

ENERGY EFFICIENCY FOR YOUR BUSINESS

The Difference between kW Demand and kWh Use



Key Points

- The term kWh refers to the quantity of energy used.
- The term kW refers to the electric power or rate at which this energy is used.
- Commercial and industrial users generally pay a kW demand charge on the peak rate at which they use power.

Energy users often confuse the concepts of kW (kilowatts or 1,000 watts) and kWh (kilowatt hours or 1,000 watt hours). The term kWh refers to the quantity of energy used, while the term kW refers to the rate at which this energy is used.

As an example, a 60 watt light bulb burns power at the rate of 60 watts (or 0.060 kW). In one hour, the bulb will consume 60 watts times one hour, or 60 watt hours. In 12 hours, that same bulb will have consumed 60 watts times 12 hours, or 720 watt hours (0.72 kWh).

Let's say that your organization has 200 of these 60 watt bulbs that operate for 12 hours each day. The way to calculate your bill for a 30-day period is as follows: Energy Use = 200 bulbs X 60 watts X 12 hrs X 30 days divided by 1,000 = 4,320 kWh. This is the quantity of power consumed. If you were paying \$0.10/kWh, this would cost you \$432.

For the previous scenario, your organization is consuming power at the rate of 12 kW (200 bulbs X 60 watts each divided by 1,000 to get kilowatts). This rate of using power is also called demand. Commercial and industrial users generally pay a demand charge. Residential customers do not because their individual demand is not large enough to justify the cost of a demand meter.

Utilities instituted demand charges because some industrial or commercial customers would have high demands for electricity over short periods of time, then very little demand the rest of the time. Since electricity is a nearly instantaneous production-to-consumption product, the utility has to install peak load requirements capacity for

all of their generation, transmission, and distribution equipment. Having this excess capacity on hand all the time costs money, a cost that is shared by the utility and the customers who occasionally, but not always, need this capacity on-line to meet higher demand use.

The demand meter calculates the average use during a 15-minute period (or 30 minutes, or one hour depending on the demand meter interval). Assume that a demand meter records the highest peak energy 15-minute period, counting the pulses in every interval, and then dividing by the appropriate timeframe to complete the calculation. The meter does not care much about spikes in demand. A 5-second spike would represent only one-half of 1% of the 15-minute (900 second) demand period. So, if a large motor starts up at the beginning of a shift and many small motors start up soon afterward, the cumulative load of all of the small motors added to the large motors that are running the entire 15-minute period will result in a peak demand that overwhelms the effect of any spike.

Heavy industrial users with lots of high horsepower motors are very thankful that demand meters do not measure the highest instantaneous peak. If demand meters worked by measuring instantaneous, rather than average demand over a particular interval, then the startup of a motor would present a significant cost. Consider that the starting current lasting for 2 to 3 seconds and may be 6 to 10 times the locked rotor current of a typical motor that does not have a soft start or a reduced voltage start feature. If this were the case, a 250 HP motor would contribute over 1,200 kW on an instantaneous demand meter, as compared to about 200 kW that would be measured on an averaged interval demand meter.

Contact us

If you have any questions or need assistance in making these savings a reality for your business, please contact your strategic accounts representative at East Central Energy, **1-800-254-7944** or www.eastcentralenergy.com.