While waiting for the workshop to start…

Get ready to participate!

- Turn on your camera
- Find the unmute button and say "Hi" to check your audio

- Find the "raise hand" button

Answer our opening question!

What is energy to you?

Answer in chat or raise hand and unmute

AUGUST 19TH, 2025

Energy fundamentals: developing a facility energy model baseline

Adam Dixon
Knowenergy

ENERGY MANAGEMENT EXCELLENCE AWARDS

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- ❑ Features real-world stories from Ontario's energy management community
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SAVE ON ENERGY POWER WHAT'S NEXT

By the end of this workshop, you will be able to:

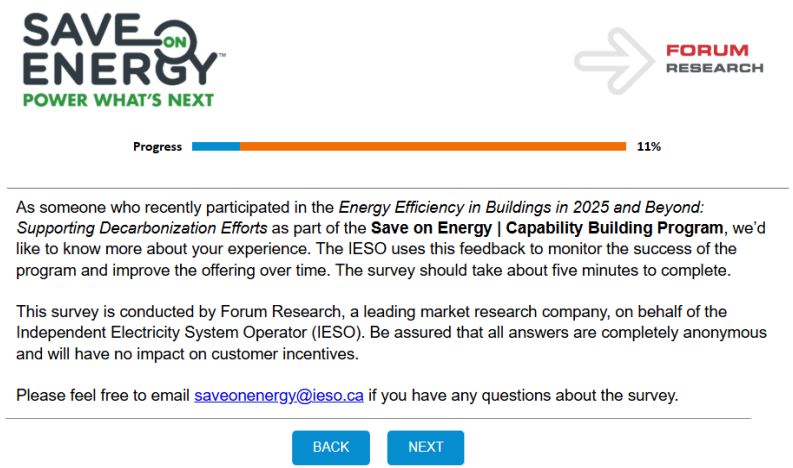
- Understand the purpose of an energy model baseline.
- Identify the types of data needed to create a baseline.
- Learn key variables that influence energy use.
- Explore common methods for developing baselines (e.g., regression).
- Discover tools and templates to support baseline development.

Welcoming our guest speaker

Adam Dixon, *Knowenergy*

Knowing energy since 2013, he brings a new and fresh approach to energy management, specializing in energy performance analysis and residential sector services. He also works behind the scenes as an energy analyst in support of energy audits while also providing support to the development of TdS Dixon's well known energy training services.

Upcoming survey: We want your feedback!



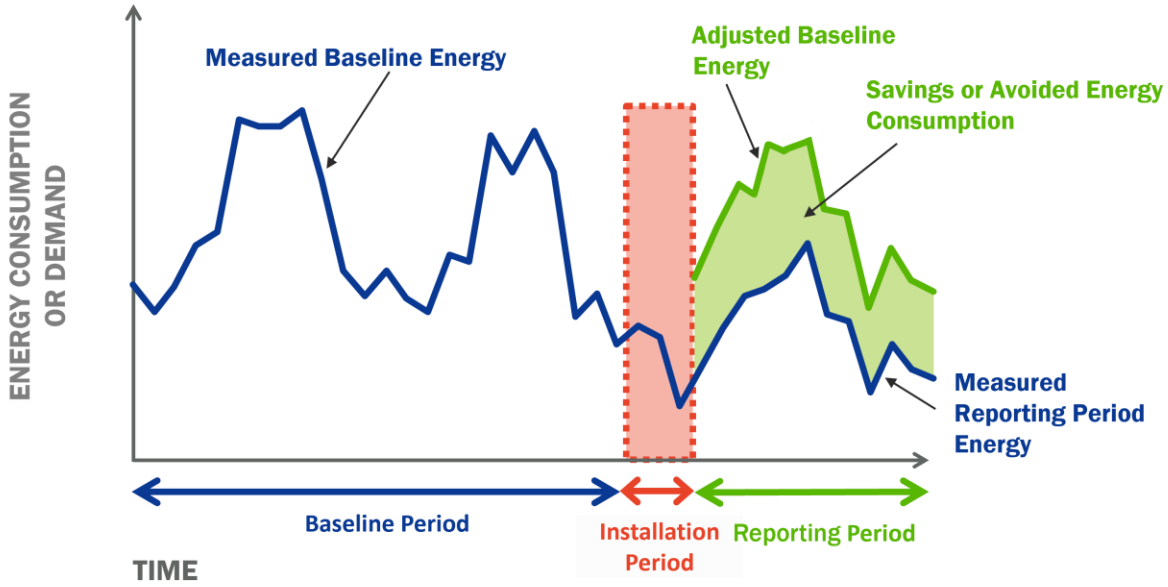
- Check your email! A survey is coming your way soon.
- Why? Help us improve our training programs.
- Who? Conducted by Forum Research on behalf of the IESO.
- Time? Takes only 5 minutes to complete.
- Confidentiality: Your responses are anonymous and won't impact participation or incentives.

The survey will be sent from:
surveyinfo@forumresearch.com

What is a baseline and why is it important

- Represent a state of operation within a facility that can be used as a reference period
- It is important in identifying, validating and quantifying savings from Energy projects
- Can also be used as a diagnostic to understand buildings better prior to retrofits
- Can and Should be changed as the building changes
  - Retrofitted building can become the new (norm) baseline

What is a baseline and why is it important… cont'd



Source: https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp

Finding a baseline step 1: collect data

- Historical Data – Utility, meter. Etc (Monthly is often the best!)
- Weather Data (Often the biggest driver of energy)
- Impact variables
  - Occupancy, production, new equipment, operators, expansion/closures, changes in use, efficiency projects
- Event Log!

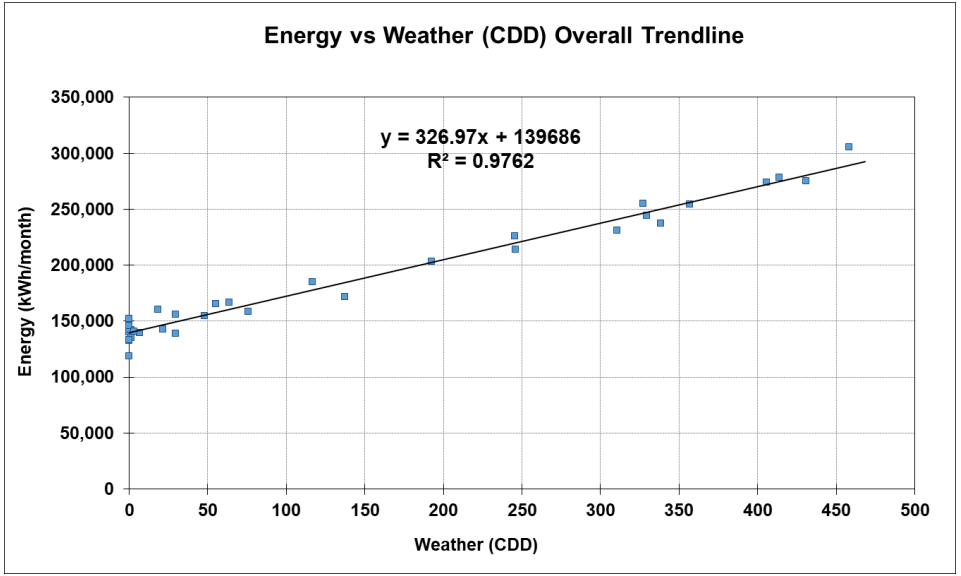
Step 2: Establish a relationship

How does energy use vary with weather (or some other driver)?

How does the relation between energy use and weather (or other driver) change over time?

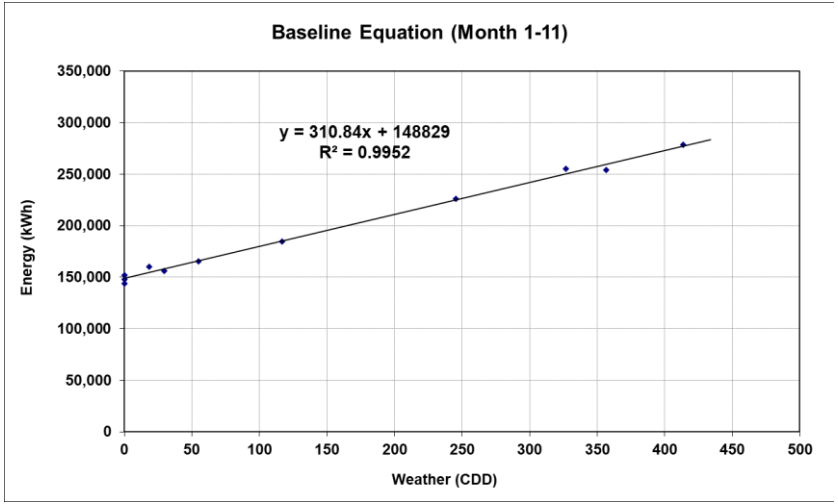
Step 2 cont'd: regression

- Statistical method used to examine the relationship between a dependent variable and one or more independent variables
- In the energy world, Electricity (or other utilities) are always the dependent variable



Step 2 cont'd: regression

- Baseline Length? One cycle of the MAX and MIN of the independent variables
  - Weather as independent Variable = 1 year baseline
- Otherwise, you may be extrapolating (i.e. HVAC capacity is reached at extreme cold or hot temps)
- Why Linear?
  - Easy Math
  - Heat loss relationship is Linear!

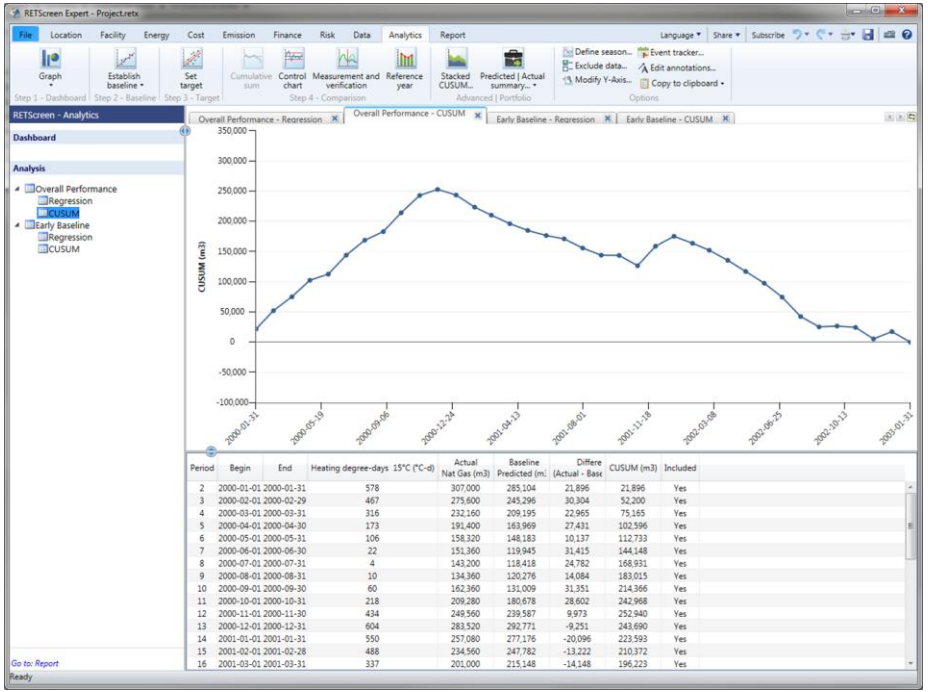


Step 3: Overall CUSUM to find a baseline

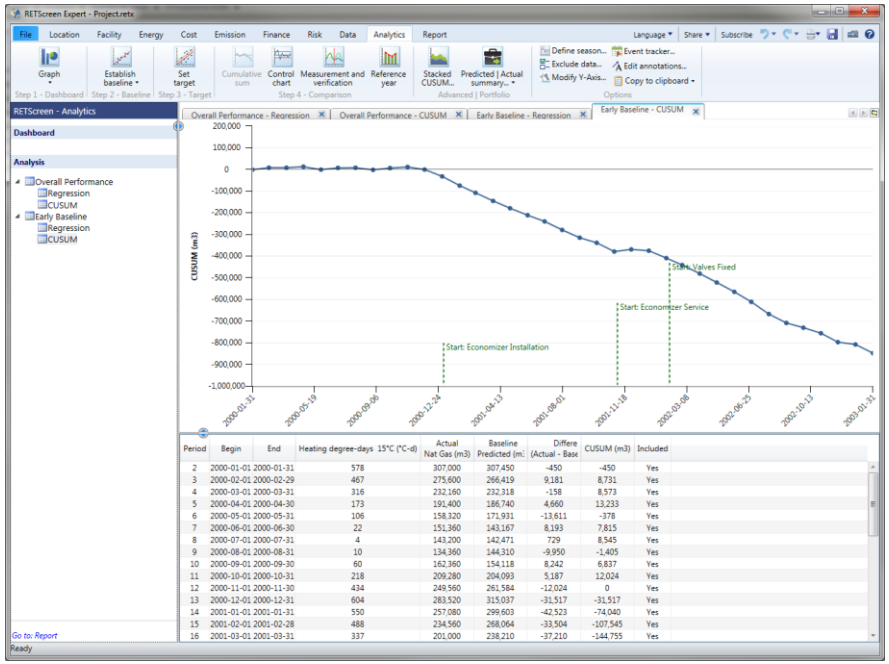
- What is a CUSUM?
- Think Golf?!
- The Cumulative Sum of the difference between actual consumption and expected (predicted/baseline)
  - Expected is what would have been consumed had action not been taken (no change)

Step 3: overall CUSUM to find a baseline

- Using RETScreen Expert
- A good candidate for a baseline on a CUSUM is a stable slope
- Up, down, or flat. Let the data talk to you
- Art vs Statistics! Fine line

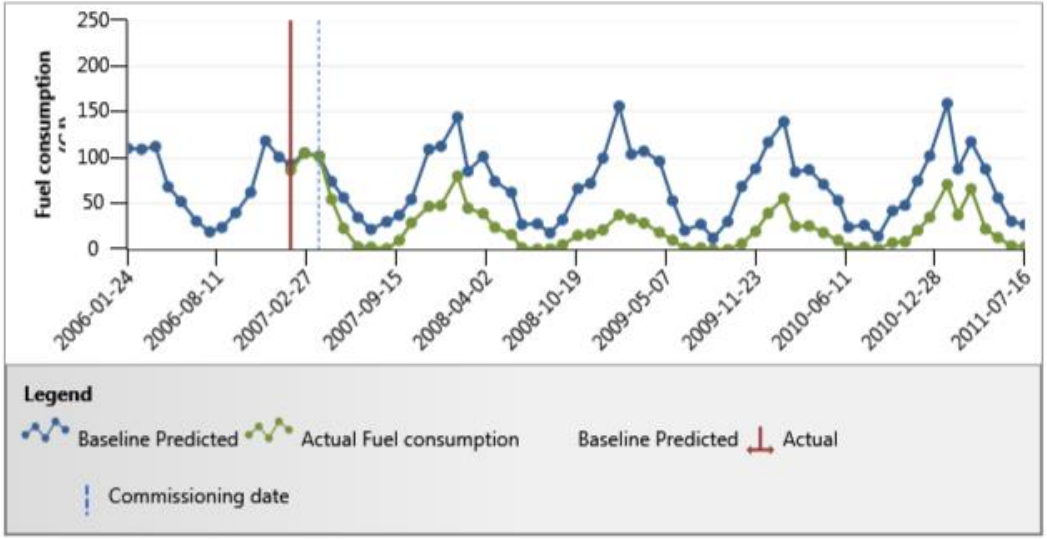


Step 4: Define baseline for reporting



- Don’t Stress about statistics
- Down = savings
- Up = increased usage
- Flat = baseline performance

Bonus step: measurement and verification



Net savings as of 2011-07-16: 2 448 (GJ)

Key takeaways:

- Establishing a baseline tells the energy story of the building without Bias
- Robust way of quantifying savings for things like incentives
- Allows for continual improvement

Remind: let the data tell the story, don’t manipulate it!

Stay connected with tools and resources

- Virtual one-on-one coaching: Post-webinar support intake form for tailored support for organizations to manage energy resources effectively
- Monthly bulletin: Sign up to receive monthly training updates on all Save on Energy training and support for new tools and resources
- Live training calendar: Visit this page to easily register for upcoming events and workshops
- Training and support webpage: Visit this page to access all training and support materials

Post-webinar support

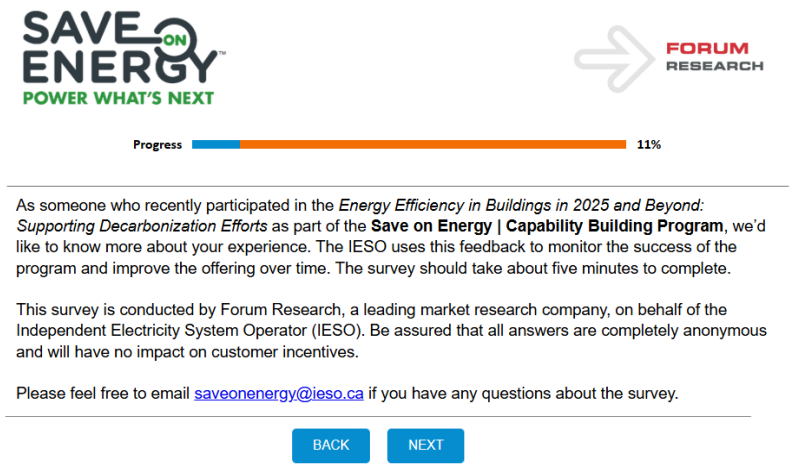
One-on-one coaching: Tailored support for managing energy resources effectively

Post-webinar support intake form

Coaching sessions conducted virtually: Phone, video calls, and email

Designed for organizations, new or old, seeking guidance

Upcoming survey: We want your feedback!



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Thank you!

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