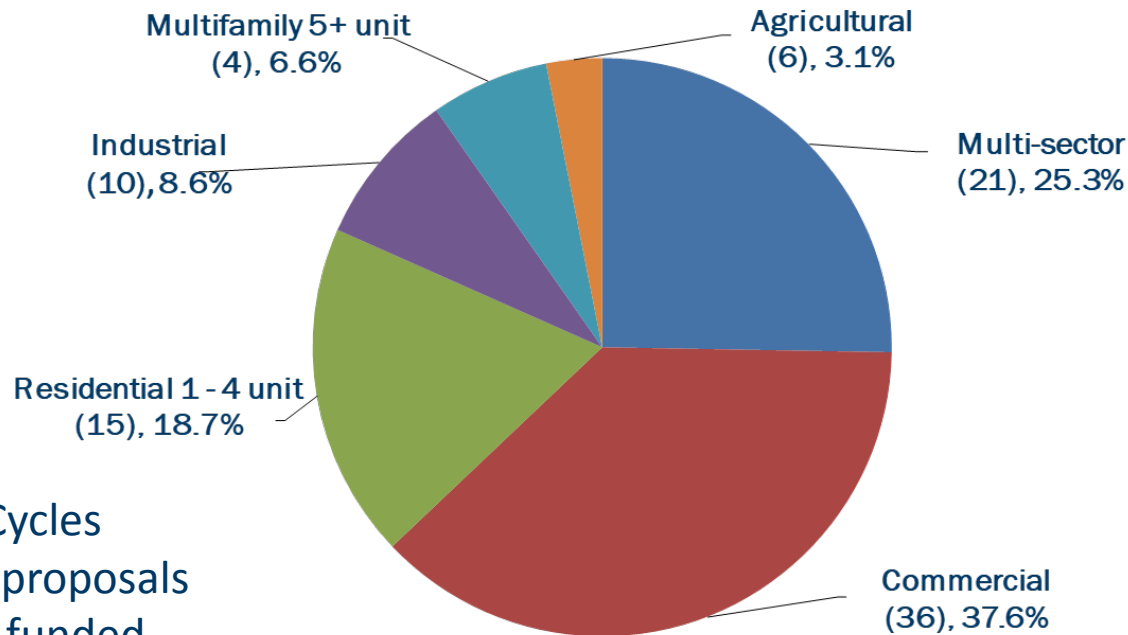
Minnesota Statutes §216B.241, Subd. 1e

- 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
- Over \$21 million in research



RESEARCH FUNDED BY:



ON-GOING COMMISSIONING FOR OUTPATIENT MEDICAL FACILITIES

DECEMBER 7, 2017



MichaelsEnergy



Michaels Energy

Who We Are

- ✓ Headquarters in La Crosse, Wisconsin
- ✓ Engineering and Energy Efficiency Consulting
- ✓ Seven CARD Grant Studies Since 2008





Gilbert Mechanical -

Key Partnership



Leading Provider of
Mechanical and Controls
Design and Service for the
MN Health Care Market



Relationships with
Participants and with
Alerton for EIS Installation





Agenda

- ✓ Background and Motivation
- ✓ Research Elements
 - > Contractor-led Energy Management of Medical Clinics
 - > On-Going Commissioning of ASCs
 - > Surgical Centers and Code Compliance
- ✓ Conclusions and Recommendations

A stack of four books is placed on a dark, reflective surface, likely a table. The books are of varying thicknesses and have dark covers. The background is a blurred view of a window with vertical frames, showing greenery and buildings outside. The lighting is soft and natural, coming from the window.

Background and Motivation



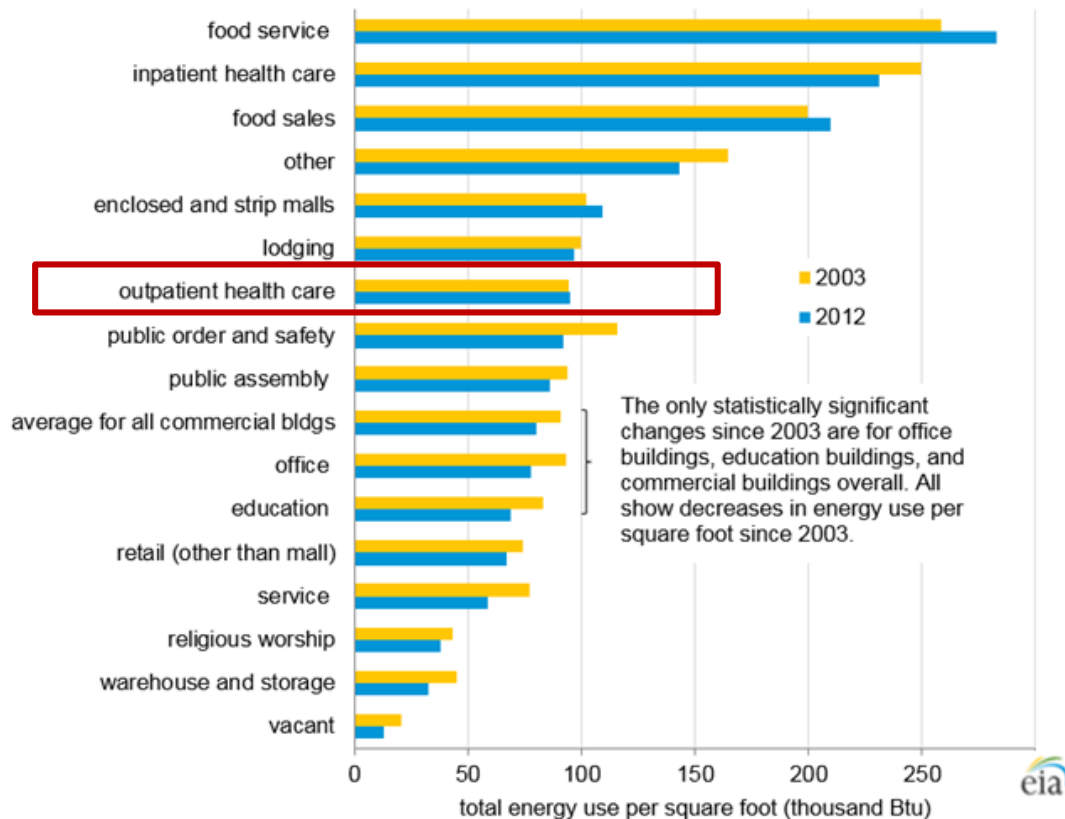
A Sector Specific Focus On

Outpatient Medical Facilities

- ✓ Outpatient (Meaning no Overnight Admission of Patients)
- ✓ Two Categories:
 - > Ambulatory Surgical Centers (ASCs)
 - > Medical Clinics (Sometimes Called Medical Offices)



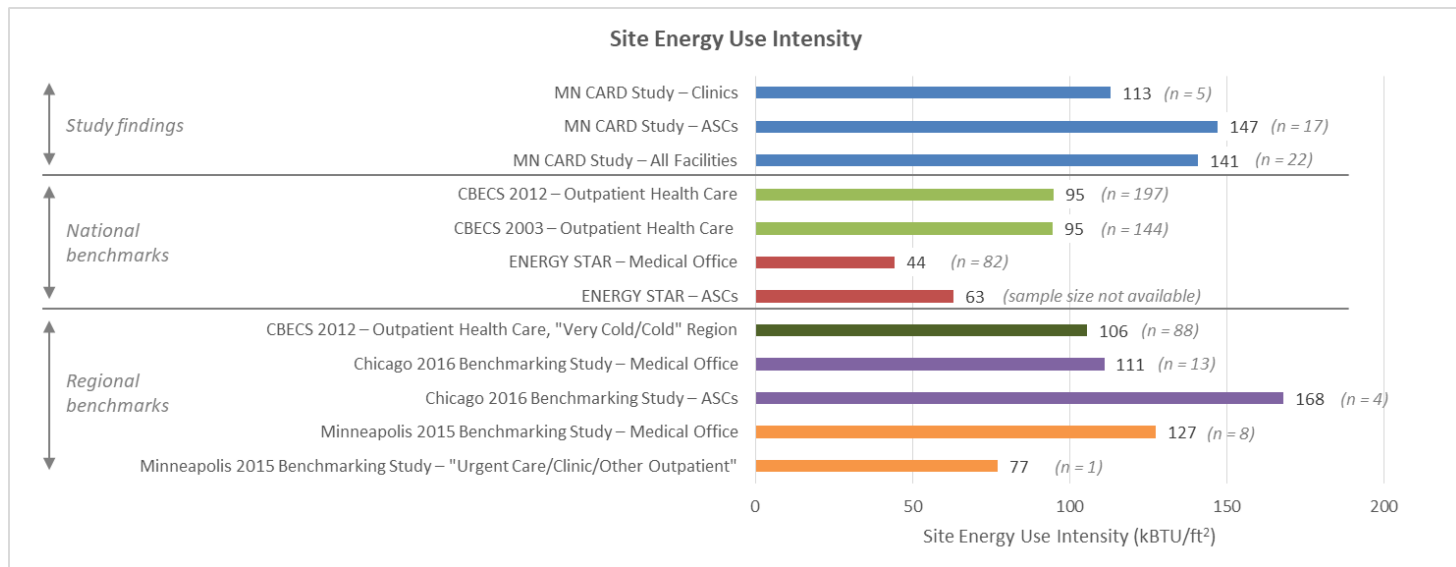
Energy in Medical Sector



Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey.



Project Benchmarking





Research Questions

➤ What's the Most Effective Way to Help the Outpatient Medical Sector?

➤ How Can Data Make Energy Efficiency Smarter and More Effective?

➤ Do Surgical Spaces Present Unique Opportunities for Efficiency?



Contractor-led
Energy
Management



On-going
Commissioning

Relax/Clarify
Operating
Requirements for
Surgical Suites





LBNL Energy Management Package

Contractor-led Energy Management of Medical Clinics



LBNL Energy Management Package

Addresses Common Barriers



- ✓ Recommissioning Requires:
 - > Experienced Engineers
 - > Building Automation System
 - > Large Savings Potential
 - > Time

Is there a better fit for small medical clinics?



LBNL Energy Management Package

Process



Source: <http://eis.lbl.gov/pubs/energy-management-package.pdf>



Pilot included

Five Medical Clinics

|||||

**Pilot of LBNL
EMP Process
+
Evaluation Via
Level II
Energy Audit**



LBNL Energy Management Package

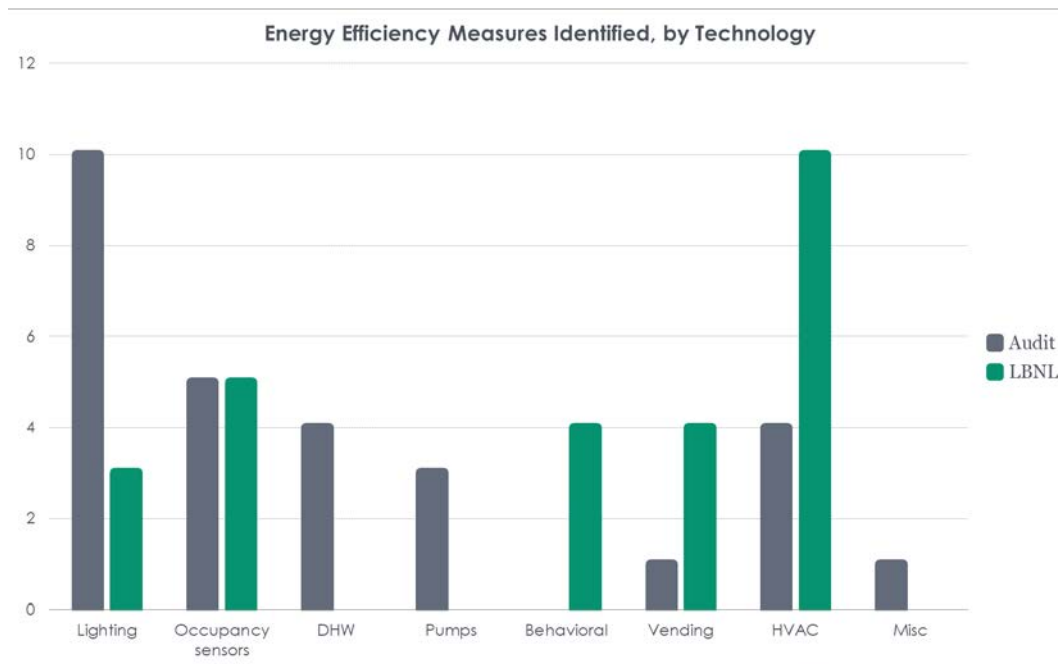
Measure Checklist

Measure Category	Measure Count	Description of Measures
HVAC	5	Are fans or space heaters being used? Are radiator and air vents obstructed? Are doors and windows closed in heating season? Are thermostats programmed? What is the most common HVAC complaint?
Lighting	2	Are there incandescent or T12 fixtures? Are lights scheduled?
Occupancy Sensors	1	Are occupancy sensors installed?
Kitchen	3	Is there an equipment start-up/shutdown schedule? Is there a service maintenance schedule? Are dishwashers run only when full?
Vending	1	Are vending machines set to turn off at off hours?
Behavioral	3	Are employees trained in energy conservation? Are computers/monitors set to sleep at night? Are copy machines & printers set to sleep at night?



LBNL Energy Management Package

Evaluating Results





LBNL Energy Management Package

Qualitative Feedback

PROS

- ✓ Positive Customer Interactions
- ✓ Identification of Opportunities
- ✓ Concept Valued by Contractor

CONS

- ✓ Challenges with Data Access and Online Tools
- ✓ Medical Clinics not Intended Fit
- ✓ Business Model not yet Apparent



On-going Commissioning of ASCs





On-going Commissioning of ASCs

Benefits

1

Improve
Persistence of
Savings from
RCx

2

Measure and
Verify Savings in
Real-Time

3

Establish
Organization
Engagement
and
Commitment



On-going Commissioning of ASCs

Energy Information Systems



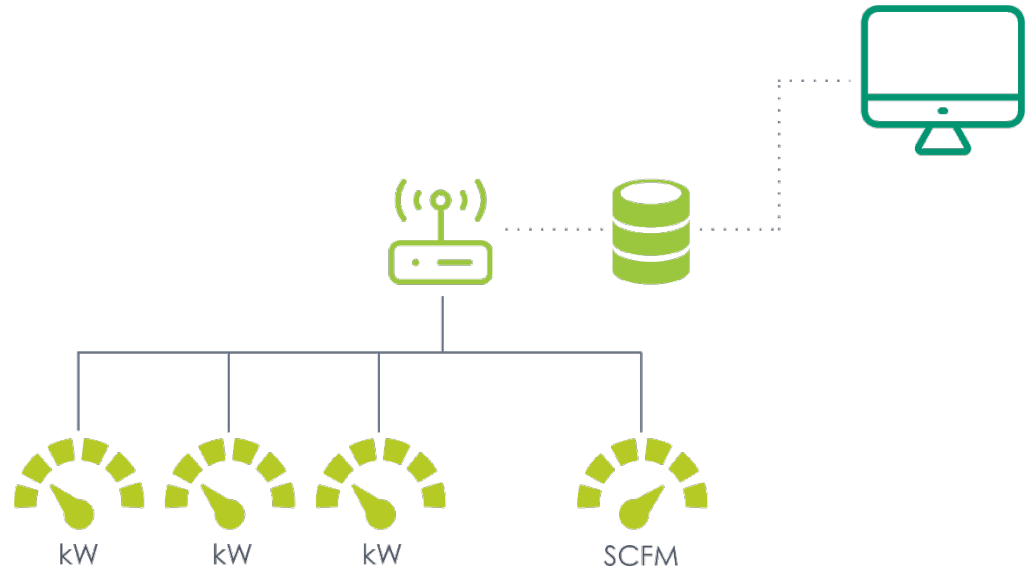
- ✓ A Tool That
 - > Collects
 - > Stores
 - > Analyzes
 - > Displays Energy Use Data
- ✓ A Process Tool – not a Widget

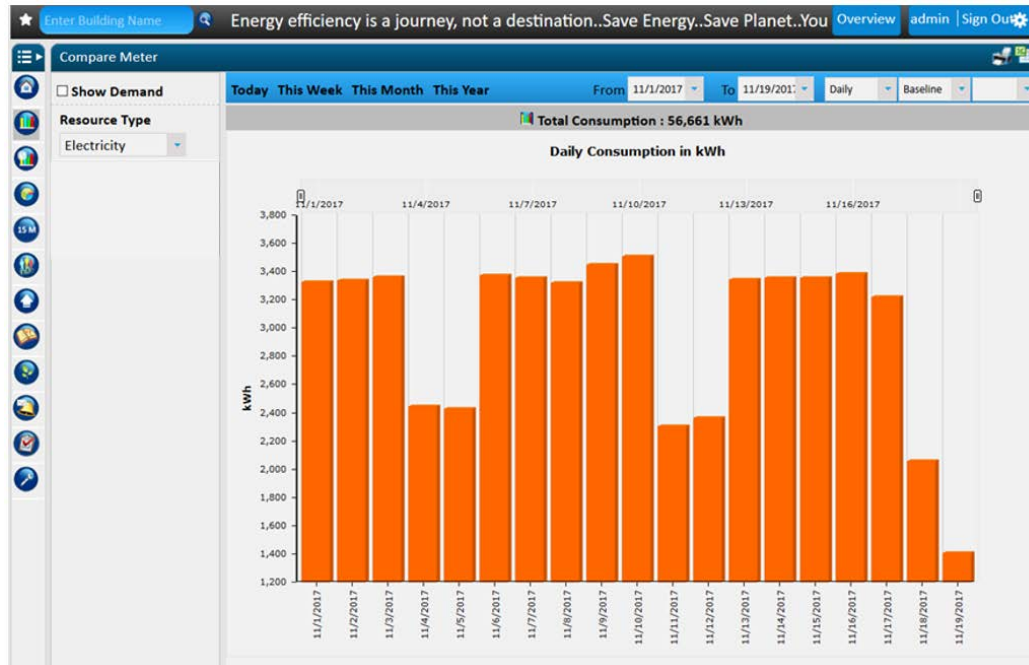


On-going Commissioning of ASCs

EIS Components

- ✓ Metering Hardware
- ✓ Data Acquisition and Storage
- ✓ Software





On-going Commissioning of ASCs

Our System



On-going Commissioning of ASCs

Methodology

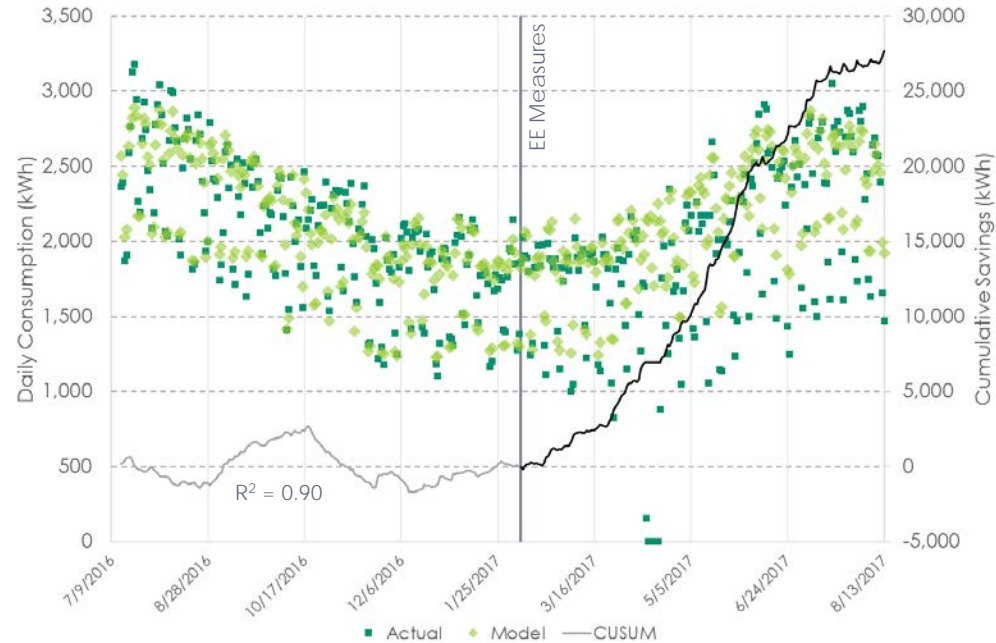
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On-going Commissioning of ASCs

Energy Modeling





On-going Commissioning of ASCs

Three Facilities

|||||

Facility #3

- ✓ 135,000 sq ft
- ✓ “No Implementation”

Facility #1

- ✓ 57,000 sq ft
- ✓ “Energy Savings”

Facility #2

- ✓ 82,000 sq ft
- ✓ “Perfect Case Study”



On-going Commissioning of ASCs

Results – Facility 3

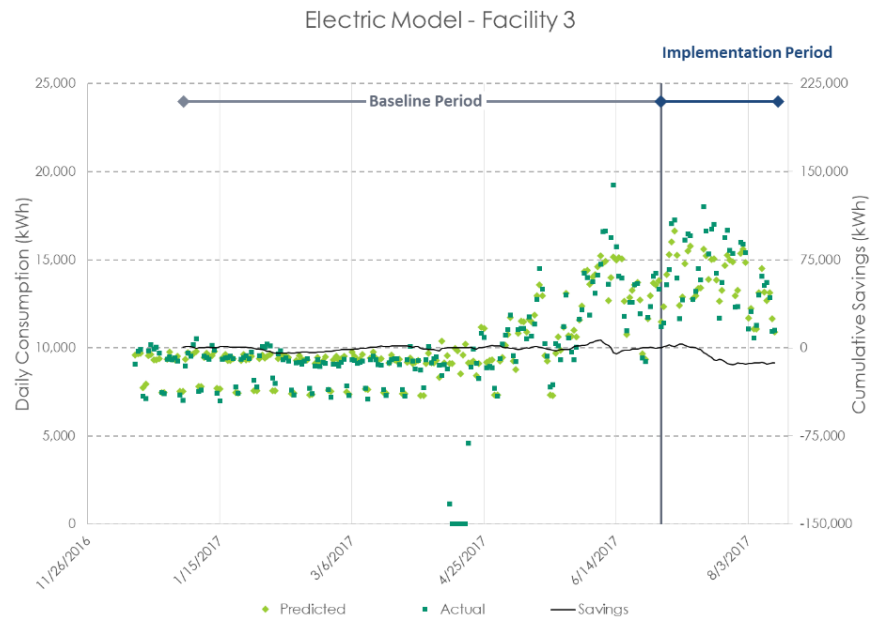
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Measures Implemented	Predicted Usage	Actual Usage	Savings % of Predicted Baseline
None	606,705 kWh	619,588 kWh	-12,883 kWh (-2%)
	22,887 therms	22,917 therms	-29 therms (0%)

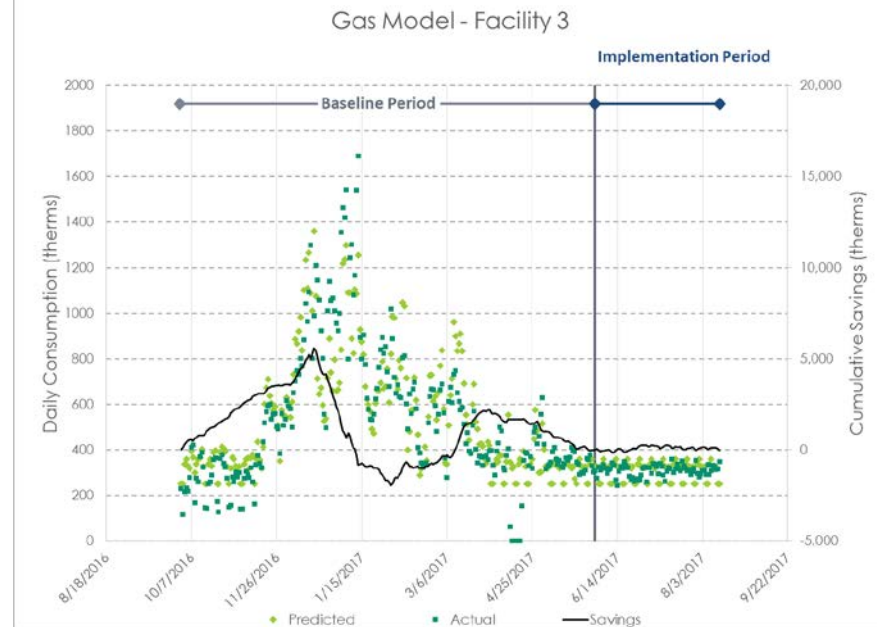


On-going Commissioning of ASCs

Results – Facility 3



R^2 Adjusted = 0.91



R^2 Adjusted = 0.77



On-going Commissioning of ASCs

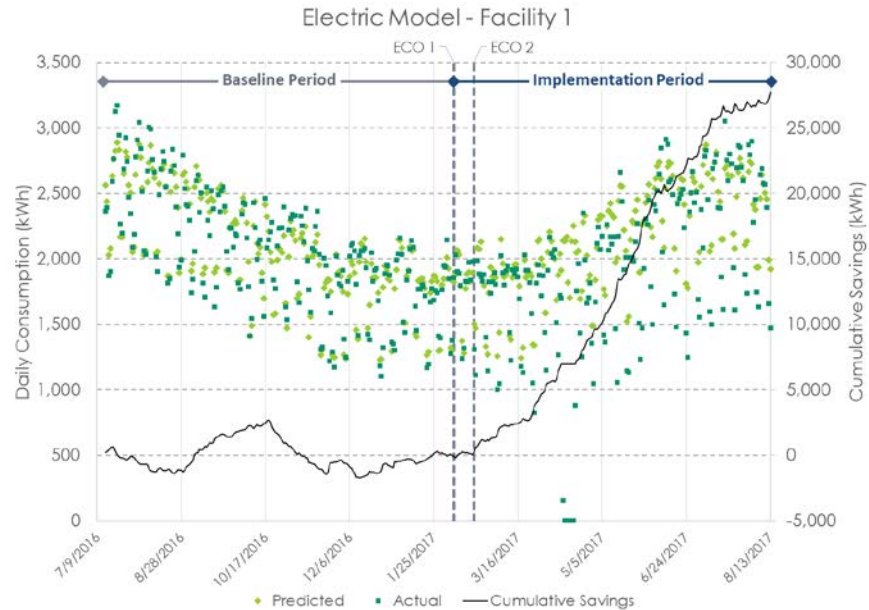
Results – Facility 1

Measures Implemented	Predicted Usage	Actual Usage	Savings % of Predicted Baseline
Schedule non-surgical AHUs (2/6/2017)	386,233 kWh	358,535 kWh	27,698 kWh (7%)
Airflow setbacks for surgical AHUs (2/18/2017)	24,060 therms	21,472 therms	2,588 therms (10%)

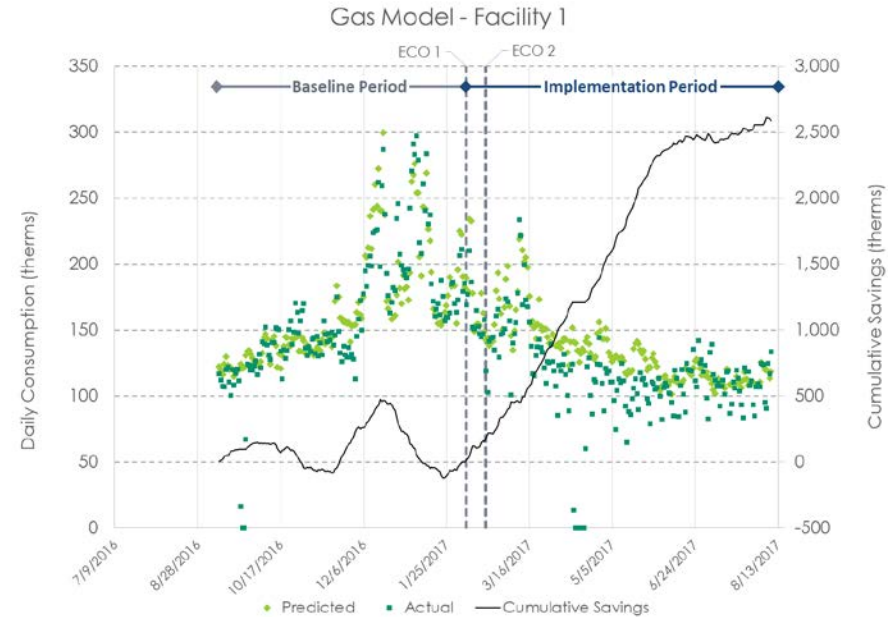


On-going Commissioning of ASCs

Results – Facility 1



R^2 Adjusted = 0.90



R^2 Adjusted = 0.85



On-going Commissioning of ASCs

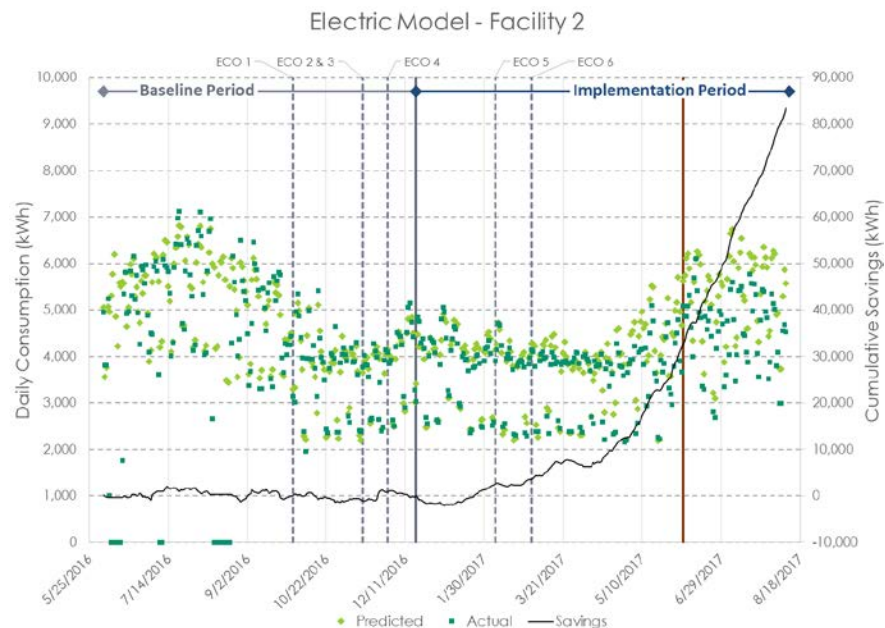
Results – Facility 2

Measures Implemented	Predicted Usage	Actual Usage	Savings % of Predicted Baseline
Reduced humidification load (10/1/2016)	998,264 kWh	914,769 kWh	83,495 kWh (8%)
Reset supply air temperature (11/14/2016)			
Chiller lockout during unoccupied periods (11/14/2016)	22,535 therms	21,128 therms	1,407 therms (6%)
AHU airflow setbacks during unoccupied periods (11/30/2016 and 2/6/2017)			
Install new VFD chiller (3/1/2017)			

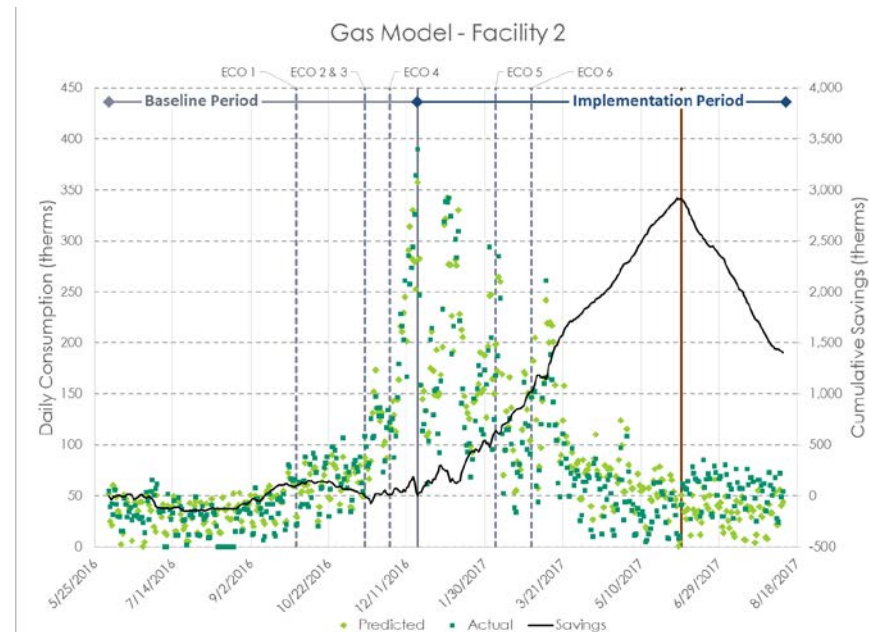


On-going Commissioning of ASCs

Results – Facility 2



R^2 Adjusted = 0.94

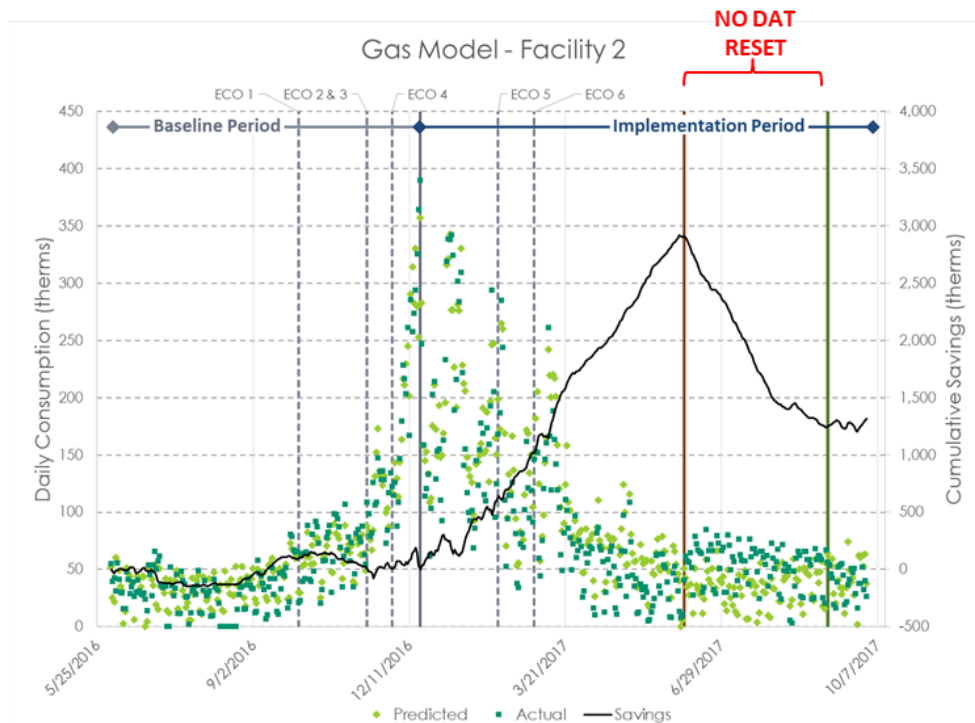


R^2 Adjusted = 0.93



On-going Commissioning of ASCs

Facility 2 Controls Correction





On-going Commissioning of ASCs

Feedback and Conclusions



Low Engagement



EIS Selected
wasn't Particularly
Robust



Delay Kills
Momentum



On-going Commissioning of ASCs

Results

1

Improve
Persistence of
Savings from
RCx

Yes!

2

Measure and
Verify Savings in
Real-Time

Yes, with room
to improve

3

Establish
Organization
Engagement
and
Commitment

Yes...but



Regulatory Requirements for **Ambulatory Surgical Centers**



ASC Regulatory Requirements

Opportunities



Reducing Relative Humidity
Requirements for Surgical
Spaces



Opportunity to Clarify
Ventilation Requirements
for Surgical Spaces



ASC Regulatory Requirements

Relative Humidity for Surgical Suites

Current MN Requirement is
50-60% RH at all Times
(MN Administrative Rules,
Chapter 4675, Section 1600)

Recent Memos from the
Department of Health Stipulate
that a Minimum of 20% can be
Adopted



ASC Regulatory Requirements

Relative Humidity for Surgical Suites

|||||

Savings:
900 Therms Per Year

Assuming:
1,000 sqft Surgery Space
90% Efficient Gas-Fired
Humidification Equipment



ASC Regulatory Requirements

Ventilation for Surgical Suites

Opportunities Identified by Standards Bodies:

FGI 2010, section 3.1-8.2.2.5(2)(b):

*“...[d]uring unoccupied hours, **operating room air change rates may be reduced, provided that the positive room pressure is maintained** as required in Part 6 (ASHRAE 170).”*

ASHRAE 170:

*“...for spaces that require a positive or negative pressure relationship, **the number of air changes can be reduced when the space is unoccupied, provided that the required pressure relationship to adjoining spaces is maintained** while the space is unoccupied and that the minimum number of air changes indicated is reestablished anytime the space becomes occupied.”*



Savings:
1,160 therms and
2,820 kWh per year

Assuming:
1,000 sqft Operating Room
Reduction from 24/7 to
12/5 Ventilation
80% Efficient Gas Equipment and
12 EER Cooling Equipment

ASC Regulatory Requirements

Ventilation for Surgical Suites



ASC Regulatory Requirements

Recommendations

	Baseline Conditions	Proposed Efficient Conditions	Process for Approval
Relative Humidity 20% Setpoint	50% to 60% relative humidity at all times	20% relative humidity at all times	Request for Equivalency
Operating Room Ventilation Scheduling	Full airflow at all times, continuous ventilation. Positive pressurization of surgical suites maintained at all times.	No ventilation while unoccupied. Supply airflow setback also possible as long as positive pressurization of surgical suites is maintained at all times.	Notification Letter

The image features four light bulbs against a dark gray background. The central bulb is illuminated with a warm orange glow and has several thin black lines radiating from its base, suggesting light. The other three bulbs are unlit and shown in a simple black-and-white line-art style. The text "Conclusions and Recommendations" is centered over the glowing bulb.

Conclusions and Recommendations



Conclusions

- ✓ There is Room to Save Energy
 - > Especially in Surgical Suites
- ✓ Data can Improve Performance, but...
 - > Don't Assume it will Get Used
 - > Assume it will Take a Long Time
 - > Pair it with a Holistic Approach to Managing Energy
- ✓ Competing Priorities are Real in Health Care, don't Assume You can Change Them



Program Recommendations

- ✓ Meeting Out-Patient Facilities Needs can be Done in General C&I Programs
 - > Same Challenges Other Large Customers Face
- ✓ Data Access, Specifically Speed of Pulse Meter Installation, Can be Improved
- ✓ Build Programs with Data + Leadership Development to Get Customers to Actually Use Data

THANK YOU!



Carl Samuelson
Manager - Client Solutions



Aaron Conger
Energy Program Engineer



Questions?



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Send us your questions using
GoToWebinar question box



CARD Project Resources

Industries & Agencies

Energy

Solar Industry

Wind Industry

Bioenergy Industry

Energy Environmental Review & Analysis

Energy Efficiency

Distributed Energy Resources

Financial Assistance

Technical Assistance

Commercialization Assistance

Utilities

Annual Reporting

Rate Cases

Conservation Improvement Programs

Technical Reference Manual

Applied Research & Development

Projects & Rates

Service Providers

Financial Institutions

Insurance

Unclaimed Property

Securities, Franchises & Subdivided Lands

Fuel

Scales & Meters

Retailers

Telecom Provider

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 (SB2030)
- \$500,000 for the Clean Energy Resources Teams (CERTs) for community energy technical assistance and outreach.

Program Updates

Project Info

Stakeholder Info

Grantee Info

CARD Program Updates

FY 2017 CARD RFP

Two CARD Request for Proposals (RFPs) have been posted for fiscal year 2017:

RESOURCES

CARD search

CARD Webinars & Videos

Request for Proposals

Proposals & Evaluations [E?](#)

QUESTIONS?

For questions related to the CARD program, upcoming events, or if you'd like to provide feedback or suggestions, contact:

Department of Commerce
Mary Sue Lobenstein | R&D Program Administrator
E-mail: marysue.lobenstein@state.mn.us

For Reports use CARD
Search Quick Link

For Webinars use CARD
Webinars & Videos Quick Link



Thanks for Participating!

Upcoming CARD Webinars:

- **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
- **Feb 6:** Evaluation of demand-based controls for DHW recirculating systems

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

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

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