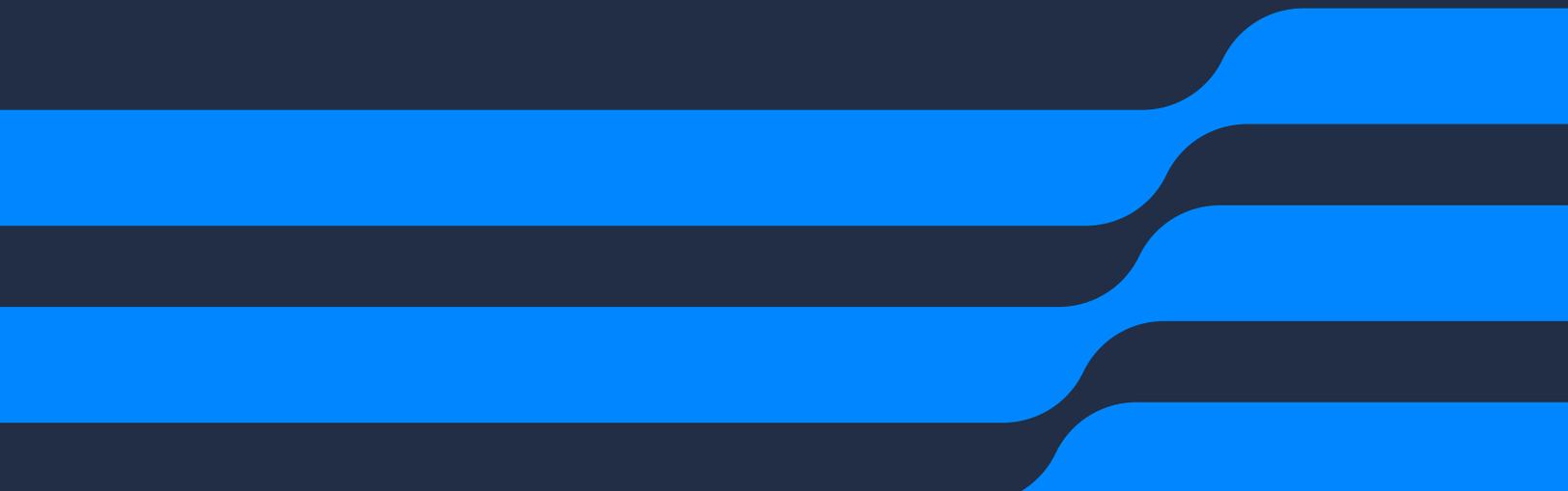


P  **WERSIDE**®

All our energy, in your power

The Cost of Poor Power Factor.



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Are you throwing money away due to having a poor power factor? If you are responsible for a commercial or industrial facility then chances are that you already know a bit about power factor. It may appear on your electricity bill as just that, or it may be described in a different way, such as 'reactive power' or 'kVAR'. It all relates to the supply of electrical power, that is not used within the facility and is instead returned to the supplier. Facilities that return a large proportion of their supplied power (or apparent power) to the distribution network will have a poor power factor.

What is Power Factor?

The first critical step is to understand what power factor is and how it's measured.

Power factor refers to the relationship between active (useful power) and the apparent (total) power. This relationship is a measure of how effectively electricity is being used.

Active power

Active power is the name given to the power consumed by an electrical circuit doing something useful, like powering street lights or running a production line. The measurement of active power is watts (W), or multiples thereof, such as kilowatts (kW) and megawatts (MW). A device that runs on electrical power has a rating based on the active power that it consumes, such as a 60W light bulb or a 500kW arc furnace.



Apparent power

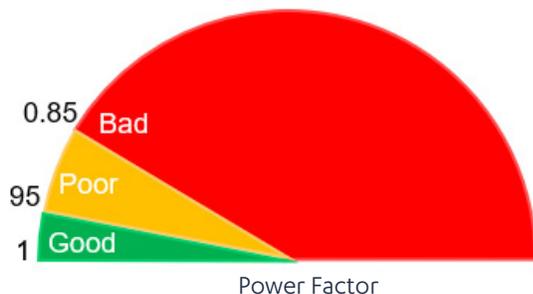
Apparent power is the total power passing through an electrical circuit, both active and reactive. It is a significant value to consider when designing and rating an electrical circuit. The measurement of apparent power is volt-ampere (VA). You will often see devices used to generate or transform electrical power rated in kVA, or MVA. Examples may include a 50kVA transformer or a 1000kVA diesel generator.

How do you measure power factor?

You can connect monitoring devices to critical locations in an electrical power system to measure voltage and current. These locations include generator outputs, transformer connections, and large, intermittent, or unpredictable loads. Such a monitoring device can use the measured voltage and current values to calculate the active, reactive, apparent power, and power factor. More advanced devices such as the PQube 3 power analyzer, can record this data over time and generate regular reports.

What is Poor Power Factor?

Perfect, or unity power factor occurs where the apparent power supplied to a facility is only used by electrical equipment on the site to do useful work. A theoretical electrical circuit with only resistive loads, such as ovens and heaters, will have a power factor equal to one. A similar circuit with only inductive or capacitive loads will have a power factor of zero. In reality an electrical circuit contains a mixture of both of these types of loads. A good power factor is between 1 and 0.95, between 0.95 and 0.85 is poor, and below 0.85 is bad.



Domestic homes and office buildings normally have good power factor. Whereas industrial sites often use large inductive loads and can have poor or even bad power factor.

and defectivity should be conducted with operations managers, to include any manufacturer-recommended upgrades. Following this review, known or contingency consumables or replacement parts should be pre-ordered so the PM can be completed expeditiously.

What does it cost?

For a domestic customer standard domestic electrical meters only measure the real, or active power supplied to your home. The utility company will bill you in kilowatt hours (kWh), which means you are not directly billed for receiving reactive power (kVARh). Newer domestic smart meters do have the capability to monitor reactive power though. This means that it would be possible for a utility, to advise their customers on how to reduce their reactive power consumption. In the future they may even impose charges or penalties for poor power factor.

The majority of the apparent power used in a domestic home, heats things up (hot water, cooking, living space) or cools things down (refrigerator, freezer, air conditioning). These types of loads tend to only need active power and so most domestic customers don't need to worry about poor power factor.

For a commercial or industrial customer with poor power factor they will have larger than expected electrical currents flowing through their electrical power system. These higher currents can result in unexpected overloads and outages. Larger currents also require higher capacity on-site electrical distribution equipment. Such equipment will often need more dedicated space, than its lower capacity equivalent, reducing the amount of productive space available on a site.

For a utility company the principal costs that it incurs from its customers' poor power factor, are from the



required increase in distribution capacity. The additional reactive power increases the apparent power that the distribution network must handle. This decreases the network's efficiency and can also result in voltage drops on long transmission lines. The electricity network requires higher capacity, more expensive power lines, transformers (such as voltage regulating step-up transformers), and generators, and the customer will ultimately inherit the increased costs for this. If there are many utility customers with poor power factor in one region, localized overloads of the distribution network may occur. Like with a commercial or industrial customer, poor power factor can increase the environmental footprint of a utility company.

How do you know if poor power factor is costing you money?

If you know or suspect that poor power factor is costing you money, the best place to begin your search is to review your utility bill. Do you have a power factor surcharge applied to your account? This surcharge appears when your power factor is below 90%. It is used to recover the cost of supplying reactive power to you, which isn't included in other charges.

The next step is to find out what is causing the problem with the help of an expert such as electrical engineers will analyze your electrical power system and pinpoint the problem. They will help you to identify a solution that will not only reduce the costs associated with poor power factor but also recommend cloud-based monitoring service like In-Site Power Monitoring that will provide real-time data about your power

quality including actionable information on energy consumption, power quality trends, and power events. This type of all-inclusive solution enables businesses to continuously detect power threats, help determine the root cause of a power problem, and take action when necessary. Which eliminates hours of troubleshooting and hiring third-party analysts wasting both time and money.



ABOUT US

Powerside, manufactures PQube® 3 power analyzers and low and medium voltage capacitor and filter banks. Our power quality products, engineering, and services cover a range of low-voltage and medium voltage applications up to 35kV.

Powerside serves companies in the power and energy, data center, transportation, medical, semiconductor, telecom, manufacturing, military, and government. We have deployed 50,000+ monitoring solutions and delivered 5,000+ correction projects in over 50 countries.

Powerside has headquarters and manufacturing facilities in both Montreal, Quebec, and Alameda, California.

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