

## CLEAN LOCAL ENERGY

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CITY OF BOULDER ENERGY FUTURE PROJECT:

# Load Forecasts (Assumptions)

This document describes the methodology used to create the load forecasts used in the Financial Forecast Tool (FFT). The load forecast directly impacts many of the results throughout the FFT. Information related to the load forecast is contained within two tabs: “Load Forecasts” and “Load Forecasts (Assumptions).”

The Load Forecasts (Assumptions) tab requires inputs for customer counts, electricity consumption, billing demand and line losses. Each includes anticipated changes over time. The data on this tab support the calculations on the Load Forecasts tab, which in turn serve as the basis for electricity sales and revenue calculations throughout the Financial Forecast Tool.

The following methodologies are used to calculate each variable:

- Customer count and annual usage
  - The forecast relies on customer count data from the [2015 Xcel Community Energy Report](#) for Boulder. This data contains the total number of residential and non-residential customers within city limits. To separate by customer class (residential, residential demand, commercial, secondary, general, primary general and transmission general), the city is assuming that the percentage of each customer class in Boulder mirrors statewide percentages for PSCo. For example, in the 2015 Xcel Community Energy Report, Boulder has 7,171 “Business” accounts, and Commercial (C) class customers represent 74.73 percent of total Xcel business accounts; therefore, the total number of Commercial class customers for Boulder is assumed to be 5,359 customers, or approximately 74 percent of the stated number of business accounts within the city. See Figures 1-4 below.
  - To account for future customer class growth, the tool uses the forecast average annual growth rate of housing between 2014 and 2040 from the [2015 Boulder Community Profile](#).
- Load Growth
  - The forecast relies on average annual usage for each customer class as calculated in [Xcel's 2016 Phase II Rate Case](#), which relies on 2013 data. The results are inflated by 1.1 percent annually, the forecasted average annual growth published in [Xcel's 2016 Electric Resource Plan](#).
    - Distribution line losses are added to the total energy consumption. The loss percentage is also published in the 2016 Phase II Rate Case.

- Coincident Factor
  - To calculate billing demand, the forecast uses a coincident peak factor, or coincident factor, that represents the percentage per month that a customer class load coincides with the system peak demand. The result is the portion of the peak demand for each customer class that contributes to the total demand charge calculation for the entire city.
- Transmission and Distribution Energy and Demand Losses
  - When electricity is delivered from generator to end use, a percentage is lost over distance, specifically as voltage is changed from high voltage at the generator to lower voltages for customers. This loss must be accounted for in the total amount of electricity Boulder must generate or purchase. In the Financial Forecast Tool, losses are reflected both at the transmission (high voltage) level before the electricity reaches city limits as well as once it has been stepped down to the distribution (lower voltage) level within city limits. Losses are also reflected in both the energy charge and the demand charge for each customer class.
- Billed kWh to 12-month Coincident Peak Demand Factor
  - Billed kWh to 12-month Coincident Peak Demand Factor measures the ratio of individual peak demand at the same time of system peak demand. This is necessary to determine the total system demand for Boulder for purposes of determining the wholesale peak demand charge.
- Billing Demand (and Billing Demand Factor)
  - Customer billing demand (MW-months) measures the sum of the peak capacity for each customer class in one year. The calculation multiplies total customer usage by a billing demand factor (equal to the sum of the annual kWh usage in a customer class divided by the sum of the twelve monthly kW billing demand determinants of the customer class). The result is used to calculate the total annual demand charge for the city.

**Figure 1: PSCo 2013 Customer Count and Usage by Class**

This table provides the number of customers, annual bills, annual kWh consumption, average annual kWh consumption per customer, percentage of total customers and percentage of total kWh by major customer class in Boulder. The data is taken from Xcel's 2016 Phase 2 Rate Case ([Exhibit of Xcel witness Dolores Basquez](#)).

Customer Class	# of Customers	Annual Bills	Total kWh	Average Annual kWh / Customer	% Total Customers	% Total kWh
<b>Residential</b>	1,176,576	14,118,912	8,846,398,501	7,519	88.02%	31.51%
<b>Residential Demand</b>	1,178	14,136	33,936,013	28,808	0.09%	0.12%
<b>Commercial</b>	118,835	1,426,020	1,320,501,548	11,112	8.89%	4.70%
<b>Secondary General</b>	39,558	474,696	11,797,929,988	298,244	2.96%	42.03%
<b>Primary General</b>	604	7,248	3,462,312,254	5,732,305	0.05%	12.33%
<b>Transmission General</b>	30	360	2,612,222,396	87,074,080	0.00%	9.31%
<b>Total</b>	1,336,781	16,041,372	28,073,300,700			

**Figure 2: Xcel 2015 Boulder Community Energy Report**

This table provides the total number of customers and annual energy consumption for Boulder customers, as published in [Xcel's 2015 Boulder Community Energy Report](#). The data is presented as either "Residential" or "Non-Residential" with no further granularity (such as by customer class) provided in the report.

Electricity	Number of Customers	Energy Consumption (kWh)
Non-Residential	7,171	1,092,615,479
Residential	41,015	242,467,229
<b>Total</b>	<b>48,186</b>	<b>1,335,082,708</b>

**Figure 3: Percentage of Boulder Customers by Customer Class**

*This table provides an estimate of the number of customers by class in Boulder. The number of customers in each class are derived by calculating the percentage of the total for each class, then applying those percentages to the number of residential and non-residential customers in Boulder (as presented in Figure 2).*

Customer Class	# of Customers	% of Class	Sub-Group
PSCo Total R + RD	1,177,754	99.9%	R
		0.1%	RD
Boulder R+RD	41,015		
	40,974		R
	41		RD
PSCo Total Commercial	159,027	74.73%	C
		24.88%	SG
		0.38%	PG
		0.02%	TG
Boulder Commercial	7,171		
	5,359		C
	1,784		SG
	27		PG
	1		TG

**Figure 4: Usage by Customer Class in Boulder**

*This table provides an estimate of the annual kWh consumption by class in Boulder. The annual kWh consumption for each class are derived by calculating the percentage of the total for each class, then applying those percentages to the total annual kWh consumption for residential and non-residential customers in Boulder (as presented in Figure 2).*

Customer Class	Total Annual kWh	% of Class Sub-Sub-Group	
		Group	Group
PSCo Total R + RD	8,880,334,514	99.6%	R
		0.4%	RD
Boulder R+RD	242,467,229		
	241,540,645	R	
	926,583	RD	
PSCo Total Commercial	16,580,743,790	7.96%	C
		71.15%	SG
		20.88%	PG
Boulder Commercial Original	866,562,900		
	69,013,650	C	
	616,597,696	SG	
	180,951,554	PG	
Boulder Commercial Updated	1,092,615,479		
	69,037,919	C	
	616,814,526	SG	
	181,015,186	PG	
	225,747,847	TG	

**Street Lighting**

*While the city does not have access to data specific to individual customer classes, the city does have data for street lighting, since the city pays these bills directly. As a result, the kWh usage for metered street lighting (customer class MSL) and non-metered street lighting (customer class SL) reflect actual Boulder values. For consistency with data sources for the other customer classes, this data is also sourced from the [2015 Boulder Community Energy Report](#) published by Xcel.*

	Number of Customers	Energy Consumption (kWh)
Street Lighting - Metered	1	216,629
Street Lighting - Non-Metered	1	3,822,726
<b>Total</b>	<b>2</b>	<b>4,039,355</b>