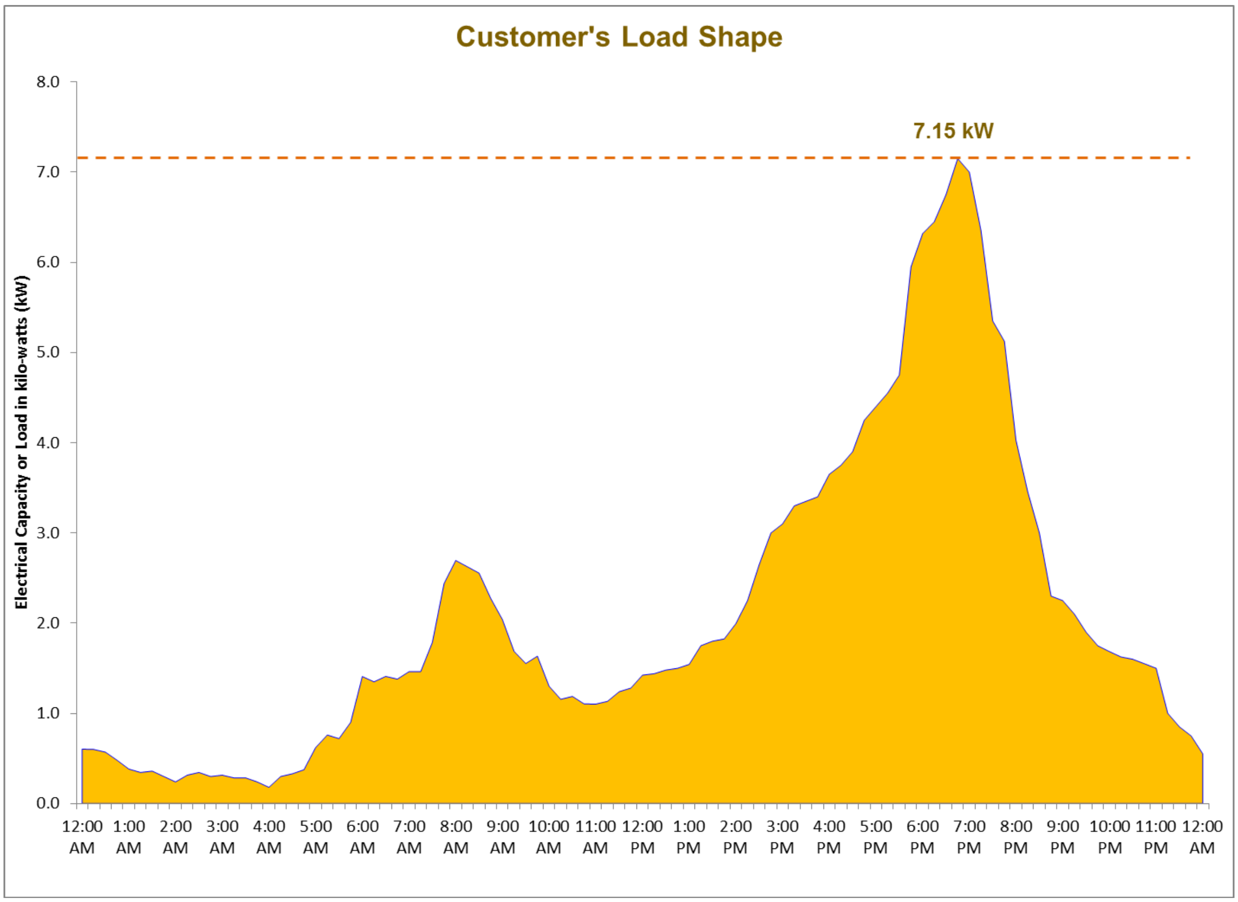
What is Load Factor?

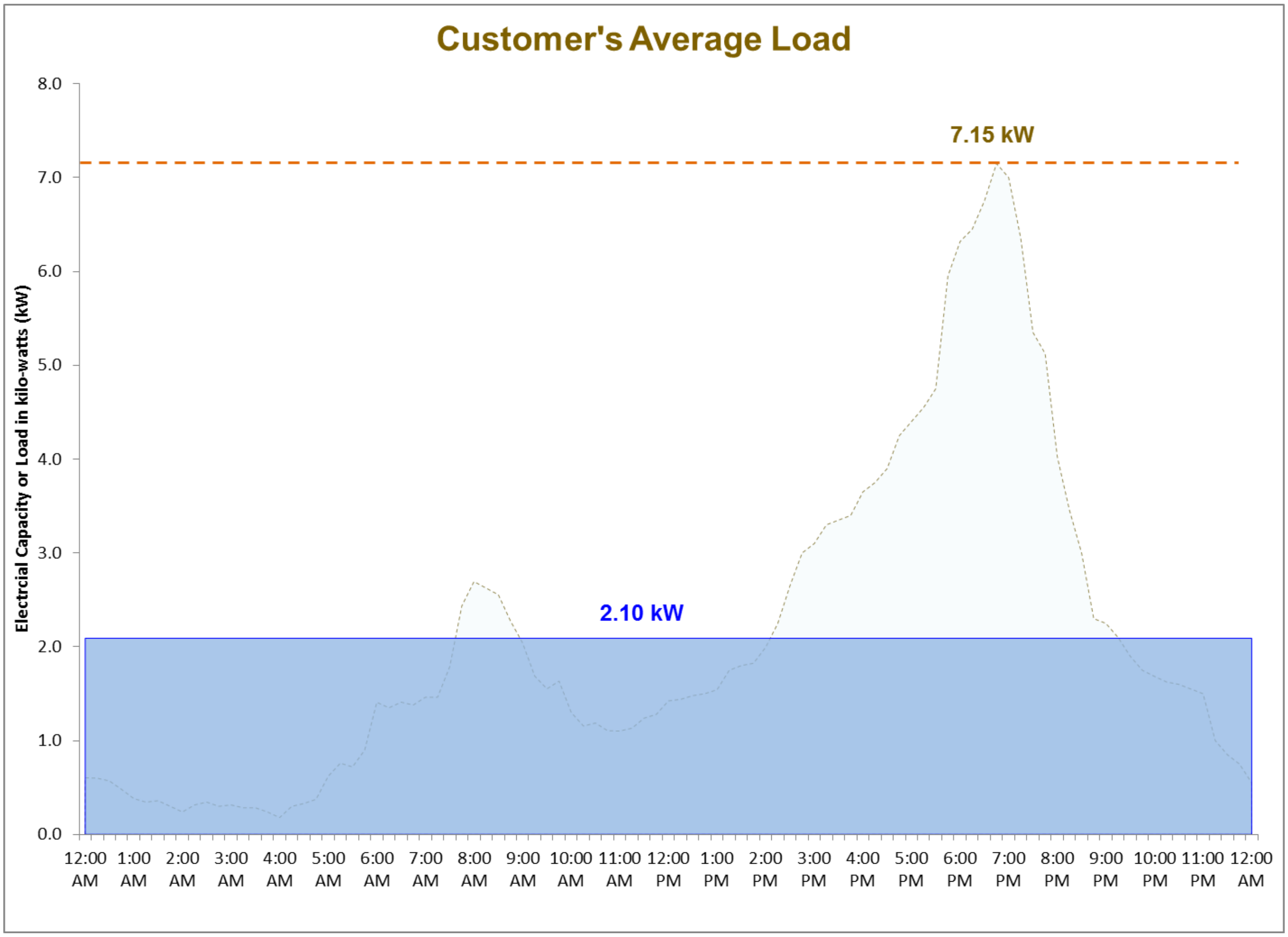
Wikipedia defines Load Factor as "the average load divided by the peak load in a specified time period". In other words, Load Factor (LF) describes how erratically electricity is used by measuring the average use of electricity over a time period and then comparing that average load to the peak load during the same time period.

For example, suppose a customer's use of electricity throughout a 24-hour period looked like this:



We can see in this example that the peak demand or "load" occurred around 6:30 to 7:00 p.m. and measured 7.15 kW. The *energy* used during the day is represented by the gold colored area under the charted line, and can be calculated by adding all of the 24 hourly loads together. In this case, the electrical energy used in the 24-hour period was 50.7 kWh.

The phrase "average demand" refers to the level of demand that would have occurred if the total energy was spread evenly over the entire time period. It would be as if the mountain profile of the load shape in the figure above was melted so that the peaks poured down into the valleys until every hour was filled to the same level. Mathematically, the average demand is found by dividing the total energy used throughout the time period by the number of hours in the time period. In this case, when we divide the 50.7 kWh energy value by 24 hours, we find the average demand is 2.1 kW. Graphically, the average demand looks like this:



The load factor during the example day can now be found by dividing the average demand of 2.1 kW by the peak demand of 7.15 kW. This results in a LF of 29.5%.

LOAD FACTOR DURING PERIODS OF TIME LONGER THAN A DAY

Simply stated, a high load factor corresponds to power that is used consistently and a low load factor corresponds to power used more intermittently.

$$LF = \frac{\text{Total kWh}}{\text{Peak kW demand} * \text{Total hours}}$$

Example 2: Let's say an artist operates an electric kiln but only uses it once each month to batch fire all of the pottery at one time. Suppose too that this firing operation requires the kiln to run for ten hours. The kiln is "nameplate" rated at 12,000 watts, but will very likely cycle on and off with different heat requirements and not operate at its nameplate capacity for the entire time period. For simplicity, we will say that the kiln will peak an average load of 8.4 kW. The energy consumption during this time would be 8.4 kW * 10 hours or 84 kWh. The load factor for those ten hours would be 100%.

However, if we want to find the weekly load factor, and determine that no additional energy is consumed by the artist throughout the week, the LF would decrease significantly. This is because the *average demand,* which is used in the LF calculation, is equal to the *energy value divided by the number of hours in the time period* (recall the earlier example). The calculation that previously measured LF over a 10-hour period of time will now measure the LF over a 7-day (i.e., 168 hour) period. In this case, the LF will be approximately 5.9%:

$$LF = \frac{84\ \text{kWH}}{8.4\ \text{kW demand} * 168\ \text{hours}}$$

If we expand the time period to a typical month (30 days) and determine the load factor, again assuming that no additional energy is used, the LF will drop to1.4%:

$$LF = \frac{84\ \text{kWH}}{8.4\ \text{kW demand} * 720\ \text{hours}}$$

Most residential services have monthly LFs of approximately 20%. If you would like more information regarding load factor, please contact Engineering Services at ext. 5497.