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## **ESR-2021-01 Demand in a alternating current circuit**

ESR-2021-01 Demand in a alternating current circuit

Demand in a alternating current circuit is measured in volt amps.

Measuring watts dissipated at the load and sizing power source and wiring using watts works for most direct current circuits.

Alternating current circuits require additional vector calculations to determine demand on the power source.

Many smart meters can report power factor. 20 CCR section 1353 allows the Energy Commission access utility power factor data collected by utility smart meters.

Energy Data Modernization docket 22-MISC-03 is working on data access of utility smart meter data.

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*Additional submitted attachment is included below.*

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The ratio of volt amps to watts is expressed as power factor. Volt amps times power factor equals watts available to power the load.

Power factors less the one (unity) will increase the demand requiring more watts from the power source than the load dissipates.

Power factor is measured at the load. Loads can generate power that opposes power from the source. This load generated power and source generated power in opposition is dissipated in the circuit wiring.

Loads that are resistive have a unity (1) power factor, pure resistive loads do not generate power.

Power factor can be lagging or leading. Inductors cause lagging power factor. Capacitors cause leading power factor. Capacitors can be used to correct power factor of inductive loads.

Many loads are inductive, such as motors, transformers, anything that uses a coil of wire to convert power.

The best place to correct power factor is the at the load, usually by adding capacitors near a inductive load.

A power factor of 0.5 will result in a doubling of demand. Your washing machine may have such a power factor. A refrigerator may start out when new with a power factor of 0.95. Over time as the run capacitor ages, or on hot days, power factor can drop to 0.34. That causes the demand to increase three times. Devices such as capacitors can change with time and temperature.

Many smart meters can report power factor. [20 CCR section 1353](#) allows the Energy Commission access utility power factor data collected by utility smart meters.

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