



Calendarization & Normalization



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Agenda



Key Terms

Calendarization

1. What is Calendarization?
2. Why Calendarize?
3. The Calendarization Process

Demo

Normalization

1. What is Weather Normalization?
2. Why Normalize?
3. Normalization Limitations
4. The Normalization Process

Demo

Pop Quiz

Q&A

EnergyCAP—expert-driven energy management

Key Terms

- **Weather station** - assigned to site, determined by postal code or coordinates
- **Balance point temperature (BPT)** - temperature at which normal building use would require no energy for heating or cooling (default set to 55 deg F)
- **Degree days (HDD, CDD)** - calculated as difference between average daily temperature and BPT, used as an indicator of weather as it affects the heating and cooling energy required to maintain a comfortable building temperature
- **Weather regression** – statistical analysis of use vs. degree days, determines a meter's weather sensitivity using the prior year's weather data

Key Terms

Degree Day Examples

- **Example 1:** Average daily temperature = 25 deg F, BPT = 55 deg F
 - Heating degree days (HDD) = 30
- **Example 2:** Average daily temperature = 75 deg F, BPT = 55 deg F
 - Cooling degree days (CDD) = 20
- **Example 3:** Average daily temperature = 55 deg F, BPT = 55 deg F
 - No degree days

Calendarization

1. What is Calendarization?

- In EnergyCAP, each utility bill is assigned to a reporting month when entered, called the Billing Period
- Calendarization moves bill cost and use into the Calendar Period when the use actually occurred by prorating across the days of the Billing Period

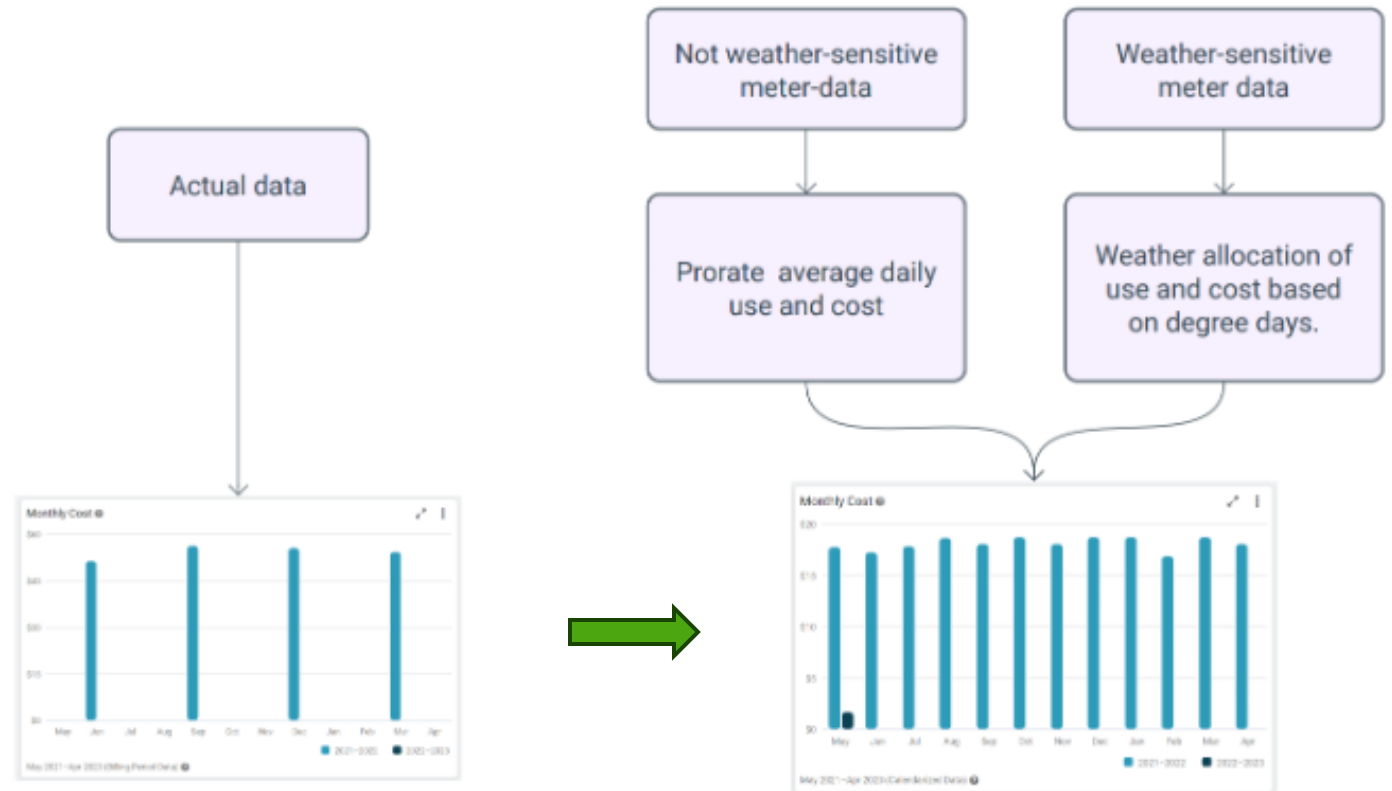
2. Why Calendarize?

- Smooths out Billing Period differences so cost and use appear on reports and graphs in the Calendar Period it happened
- Can improve accuracy for fiscal reporting, budgeting, accruals, and energy performance evaluation
- Provides better month-to-month and year-to-year comparisons and fewer 'false' alarms

Calendarization

3. The Calendarization Process

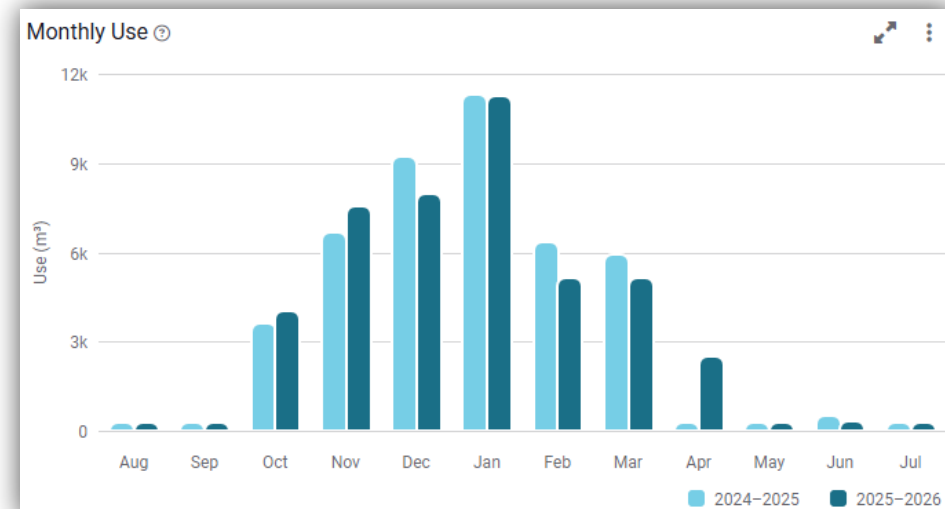
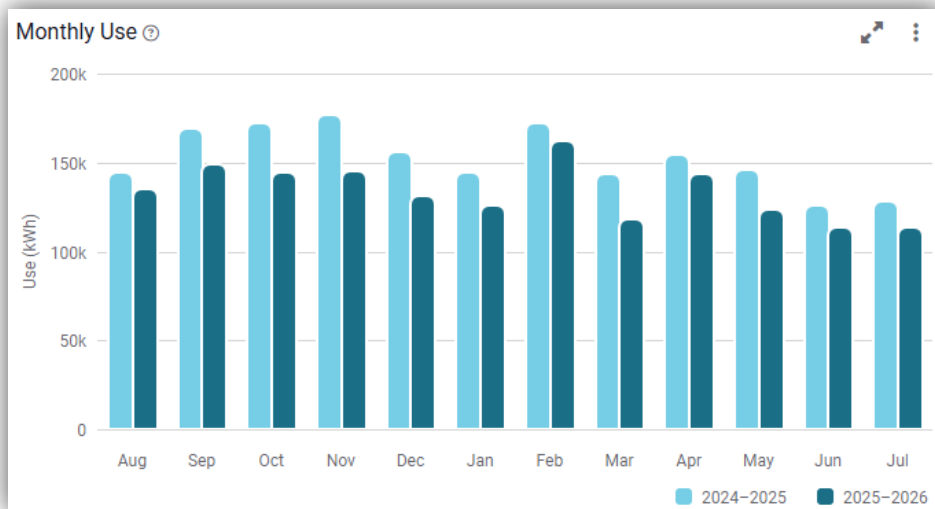
- Simple average daily cost and use proration
- Weather (degree day) allocation for weather sensitive meters



Calendarization

3. The Calendarization Process

- Starts with determining whether a meter is weather sensitive...

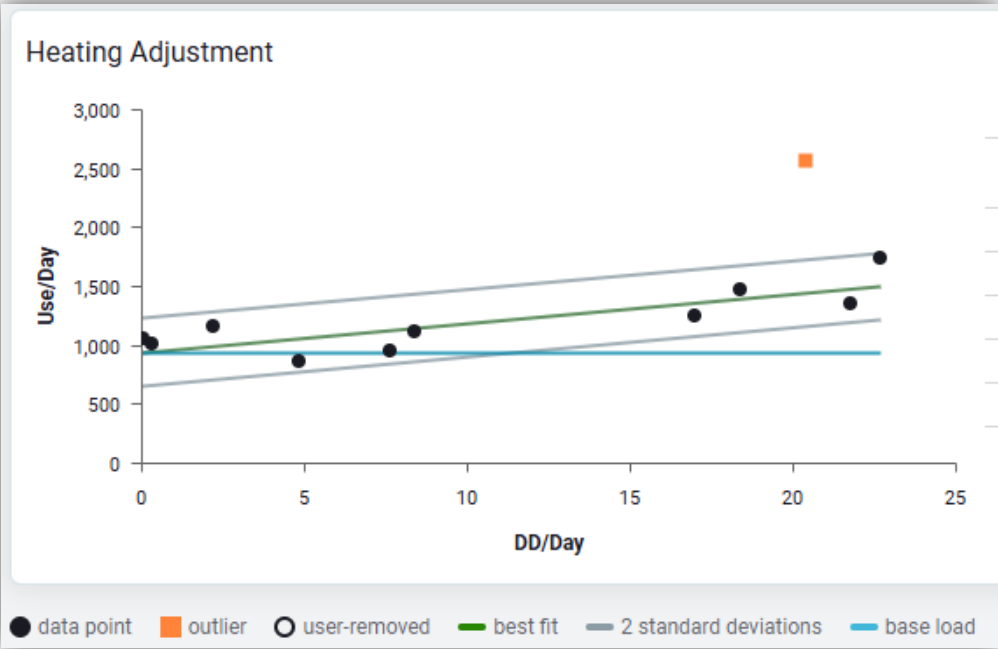


- However, even a weather sensitive meter is rarely 100% weather sensitive...

Calendarization

3. The Calendarization Process

- Weather sensitivity is determined by a weather regression for both heating and cooling seasons using HDD and CDD:



Heating		
Weather-sensitive	Base load	Weather factor
✓	535.46 kWh/day	25.12 kWh/HDD
✓	745.25 kWh/day	19.46 kWh/HDD
✓	906.03 kWh/day	39.32 kWh/HDD

Heating

The statistical analysis of usage vs. weather shows that the weather affects your energy usage in this season for this year. For each degree of outside temperature below the balance point of 55 degrees, you consume 25.12 kWh per degree day. In addition, you consume about 535.46 kWh every day of base usage (usage not related to weather).

Calendarization

3. The Calendarization Process

- For non-weather sensitive meters, cost and use allocation based on ratio of Calendar Period to Billing Period:

$$\text{Calendar Period Use} = \text{Billing Period Use} * \left(\frac{\# \text{ of Days in Calendar Period}}{\# \text{ of Days in Billing Period}} \right)$$

$$\text{Calendar Period Cost} = \text{Billing Period Cost} * \left(\frac{\text{Calendar Period Use}}{\text{Billing Period Use}} \right)$$

Calendarization

3. The Calendarization Process

- For weather sensitive meters, the following process is used:
 1. Calculate weather sensitive portion for Billing Period using weather factor(s) and Calendar Period degree days (HDD and/or CDD)
 2. Calculate non-weather sensitive portion for Billing Period:
$$\text{Billing Period Use} - \text{Weather Sensitive Portion} = \text{Non-Weather Sensitive Portion}$$
 3. Allocate non-weather sensitive portion to Calendar Period
 4. Calculate use for Calendar Period
Includes weather and non-weather sensitive portions for Calendar Period
 5. Calculate cost for Calendar Period

Calendarization

3. The Calendarization Process

- Calendarization is the better way to report and display the data unless you need to:
 - Discuss actual bills with a vendor
 - Reconcile actual bills with accounting functions
 - Use actual bills to charge tenants or departments for their portion of a utility bill
- On an annual basis, the cost and use totals of calendarized data are equal to actual utility bills (exception: possible year-end rollover)
- Weather regression used by calendarization (and normalization) cannot be disabled and does not exclude statistical outliers
- Cost Avoidance offers a more 'tunable' weather regression option for meter-by-meter analysis



Calendarization Demo

Normalization

1. What is Weather Normalization?

- Calendarization provides the starting point for normalization by establishing the process to allocate cost and use by calendar month
- Normalization further adjusts use data by applying the weather conditions from a selected comparison year to all bills
- This **removes weather as a variable**, making it easier to compare use across years
- Answers the question – “If the weather was exactly the same year-after-year, how has my energy use changed”?

2. Why Normalize?

- More accurate year-to-year use comparisons
- Better estimate of savings from energy conservation measures – not weather changes
- Valuable long-term Energy Use Intensity (EUI) charts allow you to see ‘real’ energy use reductions over time

Normalization

3. Normalization Limitations

- No adjustments for other significant variables over time (e.g., occupancy, new loads)
- Non-weather sensitive meters return normalized data that matches calendarized data

4. The Normalization Process

- Simple average daily cost and use proration
- Weather (degree day) allocation for weather sensitive meters *using degree days (HDD and/or CDD) from user-defined normalization comparison year*
- Important to select a 'typical', non-extreme degree day year for comparison

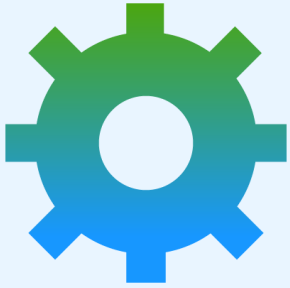


Weather Data Depot is helpful for this!



Normalization Demo

Pop Quiz



What's the primary difference between Calendarization and Normalization?

Put simply: calendarization answers "when did this use actually happen?" while normalization answers "what would use have looked like with the same weather every year?"

But they also compound - a weather sensitive meter's bill data gets calendarized using degree day data first, and normalization then builds on that by substituting the comparison year's weather into the calculation.



Calendarization & Normalization

Q & A