



## electricchoice

# Understanding Power Factor

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Power Factor is a term that applies to the supply and delivery of electric power, and it may affect your costs for electric service. Power Factor isn't easy to explain, but if you are an Electric Choice primary customer it may be a significant part of your Detroit Edison electric distribution bill.

### What Is Power Factor?

To understand Power Factor, you first have to know the components that contribute to it: Working, Reactive, and Apparent Power.

- **Working Power** is the current (and voltage) actually consumed and registered on the meter at your location. It performs the actual work, such as creating heat, light, and motion. Working power is expressed in kilowatts (kW).
- **Reactive Power** does no useful work, but it is needed to sustain the electromagnetic field associated with many commercial/industrial loads, taking up space in the distribution lines. Reactive power is expressed in kilovolt-amperes-reactive (kVAR).
- **Apparent power** represents the total required capacity, working and reactive power, and is expressed in kilovolt-amperes (kVA). Electrical equipment, such as generators and transformers, is rated in kVA.

*Power Factor is the ratio of Working Power to Apparent Power—or kW/kVA.*

### Why Is Power Factor Important?

Power Factor can affect your total energy costs. Improving the Power Factor improves efficiency, often resulting in significant economic savings. Benefits derived from improving your Power Factor may include:

- Reduced energy and distribution costs
- Lower distribution losses in your electrical system
- More consistent voltage regulation
- Increased available capacity to serve actual working power requirements
- Reduction or elimination of Power Factor Charges

### What are Power Factor Charges?

Power Factor values typically range from 0.80 to 0.98 and are often expressed as a percentage (80% to 98%). For Electric Choice customers, excess Reactive Power resulting from operations below 80% Power Factor will be charged \$3.50 for each excess kVAR.

For more information about Power Factor Charges you can refer to Detroit Edison's Rate Book (Rate Schedule No. D6, Power Factor Clause, Retail Access Service Customers) by visiting the Michigan Public Service Commission Web site at [michigan.gov/mpsc](http://michigan.gov/mpsc).

### How Is Power Factor Shown on My Bill?

Power Factor information is shown in the detail area of your bill:

- **On-peak Billing Demand** is the single highest 30-minute integrated kW reading of the interval demand meter during the on-peak hour of the billing period; it represents Working Power in the Power Factor calculation.
- **(kVAR) Coincidental Max Demand at Site** is the coincidental kVAR reading when the on-peak billing demand occurs; it represents Reactive Power in the Power Factor calculation.
- **Coincidental Power Factor** equals:
 
$$(Working\ Power) / \sqrt{(Working\ Power)^2 + (Reactive\ Power)^2}$$
- **Excess kVAR for PF less than .8** is the difference between the coincidental kVAR reading and kVAR calculated at 80% Power Factor.

### What Kind of Loads Contribute to Poor Power Factor?

If you have inductive loads, which require the use of a magnetizing current to create a magnetic field, you may have Power Factor considerations. Inductive characteristics are more pronounced in motors and transformers and are found more often in commercial and industrial facilities. One of the worst offenders is a lightly loaded induction motor, often found in "cycle processes"—for example, in the operation of saws, conveyors, and grinders—where the motor must be sized for the heaviest load. Other sources include: welders, induction furnaces, standard stamping machines, and single stroke presses.

### What Can Be Done to Improve Power Factor?

The best way to improve Power Factor depends largely on the particular operating considerations involved. In some cases, motors or transformers can be sized more closely to the actual work requirement, effectively improving the Power Factor. It may be that motor idling or "no load" running periods can be reduced, producing a twofold benefit: improved Power Factor and more effective energy management. In addition, the installation of low-cost, Power Factor correction capacitors can offer one of the most effective corrective measures. You may want to check with a consulting engineer to find out whether this corrective measure could improve efficiency.

For more information about Power Factor you can search the Internet, or call Electric Choice Customer Support at 1.888.235.3535.