

Xcel Energy Demand Side Management

(2) Rebate Program Ideas

11/27/2018

Summary: Smart Building Analytics + Coaching Services

Xcel Energy's customers are highly interested in data analytics to manage their building systems and energy more efficiently; however, most of them find big data analytics difficult to understand, and/or do not have the appropriate resources or funds to interpret findings. There are companies committed to solving this problem and driving change, using advanced data visualization, analytics and most importantly, coaching.

The current **EIS rebate** (under the EMS program) is custom, complex, and relies on real-time energy data, which can dissuade customers from taking advantage of it. There are various types of Information Systems in the market that still have immense impacts on building efficiency, without necessarily needing real-time energy data. Incentivizing various levels, or types of Information Systems, could give customers options and cause them to act.

The behavior of signing up for an EIS agreement (with data, coaching and analysis) would catch on in the market if there were more prescriptive incentives. Below are two examples of Information Systems that should be incentivized (that currently do not fall into the EIS criteria).

#1 – Real Time BAS/Equipment Fault Detection

- **BAS/Equipment Fault Detection** is technology that continuously runs tests on live and historical BAS/equipment data, in a cloud-based system. This technology analyzes building systems holistically and finds issues, recommends actionable insights, resulting in lower operating and utility costs, and a smarter/more efficient building. Continued efficient performance and additional gains happen through ongoing, continuous commissioning and analysis.
- **On average, 10-20% annual savings can be achieved through operational, behavioral and existing controls system adjustments found through BAS/Equipment Fault Detection + analysis consulting sessions.**
- A smart meter/Interval data is **not** required for this system to function, though it is useful for validating energy savings in real time.

Pricing & Scope

- Price to customer would depend on system complexity, age/comm. of BAS and set-up/connection to cloud server, which is done through a gateway (router). For customers that already have a DDC system, costs can be between **\$15-35K** for this agreement.
- The service would include set-up, Building Performance (SaaS), and semi-annual consultations with an energy/building optimization engineer.
- This rebate would incentivize customers to install a DDC Building Automation System with fault detection analytics, if the customer still has pneumatic system.
- We believe an incentive of 30-50% of this agreement price would help move the market.
- New York (NYSERDA) is currently incentivizing customers 30% of these agreements (including set-up costs, like installing a DDC system) – “RTEM or Real Time Energy Management program.”

The company proposing this already has approximately 1,300 of the current vintage BAS system controllers installed out in Xcel's territory. Most BAS companies in the industry (Johnson Controls, ATS, Trane, Setpoint, SkySpark etc.) have their own version of this technology + technical services, so this would not be something only one company could do. The entire market would be affected positively, and energy consumption would drastically be reduced if Xcel developed an incentive focused on this.

Please see appendix for screenshots/visuals of Fault Detection findings and savings.

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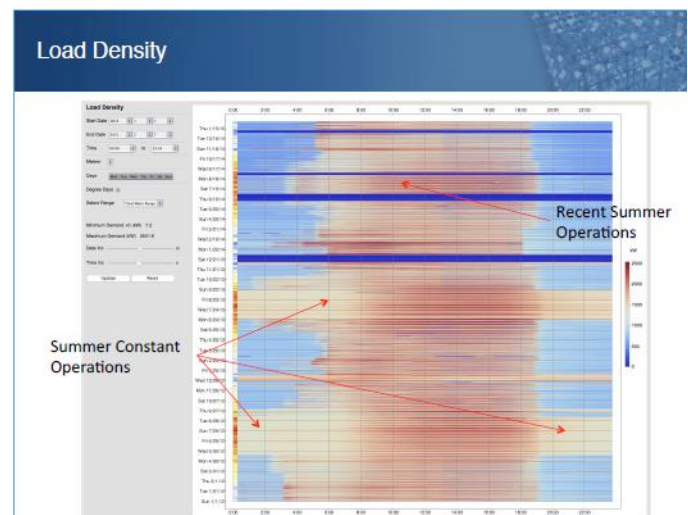
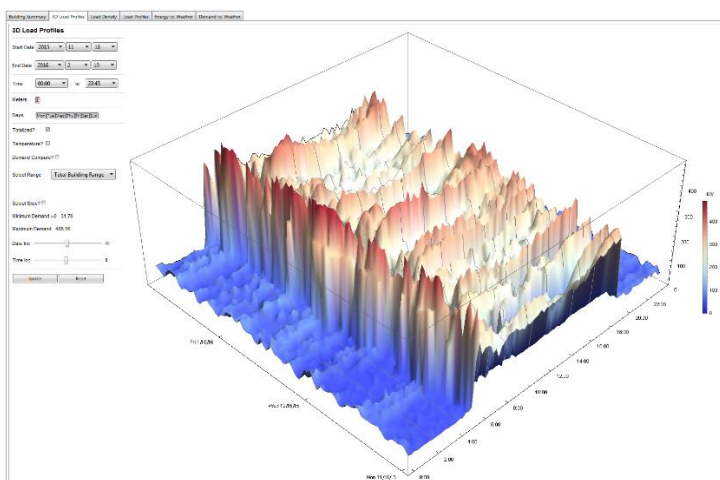
#2 – Static Interval Energy/BAS Data Analysis + Coaching

- This technology uses the power of interval energy data to find facility operational and equipment issues - much like a doctor uses MRI equipment to diagnose a patient. This analysis is used to quantify the value of improvements, show areas for improvement and measure the results.
- No cloud server connection is required; it uses static interval data
- Interval data *is* required, and it is BAS agnostic – any interval energy, OR BAS data can be analyzed through this platform.
 - (Currently, not all customers have smart/interval meters... they either have to get the data through Power TakeOff, or they pay \$2-5K to install a smart meter and tie into their BAS so that they own the meter... could this be another rebate idea?)
- **It is our experience that 10-20% annual savings (weather normalized) can be achieved through operational, behavioral and existing controls system adjustments with little to no capital. Peak demand AND consumption is targeted.**
- **Pricing & Scope**
 - Price to customer is **\$20K** if they have interval data.
 - The service would include set-up, and bi-annual consultations with an energy engineer.
- We believe an incentive of 30-50% of this agreement price would help move the market.
- New York (NYSERDA) is currently incentivizing customers 30% of Optics agreements - this is the Remote Energy Management (REM) Program.

Savings Examples - Static Interval Energy/BAS Data Analysis + Coaching

Size	Location	Type	Measures/projects	Annual Savings
300,000 SF	Dallas, TX	Commercial Office Building	Operational/behavioral. No capital projects.	726,361 kWh (13.9%)
510,000 SF	Dallas, TX	Commercial Office Building	Operational/behavioral. No capital projects.	1,754,110 kWh (15.7%)
3,800,000 SF	NY, NY	Commercial Office Building	Operational measures around central plant. No capital projects.	15.9% kW (peak demand) savings

There are unlimited ways to slice and dice the interval data; below are just two screenshots.



*An in-person demo or interview would be the best way to show how this works.

APPENDIX – Sample Real-Time Fault Detection Findings

Office Building (Englewood, CO)

Optimizing VAV system and schedules

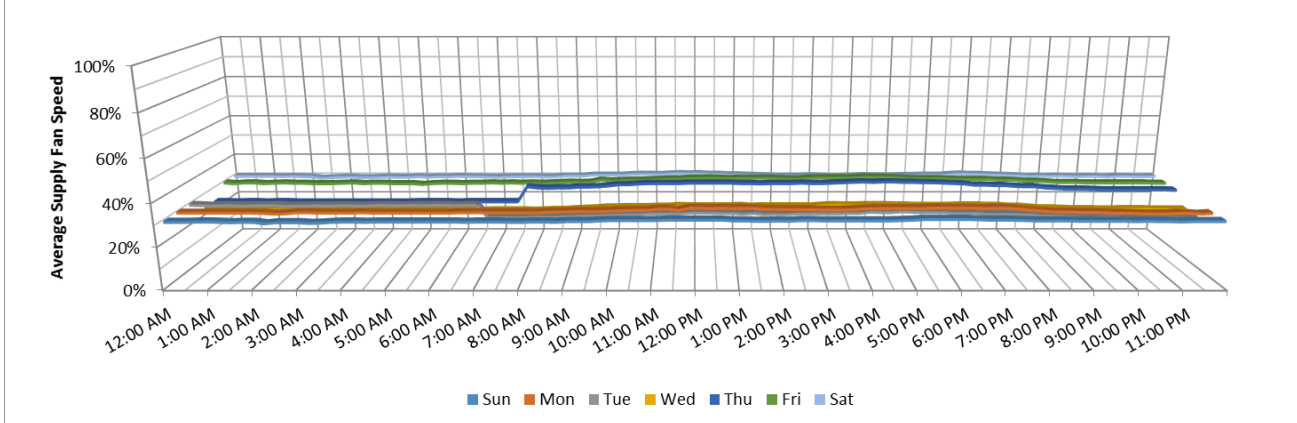
Fault detection analytics found that the system was over-working because of one 24/7 occupied control room. Due to the findings, the client is in process of installing a dedicated a/c unit for that room.

Finding and correcting this issue is projected to save this company **~254,000 kWh/year** while also extending the equipment life for all AHU fans, compressors, and reducing maintenance needs.

TOD | HVAC | FRIDAY, JUNE 1st, 2018 - MONDAY, JUNE 25th, 2018

Schedule Day	2:00	4:00	6AM	8:00	10:00	12PM	2:00	4:00	6PM	8:00	10:00
SUNDAY	12:00 AM Occupied										
MONDAY	12:00 AM Occupied										
TUESDAY	12:00 AM Occupied										
WEDNESDAY	12:00 AM Occupied		4:05 AM Occupied								
THURSDAY	12:00 AM Occupied										
FRIDAY	12:00 AM Occupied										
SATURDAY	12:00 AM Occupied										

Average VAV Supply Fan Speed by Day (RTU-4)



Office Building (Centennial, CO)

Optimizing VAV system and schedules

Fault detection analytics found Air Handler Fans had been overridden and running during unoccupied times. A Trane technician is correcting this issue, which is projected to save this company **~200,360 kWh/year** while also extending the equipment life for all AHU fans, compressors, and reducing

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maintenance needs.

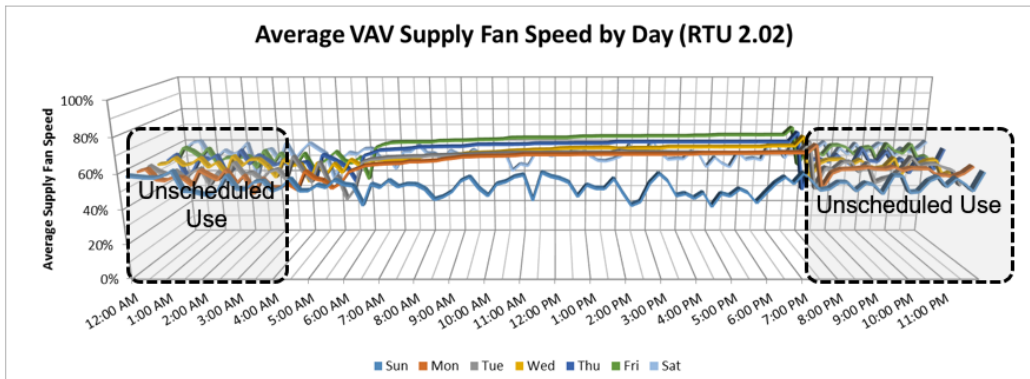
TOD | HVAC | THURSDAY, APRIL 12th, 2018 - WEDNESDAY, JULY 11th, 2018

Schedule Day	2:00	4:00	6AM	8:00	10:00	12PM	2:00	4:00	6PM	8:00	10:00
SUNDAY	12:00 AM Unscheduled										
MONDAY	12:00 AM Unscheduled	4:00 AM Scheduled Start	6:00 AM Scheduled						1:00 PM Unscheduled		
TUESDAY	12:00 AM Unscheduled	4:00 AM Scheduled Start	6:00 AM Scheduled						1:00 PM Unscheduled		
WEDNESDAY	12:00 AM Unscheduled	4:00 AM Scheduled Start	6:00 AM Scheduled						1:00 PM Unscheduled		
THURSDAY	12:00 AM Unscheduled	4:00 AM Scheduled Start	6:00 AM Scheduled						1:00 PM Unscheduled		
FRIDAY	12:00 AM Unscheduled	4:00 AM Scheduled Start	6:00 AM Scheduled						1:00 PM Unscheduled		
SATURDAY	12:00 AM Unscheduled										

Significant Unscheduled Air Handler Fan Use

Average Hourly Air Handler Fan Usage:
This chart shows the average hourly fan usage for each day shown over the assessment period. Highlighted below are times when significant unscheduled use was shown.

- Typical of Units:
 - RTU 2.01
 - RTU 2.02



Medical Office Building

Optimizing VAV system – **Many "Fault Detection" findings require \$0, just simple programming**

Status	ECM (Energy Conservation Measure)	Annual Estimated Energy Consumption Avoidance	Estimated Project Cost	Simple Payback (Years)
In Process	Change AHU-6 Schedule From 24/7 To 12/5 And Reduce VFD Speed To Design Levels	~420,500 kWh	\$35,000	2-5
In Process	20% Reduction In Hot Water Pump Speed Assuming Only One Pump Operating At A Time For (6) Months	70,000 kWh	\$0	Immediate
In Process	20% Reduction In Chilled Water Pump Speed Assuming Only One Pump Operating At A Time For (6) Months	90,000 kWh	\$0	Immediate