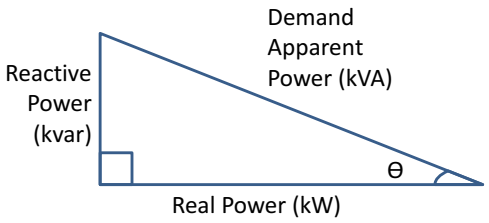
Appendix E – Calculation of Power from interval data

Interval meters that comply with the National Electricity Rules record kWh and kvarh consumption in 30-minute blocks aligned with the hour and half hour – and in Australian Eastern Standard Time (AEST). These are also called Trading Intervals. For example, kWh consumption between 11:00 and 11:30 is a trading interval. Similarly, 11:30-12:00 is a trading interval.

The NEM also allocates Data Stream Identifiers to correctly tag the data from the meters:

Import kWh (real energy generation by customer)	B
Export kWh (real energy consumption by customer)	E
Import kvarh (leading reactive energy)	K
Export kvarh (lagging reactive energy)	Q

Network capacity charges are based on the Real Power (kW) or Apparent Power (kVA). kW can be derived directly from kWh. However Apparent Power requires an intermediate calculation, explained by the Power Triangle diagram, which describes the relationship between all three types of power. It also describes the term of Power Factor.



$$Power\ Factor = \cos(\theta) = \frac{Real\ Power}{Apparent\ Power}$$

$$Apparent\ Power = kVA = \sqrt{kW^2 + kvar^2}$$

E.1 Power principle

A customer's maximum power is a measure of the capacity that must be provided by the network. Power has two components, termed real and reactive:

- The Real Power is that which performs useful work, such as providing heating and motion.
- The Reactive Power component is necessary for the flow of real power, and is part of the total demand upon the supply system. The distribution network must be built to carry the Apparent Power.

Reactive power typically results from the inductive loads such as coils in industrial AC inductive motors and transformers. It is the inductance of the coils that causes the difference between the real power and the apparent power.

To determine the average apparent power for a given 30-minute interval, the following calculations are made:

$$kW = \frac{kWh_{30\,min}}{0.5} = 2 \times kWh_{30\,min}$$

$$kvar = \frac{|kvarh(lag)_{30\,min} - kvarh(lead)_{30\,min}|}{0.5} = 2 \times |kvarh(lag)_{30\,min} - kvarh(lead)_{30\,min}|$$

$$kVA = \sqrt{kW^2 + kvar^2}$$

In terms of NMI data stream suffixes, this can be simplified to the following calculation for each **30-minute** interval:

$kW = 2 \times E$
$kVA = 2 \times \sqrt{E^2 + (Q - K)^2}$