DECEMBER 9, 2021

Save on Energy Workshop: How To Get The Most Value From Your Building Energy Data

Presented by the IESO





Today's Presenters

Rob Edwards: Business Advisor, IESO

Stephen Dixon: President, KnowEnergy

Jess Burgess: Consultant, Canadian Institute for Energy Training-Econoler



Agenda

- Introduction
- Types of Energy Data
- Accessing Your Energy Interval Data
- Energy Benchmarking with ENERGY STAR[®] Portfolio Manager
- Energy Data Analysis Tools and Approaches
- Participant Q&A
- What's Next?



About the IESO



Reliably operate Ontario's Province-wide system 24/7



Plan for Ontario's future energy needs



Enable competition and create efficient electricity markets





Enable province-wide energy efficiency



Smart Metering Entity





Purposefully engage to enable informed decisions



Support innovation



2021-2024 CDM Framework

- \$692M, four-year CDM Framework launched in January 2021
- Centrally delivered by the IESO under the Save on Energy brand
- Programs target commercial, institutional and industrial customers with opportunities for residential electricity consumers
- Renewed programming for income-eligible electricity consumers and on-reserve First Nation communities







Save on Energy Programs

- Ontario businesses, large and small, have access to incentives for retrofits and other energy-efficiency projects to lower energy costs
 - Retrofit Program
 - Small Business Program
 - Energy Manager Program
 - Training and Support
 - Energy Performance Program
 - Existing Building Commissioning Program (targeting spring 2022)





Energy Performance Program

- Holistic approach to energy savings:
 operational + behaviour + capital
- Savings determined by comparing annual metered consumption to the baseline energy model
- Incentive of \$0.04/kWh paid each year for three years + \$50/kW adder for summer peak demand savings (June to August, weekdays)
- Facilities need to save at least 5 percent energy savings within first 2 years







Existing Building Commissioning Program Update

In 2022, the IESO will launch a program to help building owners hire a commissioning agent to tune up their buildings

- A building tune-up can find savings and improve occupant comfort by reprogramming and repairing energy-using systems
- All buildings "drift" away from how they should work, and some were not set up properly in the first place, so a building tune-up can help
- Minor replacement of some equipment would be allowed, but incentives for most capital projects would be accessed through other Save on Energy programs ineligible in this program



Energy Water Reporting and Benchmarking

- The Province of Ontario's Energy & Water Reporting and Benchmarking (EWRB) regulation is designed to help building owners and managers improve the energy and water efficiency of their buildings
- Large building owners need to report their building's energy and water use once a year to the Ministry of Energy starting:
 - July 1, 2019 for buildings 100,000 square feet and larger
 - July 1, 2023 for buildings 50,000 square feet and larger
- Building information and usage data are reported online through ENERGY STAR Portfolio Manager



Energy Water Reporting and Benchmarking (cont'd)

- The EWRB initiative can help you:
 - save money on utility bills by tracking usage
 - compare your energy and water usage to similar buildings
 - identify energy and water efficiency opportunities
- It will give owners, managers and customers access to market data that can help them make smarter investments
- In the future, building performance data will be published on <u>Ontario's</u> <u>Data Catalogue</u> so you can compare your building's energy and water usage to other similar buildings



Green Button

- Green Button is a data standard that provides residential and business energy customers with more choice in how they access their electricity or natural gas usage data
- Green Button applications can analyze this data to provide customers with personalized ways to increase energy efficiency. This will help customers:
 - save money on their monthly bills
 - reduce demand on the energy system
 - To be implemented by all LDCs in Ontario by November 2023



Green Button: How Does It Work?

- Green Button is designed to integrate with existing usage data
 - Format: XML
 - Type of data: electricity consumption data (also applicable to gas and water)
 - Source: smart meters, interval meters and other meter databases
 - Timeliness: data available via 24-hour time lag
- Green Button doesn't replace any existing tools; it is a "pipe" that allows data to flow from utilities to customers and solution providers
- Solution providers and reporting databases can build a Green Button "connector" to make their platforms compatible



Source: MaRS







Connecting Today. Powering Tomorrow.

Who Has A Role?

Internal

- Operations/maintenance technician
- Operations/maintenance manager
- ESG/sustainability/energy manager
- Superintendent
- Director of operations

External

- Energy services provider
- Controls provider
- Energy consultant







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Energy Analysis Basics: What Is A Demand Profile?





Energy Analysis Basics: What Is A CUSUM*?

*CUSUM= cumulative sum control chart





Types of Energy Data



Energy Data Types and Formats

Monthly Bill

Electricity Retail Contract Monthly Bill Statement	
,	
Account Number:	
Meter Number:	
Your Electricity Charges	
Electricity	
YOU ARE BUYING YOUR ELECTRICITY FROM [ENERGY RETAILER NAME] *	
Global Adjustment	0.00
700 kWh @ Your Contract Price	0.00
Delivery	0.00
Regulatory Charges	0.00
Your Total Electricity Charges	0.00
H.S.T.	0.00
Ontario Electricity Rebate	(0.00)
Total Amount	\$0.00
* Energy rataliar phone # 1-888-000-0000 Energy rataliar websites was	w 11111 com

LDC Data Analytics Platform



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Database

line II	KW 11	kWAr II	IVA II	PF II	
00:05	40.30	34.60	53.10	0.759	
00:10	40.30	37.40	55.00	0.733	
00:15	46.10	43.20	63.20	0.730	
00:20	51.80	46.10	69.40	0.747	
00:25	40.30	34.60	53.10	0.759	
00:30	54.70	54.70 51.80		0.726	
00:35	51.80	43.20	67.50	0.768	
00:40	37.40	37.40	52.90	0.707	
00:45	54.70	49.00	73.40	0.745	
00:50	57.60	49.00	75.60	0.762	

Green Button







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Energy Data Types and Formats

Database

Time 41	KW 11	EWAr 11	WA 11	PF II
00:05	40.30	34.60	53.10	0.759
00:10	40.30	37.40	55.00	0.733
00:15	46.10	43.20	63.20	0.730
00:20	51.80	46.10	69.40	0.747
00:25	40.30	34.60	53.10	0.759
00:30	54.70	51.80	75.40	0.726
00:35	51.80	43.20	67.50	0.768
00:40	37.40	37,40	52.90	0.707
00:45	54.70	49.00	73.40	0.745
00.50	57.60	49.00	75.60	0.762











Accessing Your Energy Interval Data



Hands-on Demo: Accessing Your Energy Data

- 1. LDC data visualization platform
- 2. RETScreen

Thank you to Christina Guido and the Town of Caledon for access to their energy data for this demonstration!





Benchmarking in ENERGY STAR Portfolio Manager



Benchmarking in ENERGY STAR Portfolio Manager

- Free benchmarking tool from ENERGY STAR and Natural Resources Canada
- Anonymously compare performance to similar buildings
- Receive a 1-100 performance score
- Recognition opportunities
- Primary tool for EWRB reporting





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Hands-on Demonstration: Benchmarking

ENERGY STAR Portfolio Mar	nager: × +								-			×
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MyPortfolio	Sharing	Reporting	Recognition									
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-			M&S Building 9768734	10/31/2019	66	0.76	1.05					
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Case Study: Finding Savings With Benchmarking

Overall intensity: 47.5 kWh/ft²

BOMA Best average: 27.4 kWh/ft²

REALpac average: 29.5 kWh/ft²

Demand intensity

Typical peak demand intensity: 4-10 watts/ft²

This building demands 380 kw/57,000 ft² = 6.7 watts/ft²

Electrical energy intensity

Typical energy intensity for an office building: 14-26 kWh/ft²

This building used 1,743,120 kWh = 30.6 kWh/ft^2

Natural gas intensity

Typical intensity: 41k-82k BTU/ft²

This building's intensity: 57,665 BTU/ft²



Overall energy intensity above comparable benchmarks. Can we find the reason?

Demand intensity is in range

Electrical intensity **not in range**

Natural gas intensity is in range

Solution: Small HVAC system to serve the 24/7 operations center outside of 8 a.m. to 5 p.m.

Savings: \$84,000 per year





Hands on Demonstration: Energy Data Analysis



Interval Data Time Series Analysis in RETScreen Expert



Powering Tomorrow.

POWER WHAT'S NEXT

Detailed Profile Analysis Using 5-Minute Demand (kW) and Power Factor (PF) Data





Case Study: Valuable Data for Industry

- LDC customer concerned with bill increase
- 2+ years of electricity data analyzed
- Weather and production as drivers
- Beginning of "increase" traced back with CUSUM to a specific week
- Operational change identified as cause
 - Not due to weather
 - Increase in waste due to idle equipment
 - Avoidable with new operational procedure
 - ~ 40,000 kWh per week (>\$4,000/week)





Case Study: Simple is Actionable!



Targets (Predicted kWh)



Case Study: Office Schedule Optimization



Cooling Demand After

Cost impact: \$24k if undetected over the summer





Case Study: Data Inform Operating Procedures

Actual (190 kW) > Predicted (170 kW) when production is stopped

Standard operating procedure to ensure fan is shut down properly

Powering Tomorrow



Energy Information Comprehensive Reference

Introduction

ENERGY INFORMATION HANDBOOK

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Applications for Energy-Efficient Building Operations The Advanced Methods rely on sophisticated underlying analyses, but interpreting their output does not tend to require deep expertise, because much of the analysis is automated. In contrast, the Chardmannent Methods may require most user expertise, to be able to translate graphs and data trends into an understanding of performance.

Analysis Methods	Requires Minimal Expertise	Requires Advanced Expertise		
Simple Tracking				
Utility Cost Accounting				
Internal Rate of Return				
Carbon Accounting				
Longitudinal Benchmarking				
Cross-Sectional Benchmarking				
Loading Profiling				
Peak Load Analysis				
PV Monitoring				
Loading Histograms				
Simple Baselines				
Model Baselines				
Lighting Efficiency				
Heating and Cooling Efficiency				
Energy Signature				
Energy Savings				
Cumulative Sum				
Anomaly Detection				



Source: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/energy-information-handbook.pdf



In the Loop

 Energy performance data are visible to all staff in a form they can understand and act upon





Performance Analysis with CUSUM



- Get a tracking tool:
 - MT&R Spreadsheet (free)
 - RETScreen Expert
- Start with your monthly bills







Energy Data Reporting and Analysis Pathways



Participant Q&A

Please submit your questions using the Chat





Customized coaching workshops:

- Develop your building energy baseline
- Identify anomalies and potential savings opportunities
- Performance monitoring and energy management
- Prepare data collection analysis protocols to support...
 - EWRB reporting
 - Energy Performance Program participation

Details and application information to follow in early 2022





Thank you

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