

White Paper #22

Understanding Large Commercial Electric Bills

Demand-Based Time of Use Electric Rates Have Some Unique Terms



COLORADO SPRINGS UTILITIES

Account Number: 1234 5678 90
Billing Date: 1/31/16
Amount Due: \$12,767.72
Due Date: 2/14/16

Details of your utility service at:

Electric Commercial Service (ETL)

Meter Number: 26262

On Peak-Kilo Watt (Demand)

Reading 01/31/16	2.430	Kilo Watt (KW)
1 →	364.50	Kilo Watt (KW)
3 → Your meter constant is	150	
4 → Adjusted Demand	368.79	Kilo Watt (KW)
4 → Power Factor % Low	1.1776	%

Off Peak-Kilo Watt (Demand)

Reading 01/31/16	2.490	Kilo Watt (KW)
1 →	373.50	Kilo Watt (KW)
3 → Your meter constant is	150	
4 → Adjusted Demand	373.50	Kilo Watt (KW)
4 → Power Factor % Low	0.0	%
5 → Excess Off Peak KW	4.71	(XOF)

On Peak-Kilowatt Hours

Reading 01/31/16	15118	
Reading 12/31/15	14883	
2 →	35250	Kilowatt Hours (KWH)

Your meter constant is 150

Off Peak-Kilowatt Hours

Reading 01/31/16	60474	
Reading 12/31/15	59534	
2 →	141000	Kilowatt Hours (KWH)

Your meter constant is 150

Kilowatt Hours (Total)

Reading 01/31/16	75592	
Reading 12/31/15	74417	
6 →	176250	Kilowatt Hours (KWH)

Your meter constant is 150

On Peak-Kilo Volt Amperes

Reading 01/31/16	2.590	Kilo Volt Amperes (KVA)
	388.50	Kilo Volt Amperes (KVA)

Your meter constant is 150

Off Peak-Kilo Volt Amperes

Reading 01/31/16	2.620	Kilo Volt Amperes (KVA)
	393.00	Kilo Volt Amperes (KVA)

Your meter constant is 150

8 → Your average daily usage was 5685.48 KWH

11 →	9 →	10 →	Access Chg: 31 days x \$2.8281	\$87.67
12 →			Dmd Chg: kW/On x \$0.6548/Day	\$7,486.04
13 →			Dmd Chg: kW/XOF x \$0.4256/Day	\$62.11
14 →			ECA On Peak: 35,250 kWh/On x \$0.0426	\$1,501.65
15 →			ECA Off Peak: 141,000 kWh/Off x \$0.0174	\$2,453.40
			Capacity Chg: 176,250 kWh x \$0.0014	\$246.75
			City Sales Tax: 2.5% x \$12,190.12	\$304.75
			County Sales Tax: 1.23% x \$12,190.12	\$149.94
			State Sales Tax: 2.9% x \$12,190.12	\$353.51
			PPRTA Tax: 1% x \$12,190.12	\$121.90
			ECA = Electric Cost Adjustment	

Total charge this service \$12,767.72

Sample Bill

Specific Line Items

○	Line Item	How it is Calculated	Explanation
1	Demand Measurement	Measured separately for On-Peak and Off-Peak periods.	Power or maximum rate of energy draw from the system during the period.
2	Energy Measurement	Measured separately for On-Peak and Off-Peak periods.	Energy consumed during the period.
3	Adjusted Demand	Measured demand multiplied by the factor $(1 + PF)$ where PF is the difference between 95% and actual power factor. Calculated separately for On-Peak and Off-Peak periods.	See also “Power Factor Adjustment”. The measured electrical demand is adjusted (increased) if customer power factor is too low. If a customer power factor is 10% below our threshold of 95% PF, the measured demand is adjusted up by 10% and is the basis for the power factor charge.
4	Power Factor % Low	The difference between measured power factor and 95%. Calculated separately for On-Peak and Off-Peak periods.	This is the amount below our threshold of 95%. A value of 5% Low would be a power factor of 90%. It is the amount, in percent, lower than 95%.
5	XOF Excess Off Peak	The difference between adjusted Off-Peak and On-Peak demand, in kW.	This forms the billable kW for Off-Peak demand charge, which is billed only on the Off-Peak demand kW that is greater than the On-Peak kW. The subtraction occurs after adjustment for power factor, i.e. with adjusted demand values. The result cannot be less than zero.
6	Kilowatt-Hours (Total)	Sum of On-Peak and Off-Peak kWh	This is the total electric energy usage for the period.
7	Kilo Volt-Amperes	Product of two measured values. $kVA = (\text{volts} * \text{amps}) / 1000$. Measured and calculated separately for On-Peak and Off-Peak periods.	Volts, Amps, Watts, and Power Factor are related. Customers interested in their power factor can calculate it from their bill, from $PF = kW/kVA$. For the sample bill, the PF is $364.5 \text{ kW} / 388.5 \text{ kVA} = 93.82\%$.
8	Average Daily Usage	Total On-Peak and Off-Peak kWh divided by the number of billing days.	When this figure is above a threshold, commercial customers with increasing loads will move from a non-demand rate to a time of use rate with separate charges for energy and demand. Customers can also use the figure for general energy management purposes.

○	Line Item	How it is Calculated	Explanation
9	Access Chg. (Access Charge)	Daily fee multiplied by the number of days in the billing period.	
10	Bill Days	The number of days since the prior meter reading	
11	Dmd Chg: kW/On On-Peak Demand Charge	The highest demand measured during On-Peak hours, in kW, multiplied by the number of days and the charge per-kW On-Peak.	
12	(Dmd Chg: kW/Off) Off-Peak Demand Charge	The highest demand measured during Off-Peak hours, in kW, multiplied by the number of days and the charge per-kW Off-Peak. However, the only billed kW is the amount of kW that is greater than the On-Peak kW.	Unlike On-Peak Charge, the only amount of demand billed for this time period is any amount that is greater than the On-Peak Demand. For example, if the On-Peak demand is 200 kW and the Off-Peak Demand is 150 kW, the Off Peak Demand Charge is zero. If the On-Peak demand is 200 kW and the Off-Peak demand is 250 kW, the Off-Peak demand charge is based on 50kW....just the portion that exceeded the On-Peak kW. For most customers, the majority of demand charges will be for On-Peak.
13	ECA On Peak: kWh/On On-Peak Energy Charge	Energy used (kWh) during On-Peak periods multiplied by the rate per-kWh On-Peak.	
14	ECA Off Peak: kWh/Off Off-Peak Energy Charge	Energy used (kWh) during Off-Peak periods multiplied by the rate per-kWh Off-Peak.	
15	Capacity Chg. Capacity Charge	All energy used (On-Peak kWh + Off-Peak kWh) multiplied by the per-kWh rate.	

General Concept Descriptions

Electric Energy (kWh). Electric energy is measured in kilowatt-hours “kWh”. It’s like the quantity of fuel used by a car in a month’s time. Depending on the time of day, we may run different types of equipment and use different types of fuel. For reasons such as these, the cost of the energy component of the bill varies between On-Peak and Off-Peak times.

Electric Demand (kW). Electric demand is measured in kilowatts “kW” which is instantaneous power we provide to the facility. It’s like the horsepower rating of a car engine and is a rating irrespective of time. The demand for power from the facility must be met with installed infrastructure and generation capacity, and helps determine the size of the equipment and wires we install. When the overall demand of all customers combined is too great, we must increase the infrastructure. Time of Use rates charge more for On-Peak use, encouraging customers to use power Off-Peak if possible. On-Peak times – when our system is pushed the hardest - generally coincide with normal daytime business hours; of these times the most intense loads are felt on hot summer afternoons from air conditioning loads. Large customers have special meters that record the demand during our On-Peak and Off-Peak times, for billing purposes; electric cost is different for On-Peak and Off-Peak periods. The recorded value represents the highest fifteen minute average power draw during the period. The fifteen minute averaging window moves ahead each five minutes and is termed a ‘moving window’. Because the maximum demand is averaged over 15 minutes time, momentary events, such as starting of a motor, have only a very small impact on the maximum demand. However, turning on sustained loads (like electric heaters) all at once can ‘set’ the maximum demand for the billing period.

Power Factor Adjustment. (See separate White Paper #23: Power Factor Correction). In general, the term “power factor” is the portion of the total volume of volts and amps delivered to a facility that is not recorded on our watt meters. Our energy billing is based on “kilowatt-hours” which is true power. For many electric uses, such as motors, a portion of the “apparent power” (product of volts and amps) is consumed by magnetic energy used to run the motor. This “reactive” power occupies space in our cables and generators but isn’t recorded on the watt meters. For large customers (those with demand meters) we measure power factor and create power factor charges for facilities with low power factors. We allow up to 5% of the total apparent power to be reactive, but if there is more than that we add a “power factor charge” to the bill. The power factor charge is not a separate line item, but it can be identified. Our billing system uses measured demand (‘reading’) and ‘adjusted demand’ or the difference between the two representing the effect of power factor. A power factor of 95%-100% is not charged at all; only power factors lower than 95% are charged. If a facility has an 85% power factor, the power factor is 10% below the 95% free limit – so, for this example, the *measured* demand is adjusted upwards, making the *billing demand* higher by 10%. The increase in the demand charge is the value of the power factor charge. For example, if the billing demand is 10% higher than the measured demand, this tells the customer that 10% of the demand charge is from power factor (the embedded power factor charge).

How We Recover Electricity Costs

Access and Facilities Charges: Access and Facilities charges are designed to recover customer related costs such as metering equipment and customer care expenses.

Demand charges: Recovers costs of assets and infrastructure for the electric system; equipment that must be in place to serve the highest load even when not used consistently. Demand charges also recover most maintenance and repair costs; the majority of all non-fuel costs are recovered through demand charges.

ECA on peak: Recovers fuel related operational costs including coal, natural gas, and purchased power.

ECA off peak: Recovers fuel related operational costs including coal, natural gas, and purchased power.

Time of use rates vary between On-Peak and Off-Peak to match the higher market costs of providing energy during periods of peak use.

On-Peak / Off-Peak Hours

On-peak periods Oct. - March: 4 to 10 p.m. Monday through Friday

On-peak periods April - Sept.: 11 a.m. to 6 p.m. Monday through Friday

Off-peak periods: all other hours plus legally-observed holidays

Capacity charge: Recovers cost of fixed capacity payments, which Utilities makes to the Western Area Power Administration (WAPA) for assured delivery of purchased power to Utilities system.

Other Recovered Costs in Access and Demand Charges

- Costs for Surplus Fund (like a franchise fee) paid to the municipal government.
- Costs for DSM (Demand Side Management) rebate programs.
- Costs for communications.
- Costs for other community programs such as low income assistance and support for local organizations.

Taxes: Springs Utilities collects taxes on utility services and disburses them to the appropriate entity.