The Total power demand that a customer places on the network has two components: Real power (kW) and Reactive power (kVA). Customers consume Real power to perform work at a particular time. Real power is converted to motive power, light or heat in your premises. Reactive power arises due to energy stored in the load and returned to the source; it does not perform useful work. The Total power (kVA) demand on the network is usually greater than the Real power.

The ratio of the Real power to the Total power is termed the power factor. The power factor of a load is a number between 0 and 1.

A simple analogy to explain power factor is that of a cappuccino or a glass of beer. Here the mug or the glass must have sufficient capacity to contain both the coffee or the beer and the froth, corresponding to the Total power. The froth represents the Reactive power and the liquid represents the Real or Active power. Yet we only gain real value from the liquid.

The higher power demand of a customer with low power factor (more kVA) requires larger capacity lines and other equipment. The higher demand also increases the energy lost in the electrical network (which is proportional to the square of the Total power).

The relationship between these power components is shown below. Most customers have equipment like motors and transformers that consume Reactive power.

The closer the power factor is to 1.0, the more efficiently the network can be designed and utilised. Reactive power is usually supplied using capacitors. A lagging power factor is where the network supplies Reactive power to the customer.
In some circumstances, usually where the customer has a generator, the customer may supply Reactive power to the network. Ergon Energy will consider customer installations with a leading power factor on a case-by-case basis and require the customer to take action where the quality of supply to other customers would be compromised.

Improved power factor will reduce Ergon Energy’s costs for all customers by reducing the capacity the network must provide.

For this reason we consider a site’s power factor in the charges we apply to our largest users. There are also regulatory requirements to maintain a site’s power factor at set levels, and so it is something all businesses should understand.

**MEASURING ELECTRICITY DEMAND**

- **Capacitors can improve power factor by reducing Reactive power taken from the network**

**UNITS OF MEASUREMENT**

- **Real power:** kilowatts (kW)
- **Total power:** kilovolt amperes (kVA)
- **Reactive power:** kilovolt amperes reactive (kVAr)

Power factor = \[
\frac{\text{Real power}}{\text{Total power}}
\]

- **Leading power factor** (kVAr Absorb)
- **Lagging power factor** (kVAr Supply)

**How can I find out more?**

Regarding network tariff changes:
Please go to www.ergon.com.au/futurenetworktariffs

**Email:** futurenetworktariffs@ergon.com.au

Regarding options to improve power factor through energy management:
Please go to www.ergon.com.au/network/manage-your-energy

**Email:** demandmanagement@ergon.com.au