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## Technical Bulletin # 2

# Power Factor Improvement

### Energy Saving by Power Factor Improvement:

In an electrical network reactive component is called a Watt less component where as the active component consumed energy to be charged in Tariff.

Utilities company i.e. KESC charge penalties for increase in reactive components by the consumer.

Rule of allowable power factor and its penalty according to NEPRA is that average power factor of consumer at the point of supply shall not to be less than 90%.

The consumer shall pay penalty of 2% increase in the fixed cost corresponding to 1% decrease in below 90%.

### Power factor Calculation

$\cos(\tan^{-1} R_1/K_1)$  where  $R_1$  and  $K_1$  are reactive and active component measure from KESC.

### Power Factor Penalty is

$(0.9 - P.f.) \times \text{Maximum Demand Charge/KW} \times \text{Maximum Demand} \times 2$

Adding or improving your power factor plant not only gives a substantial reduction on the electric bill, but saves you from penalties, and improves operational factor such as longer motorized equipment, incandescent light fixtures and transformer's life due to higher power, improved starting torque of motors due to reduced voltage drop: and lower transmission losses with in the plant due to low current.

The advantages of P.f. in addition to save in energy cost are:

1. Reduction in energy losses
2. System capacity enhancement

The imposed penalty will increase the cost of energy. However for P.f. improvement plant installation expert vigilance is required to avoid the harmonics impact and to ensure pay back of investment in minimal time.