



Billing Power Factor Charge Q & A

Approximately 300 commercial/industrial customers of Snohomish County PUD have their demand charge adjusted on their power factor. Here are some common questions and answers to help you understand the power factor demand adjustment:

What is power factor?

Power factor is the ratio of working power or energy (kilowatts or kW) to apparent or total power (kilovolt-amperes or kVA) delivered by the PUD. It measures how effectively total delivered power is being used. A high power factor signals effective utilization of electrical power, while a low power factor indicates poor utilization of electrical power. However, this is not to be confused with energy efficiency or conservation which applies only to energy or kW. Improving the efficiency of electrical equipment reduces energy consumption but does not improve the power factor.

What causes a low power factor?

The main contributors to low power factor are motors operated at less than full load. This often occurs in cycle processes such as saws, conveyors, compressors, grinders, etc. – where motor must be sized for the heaviest loads. HVAC fans often have a low power factor due to running at reduced load.

What is a power factor charge?

The power factor charge is an adjustment to the demand charge if the customer's power factor is less than 0.97 or 97%. This fee is charged to large electricity users to recover the PUD costs for maintaining a good power factor on our distribution system. The PUD pays power factor charges to its largest electricity supplier, the Bonneville Power Administration (BPA) if the power it purchases from BPA is below 97% power factor.

How is the power factor charge shown on my bill?

The average "Power Factor" and "Adjusted Demand" for that billing period is shown on the customer's bill. The Demand charge shown on the bill includes the adjustment due to low power factor.

How is power factor measured? Is there a special meter for measuring power factor?

Power factor is calculated from measured quantities using a meter capable of measuring both kilowatt-hours (kWh) and kilovolt-amperes-reactive-hours (kVARh).

How does the PUD select which customers get charged for power factor?

Customers who consistently have a demand that is greater than 100 KW and have a power factor that is less than 0.97 or 97% will have their demand adjusted based on power factor.

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How is a customer's monthly power factor determined?

As stated in the PUD's Rate Schedule 82, the power factor is calculated using the total monthly kWh and total monthly kVARh. The demand is increased by one percentage point for each one hundredth (.01) the average power factor is less than 0.97

The formula is as follows:

Average Power Factor=

kWh divided by square root of (Kilowatt-hours² + Reactive Kilovolt Ampere Hours²)

or

$PF_{avg} = kWh / (kWh^2 + kVARh^2)^{1/2}$

Adjusted demand = kW Demand * ((.97 – PF) +1)

What can I do to limit my power factor charge?

One method to improve your power factor is by adding power factor correction capacitors to your plant distribution system.

When apparent power (KVA) is greater than working power (kW), the utility must supply the excess reactive current plus the working current. Power capacitors act as reactive current generators. By providing the reactive current, they reduce the total amount of current your system must draw from the utility.

Another method is to install equipment that has a good power factor rating versus a poor power factor – for example, adding an adjustable speed drive to a lightly or variably loaded induction motor. Whenever specifying new equipment, the power factor of the equipment should be considered. While initial costs might be higher, it is often more economical in the long run to purchase equipment with a higher or better power factor.

Who can help me determine the size and placement of capacitors on my electrical system?

A consulting electrical engineer should be able to assist you with your specific application and equipment needs. The consultant can also work with PUD engineers to ensure the solution is the optimal size and location for both of our systems. There are many factors to consider such as NEC & NESC requirements, harmonic interaction and voltage regulation, as well as economics.

Where can I get more information about factor correction?

This booklet can be obtained from the PUD's Energy Services Department at 425-783-8290:

- *Power Quality and Power Factor Correction* – Power Quality Service Center