Example 1 - Regression Model Overview

A linear regression was performed to model monthly electricity usage based on outdoor weather conditions. The model uses cooling degree days (CDD) to predict monthly energy consumption.

Regression Equation

Energy Use (kWh) = Base Load + (CDD Coefficient × CDD65)

Where:

- **Base Load (Intercept)** = 141,531 kWh/month
- **CDD Coefficient** = 184.69 kWh per CDD
- **CDD Balance Point** = 65°F

Model Inputs and Results

Parameter	Value	Description
Intercept	141,531	kWh per billing period
CDD Coefficient	184.69	kWh per cooling degree day (CDD65)
Balance Point	65°F	Used for CDD
R^2	0.957	Indicates a strong correlation
CVRMSE	5.1%	Very strong statistical fit
T-Statistics	38.9 (baseload), 14.9 (CDD)	Shows both coefficients are significant

Notes

- The model adequately explains changes in monthly energy use based on outdoor temperature.
- Electricity consumption increases as Cooling Degree Days increase, indicating that cooling demand is a primary contributor to this building's energy use.
- The model identifies a stable base load of energy use that occurs every month, regardless of weather.

Sample Monthly Energy Data (kWh)

Period Start	Period End	Month	Energy Use (kWh)
9/1/2024	9/30/2024	September	189,600
10/1/2024	10/31/2024	October	158,800
11/1/2024	11/30/2024	November	155,200
12/1/2024	12/31/2024	December	143,600
1/1/2025	1/31/2025	January	143,600
2/1/2025	2/28/2025	February	144,000
3/1/2025	3/31/2025	March	136,000
4/1/2025	4/30/2025	April	161,200
5/1/2025	5/31/2025	May	194,400
6/1/2025	6/30/2025	June	224,400
7/1/2025	7/31/2025	July	254,000
8/1/2025	8/31/2025	August	244,400

Example 2 - Regression Model Overview

A multiple linear regression was performed to model monthly electricity usage based on outdoor weather conditions and billing period length. The model uses heating degree days (HDD), cooling degree days (CDD), and the number of days in the billing period.

Regression Equation

Estimated kWh = (1,620.45 x Days) + (21.38 x HDD65) + (28.75 x CDD65)

Model Inputs and Results

Parameter	Value	Description
Base Load Coefficient	1620.45	kWh/day
HDD Coefficient	21.38	kWh per heating degree day (HDD65)
CDD Coefficient	28.75	kWh per cooling degree day (CDD65)
Balance Point	65°F	Used for both HDD and CDD
R^2	0.793	Indicates a strong correlation
CVRMSE	4.12	Indicates acceptable model fit
Bias %	-0.5%	Indicates low model bias
T-Statistics	3.95 (HDD), 5.12 (CDD)	Shows both weather variables are significant

Notes

- Data covers **June 2024 through May 2025**.
- **October and November** excluded due to transitional season volatility and low R^2 when included.

Sample Monthly Energy Data (kWh)

Period Start	Period End	Month	Energy Use (kWh)
6/1/2024	6/30/2024	June	62,310
7/1/2024	7/31/2024	July	67,425
8/1/2024	8/31/2024	August	68,010
9/1/2024	9/30/2024	September	64,280
12/1/2024	12/31/2024	December	66,905
1/1/2025	1/31/2025	January	68,215
2/1/2025	2/28/2025	February	60,450
3/1/2025	3/31/2025	March	61,390
4/1/2025	4/30/2025	April	63,120
5/1/2025	5/31/2025	May	65,475

October and November data were collected but not used in regression modeling due to transitional seasonal anomalies.