DECEMBER 9, 2021

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

Presented by the IESO

ieso
Connecting Today.
Powering Tomorrow.

SAVE ON ENERGY
POWER WHAT'S NEXT

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

Purposefully engage to enable informed decisions

Support innovation

Cybersecurity leadership

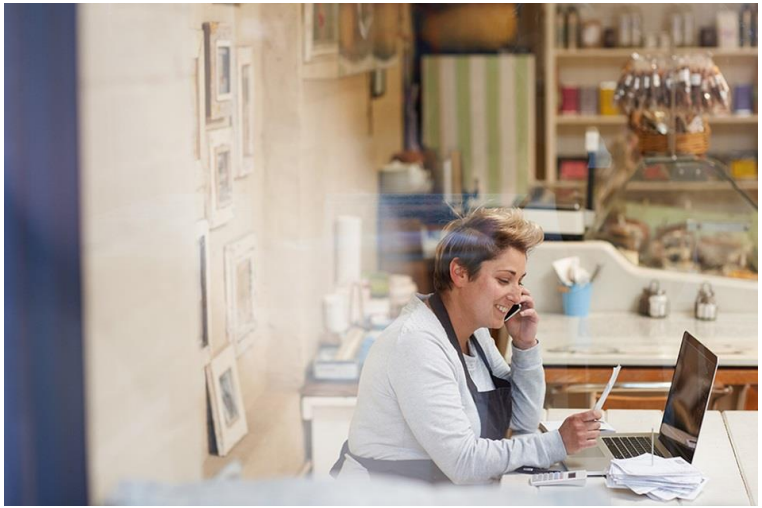
Smart Metering Entity

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 Ontario's Data Catalogue 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

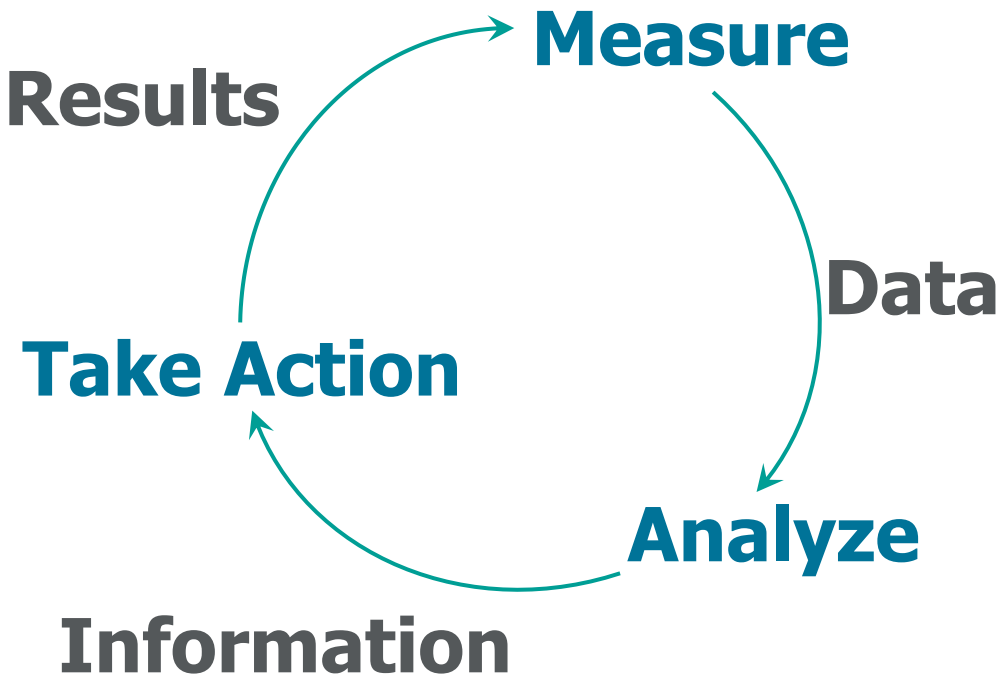
Green Button: How Does It Work?

- 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

The Energy Action Cycle



Who Has A Role?

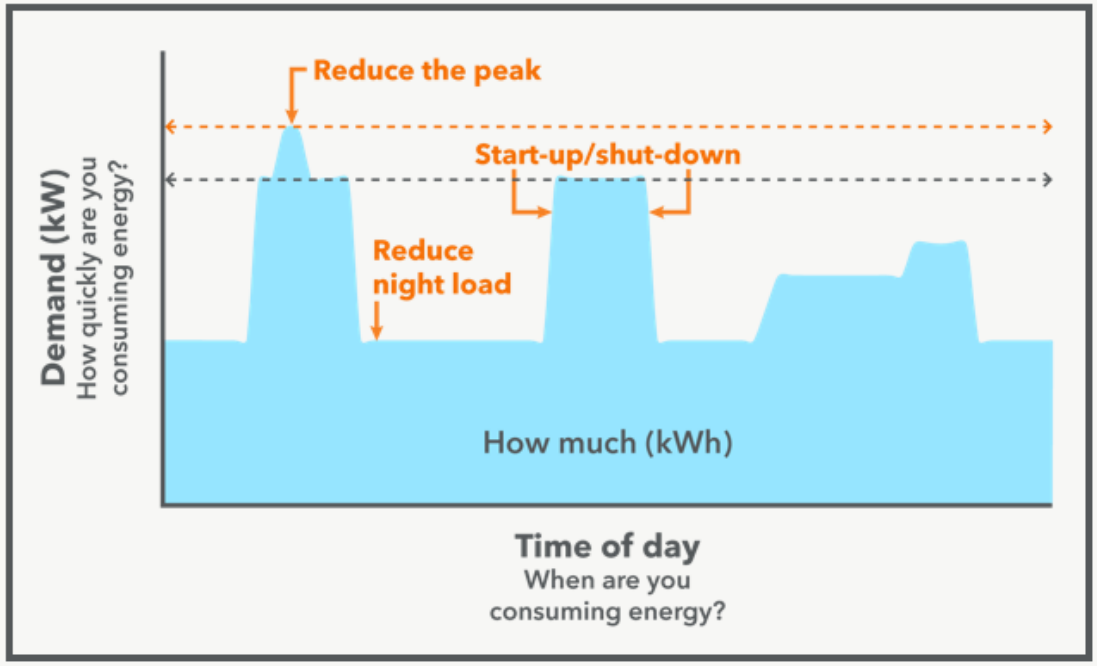
Internal

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

External

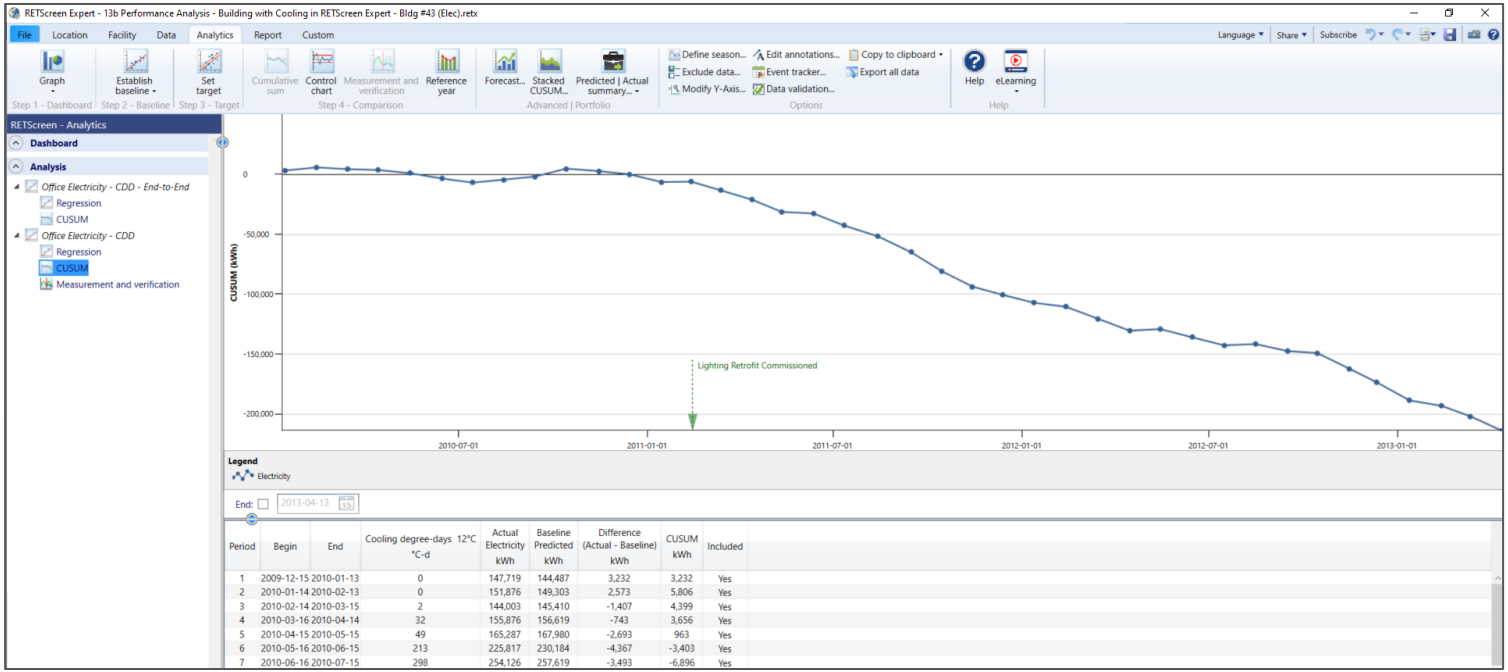
- Energy services provider
- Controls provider
- Energy consultant

Energy Analysis Basics: What Is A Demand Profile?



Energy Analysis Basics: What Is A CUSUM*?

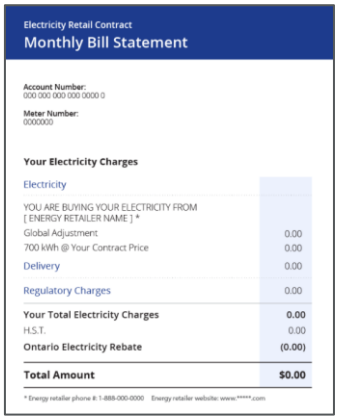
***CUSUM= cumulative sum control chart**



Types of Energy Data

Energy Data Types and Formats

Monthly Bill



Electricity Retail Contract

Monthly Bill Statement

Account Number:
000 000 000 000 0000 0

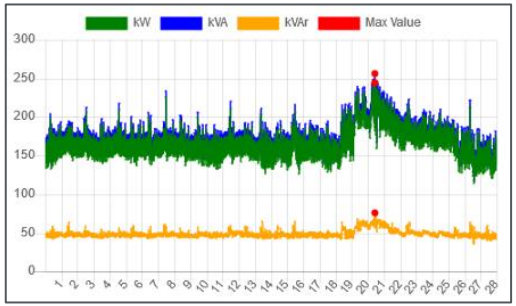
Meter Number:
0000000

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**

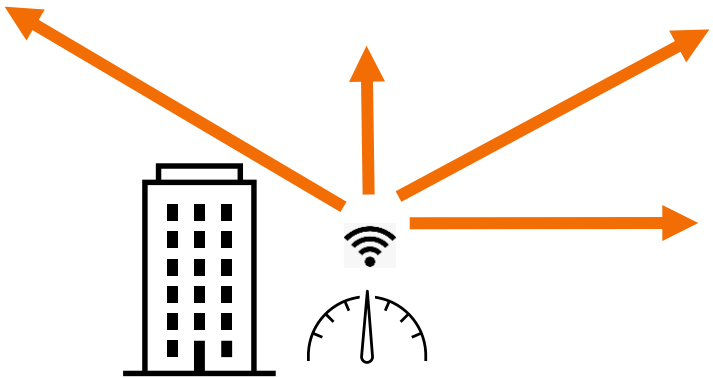
* Energy retailer phone #: 1-888-000-0000 Energy retailer website: www.*****.com

LDC Data Analytics Platform

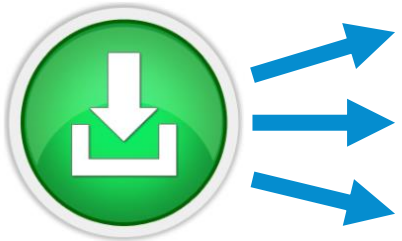


Database

Time	kW	kVAr	kVA	PF
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



Green Button



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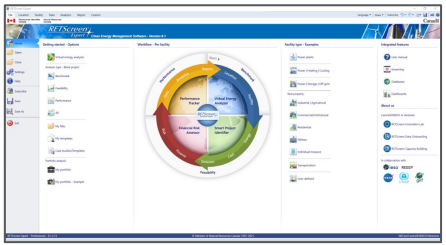
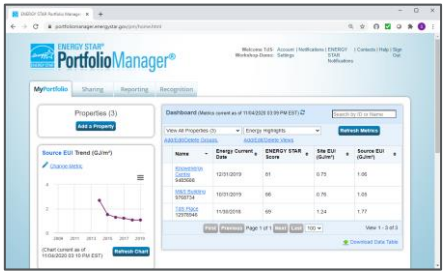
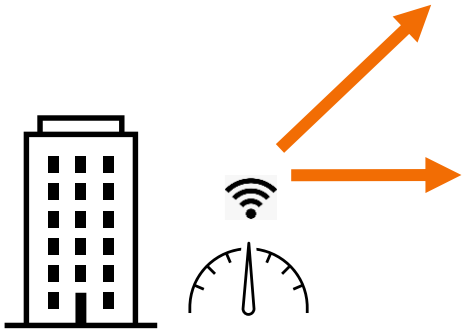




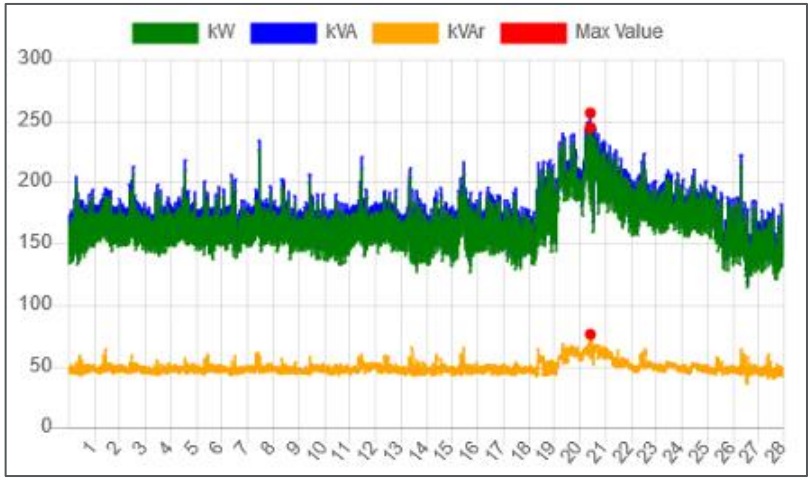


Green Button

Accessing Your Energy Interval Data

Hands-on Demo: Accessing Your Energy Data

1. LDC data visualization platform
2. RETScreen

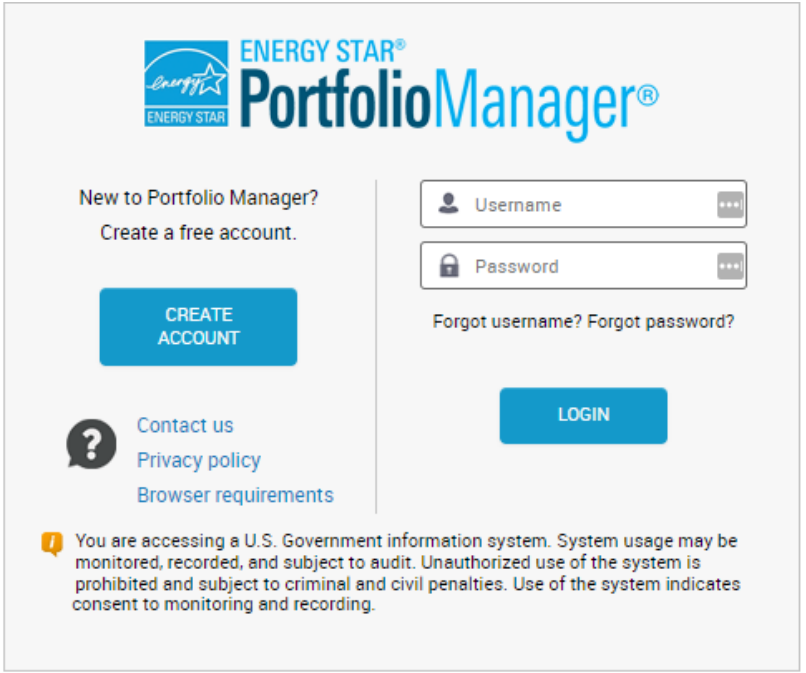


Thank you to Christina Guido and the Town of Caledon for access to their energy data for this demonstration!

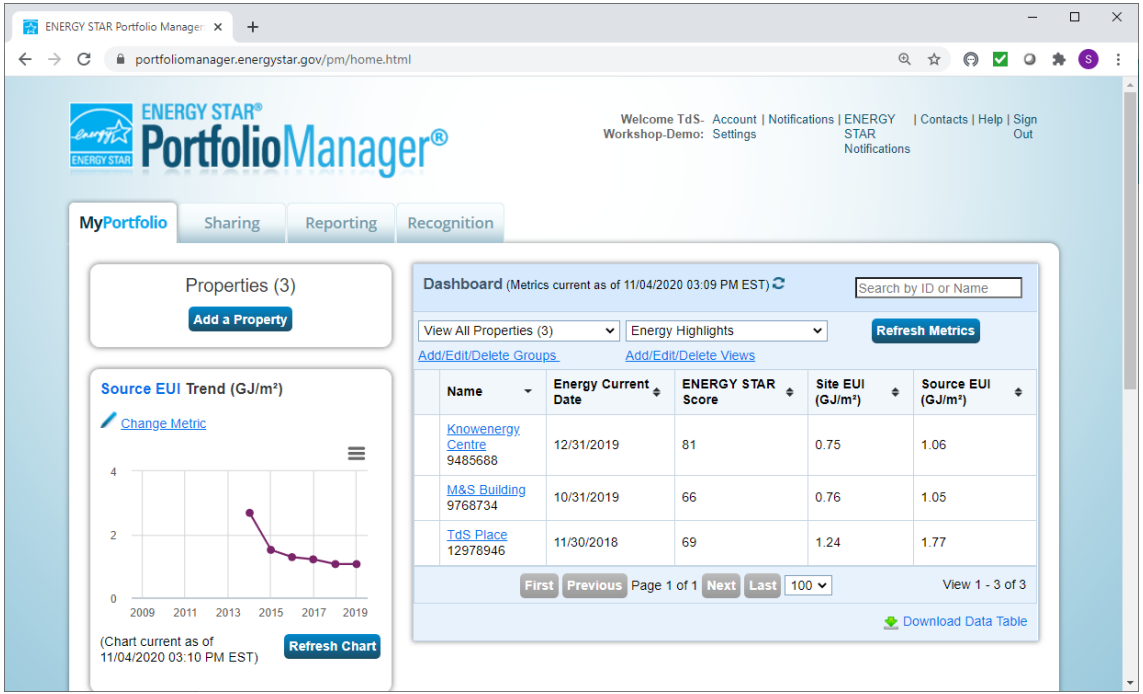
Benchmarking in ENERGY STAR Portfolio Manager

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



Hands-on Demonstration: Benchmarking



Case Study: Finding Savings With Benchmarking

Overall intensity: 47.5 kWh/ft^2

- BOMA Best average: 27.4 kWh/ft^2
- REALpac average: 29.5 kWh/ft^2

Demand intensity

- Typical peak demand intensity: 4-10 watts/ft^2
- This building demands 380 kw/57,000 ft^2 = 6.7 watts/ft^2

Electrical energy intensity

- Typical energy intensity for an office building: 14-26 kWh/ft^2
- This building used 1,743,120 kWh = 30.6 kWh/ft^2

Natural gas intensity

- Typical intensity: 41k-82k BTU/ft^2
- This building's intensity: 57,665 BTU/ft^2

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

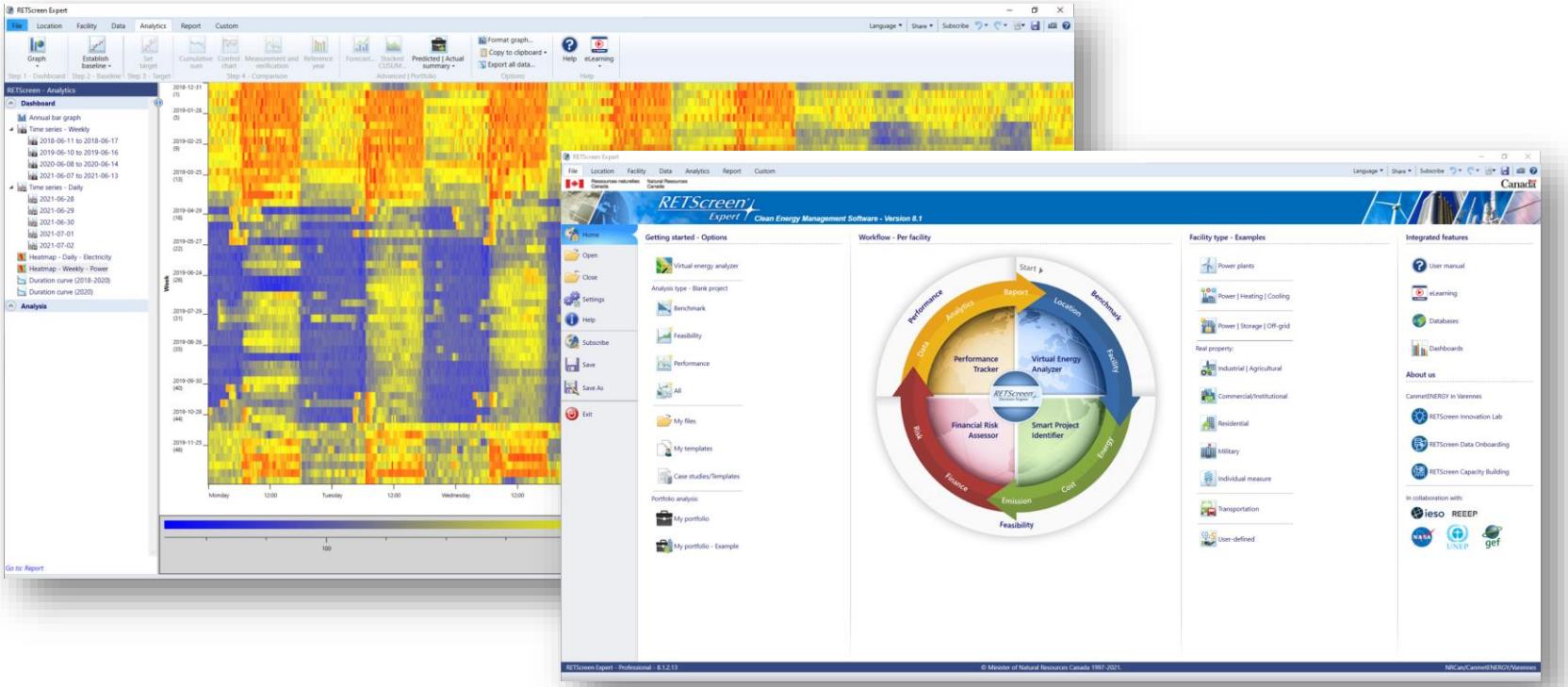
- Demand intensity is in range
- Electrical intensity **not in range**
- Natural gas intensity is in range

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

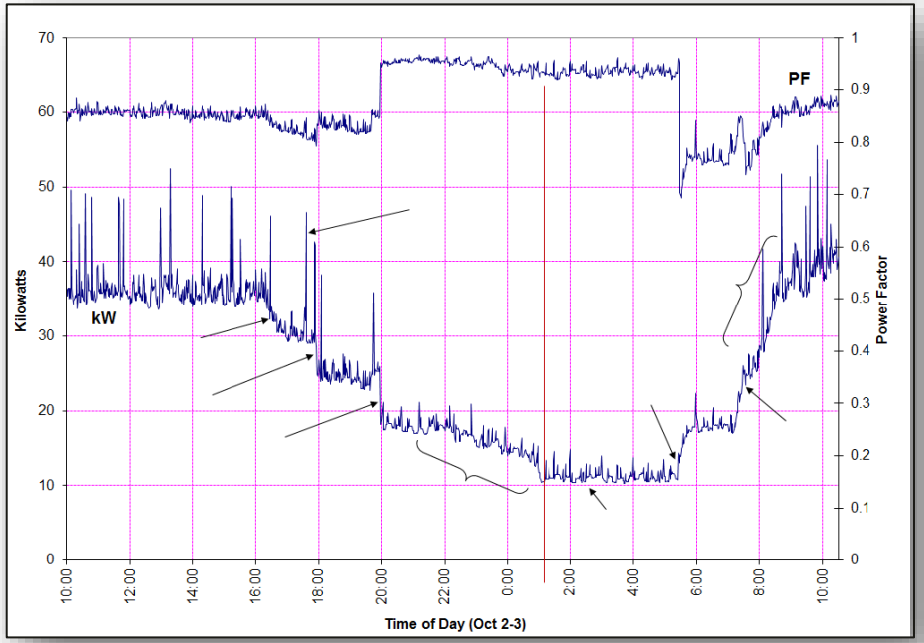
Interval Data Time Series Analysis in RETScreen Expert



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

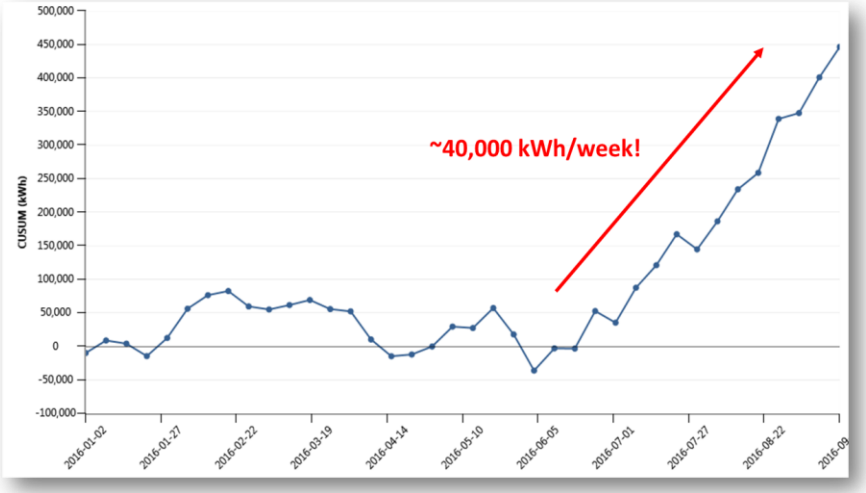
Using kW & PF Information

- + kW - PF
  - Motor load on
- + kW + PF
  - Lighting load on
- - kW - PF
  - Lighting load off
- - kW + PF
  - Motor load off

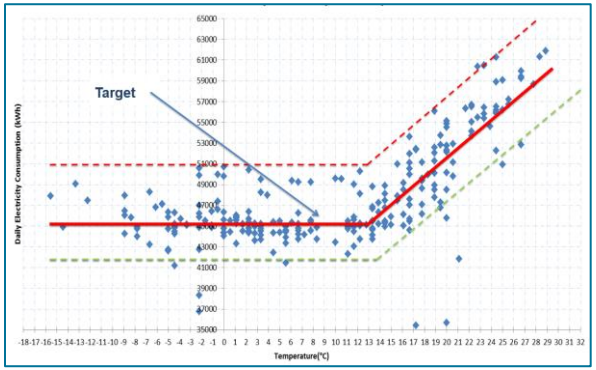


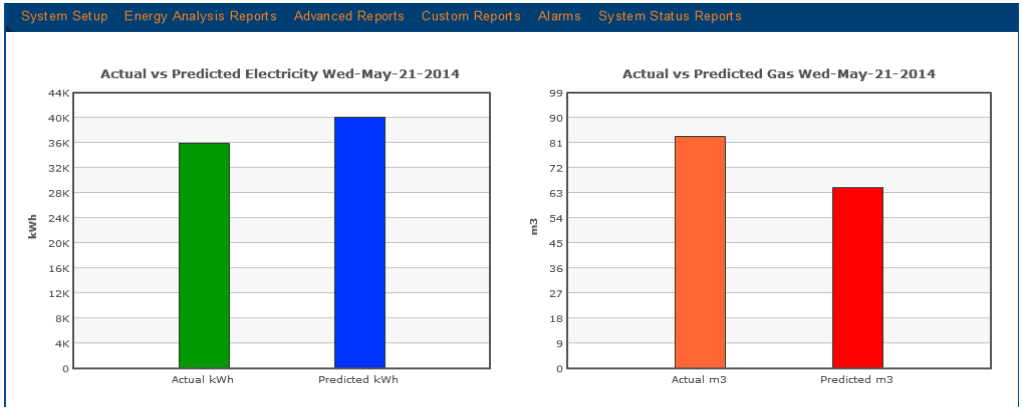
Case Study: Valuable Data for Industry

- 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!

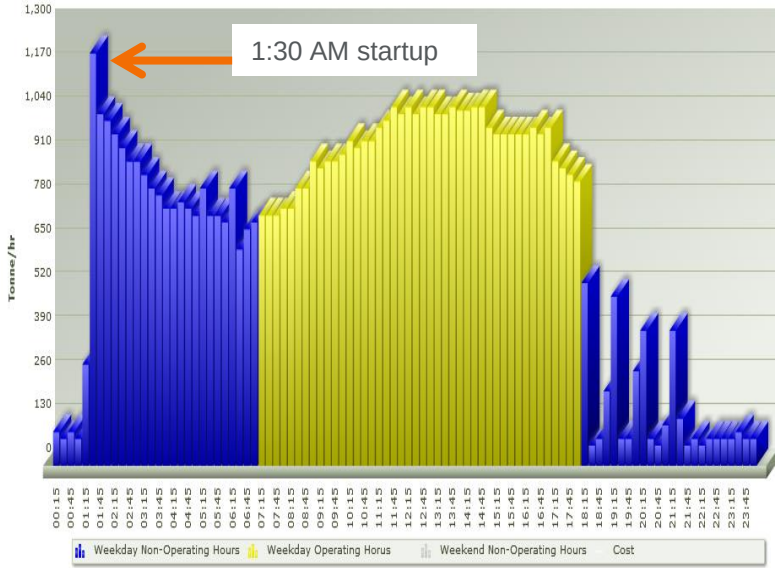




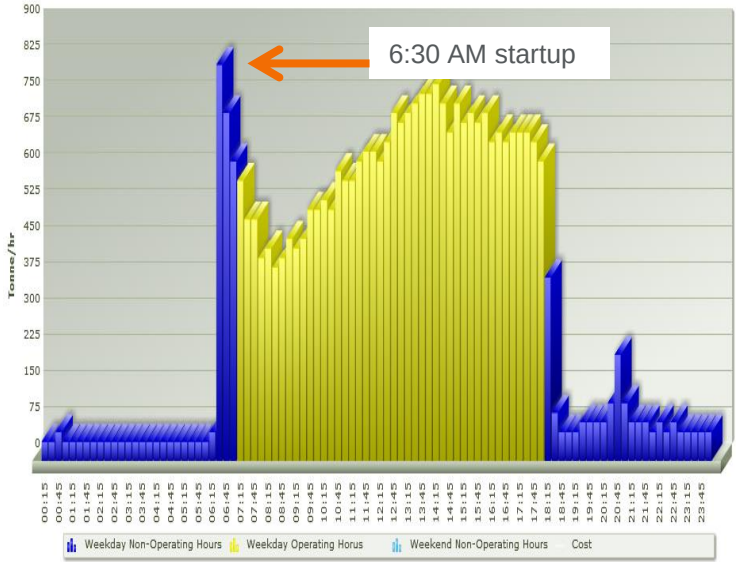
Targets (Predicted kWh)

Case Study: Office Schedule Optimization

Cooling Demand Before



Cooling Demand After

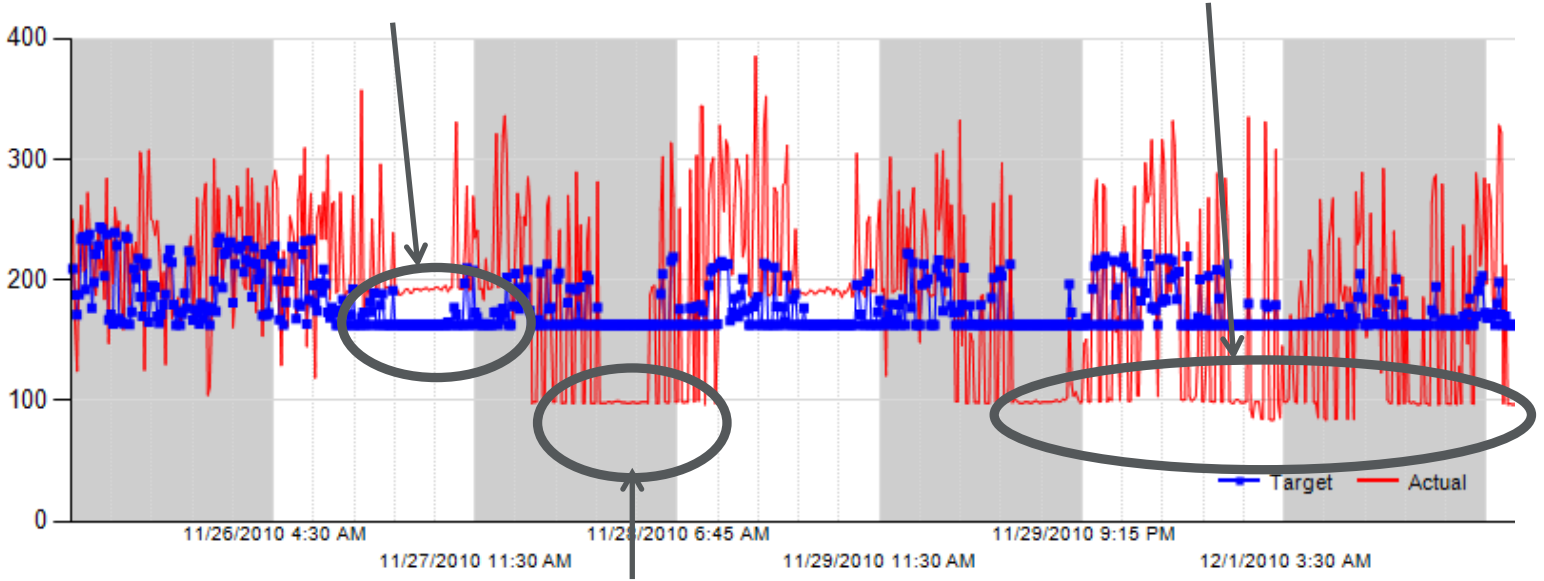


Cost impact: $24k if undetected over the summer

Case Study: Data Inform Operating Procedures

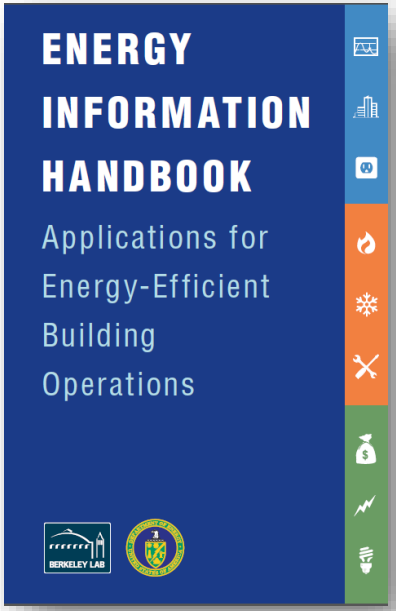
Actual (190 kW) > Predicted (170 kW) when production is stopped

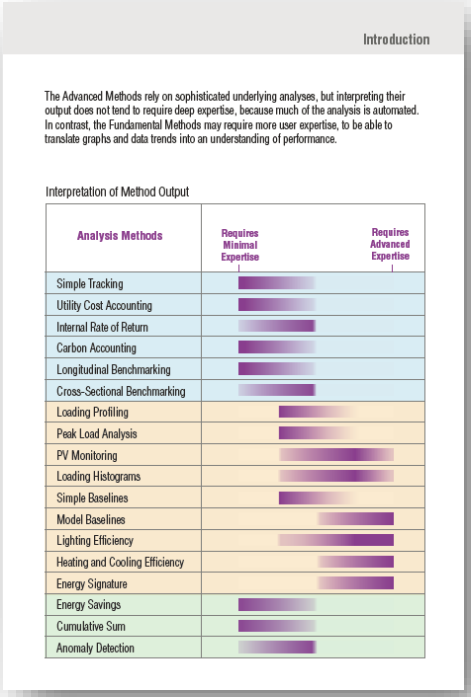
Standard operating procedure to ensure fan is shut down properly

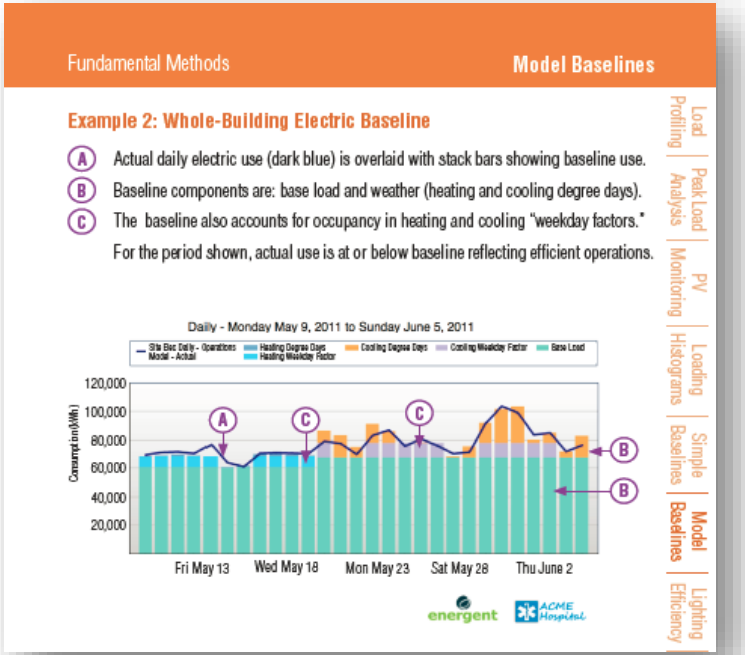


Actual (100 kW) < Predicted (170 kW) another time production is stopped

Energy Information Comprehensive Reference



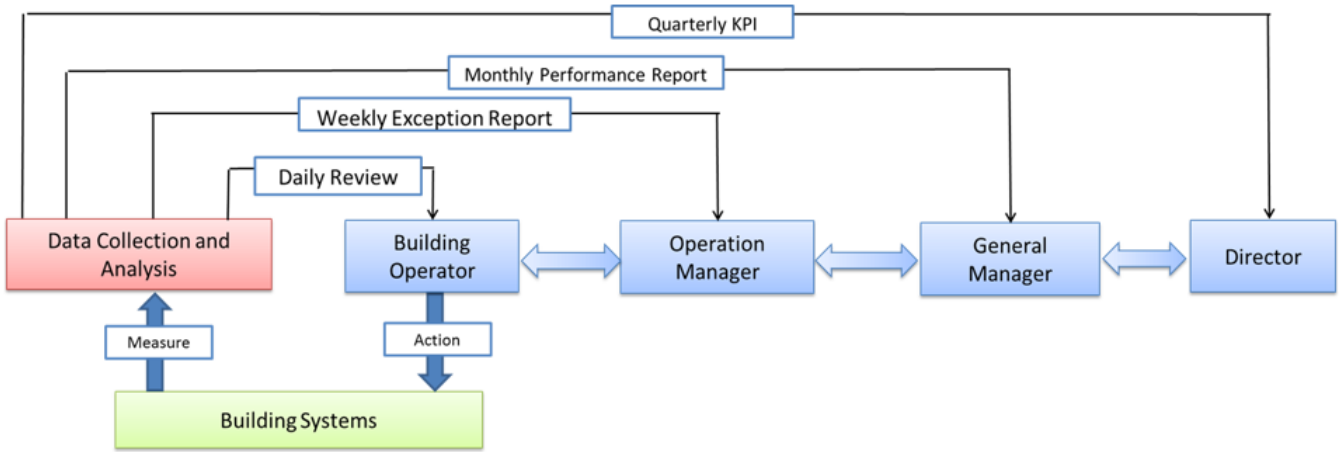




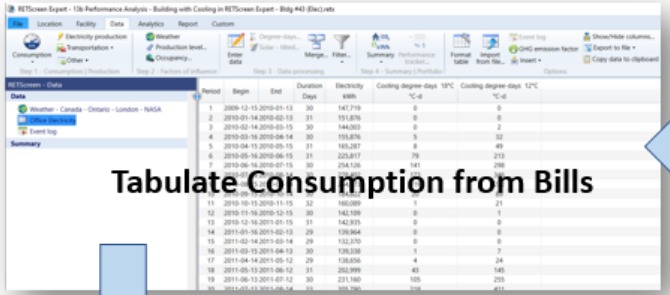
Source: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/energy-information-handbook.pdf

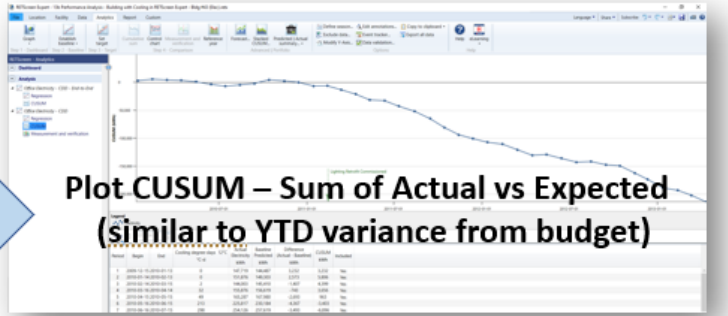
In the Loop

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



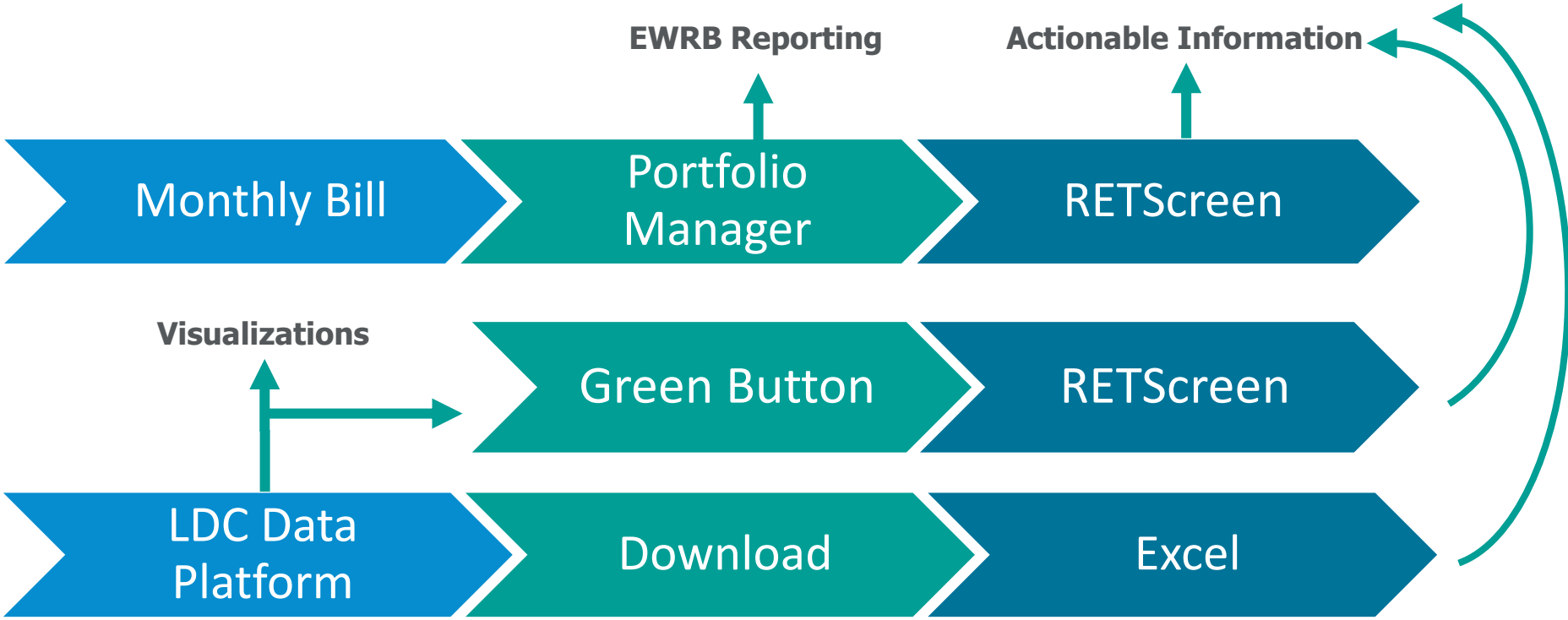
Performance Analysis with CUSUM





- 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

What's Next?

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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