



# Energy Performance Assessment of Equipment and SMEs

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**Energy Audits in Industrial Small Medium Enterprises  
(SMES) - Training Course**

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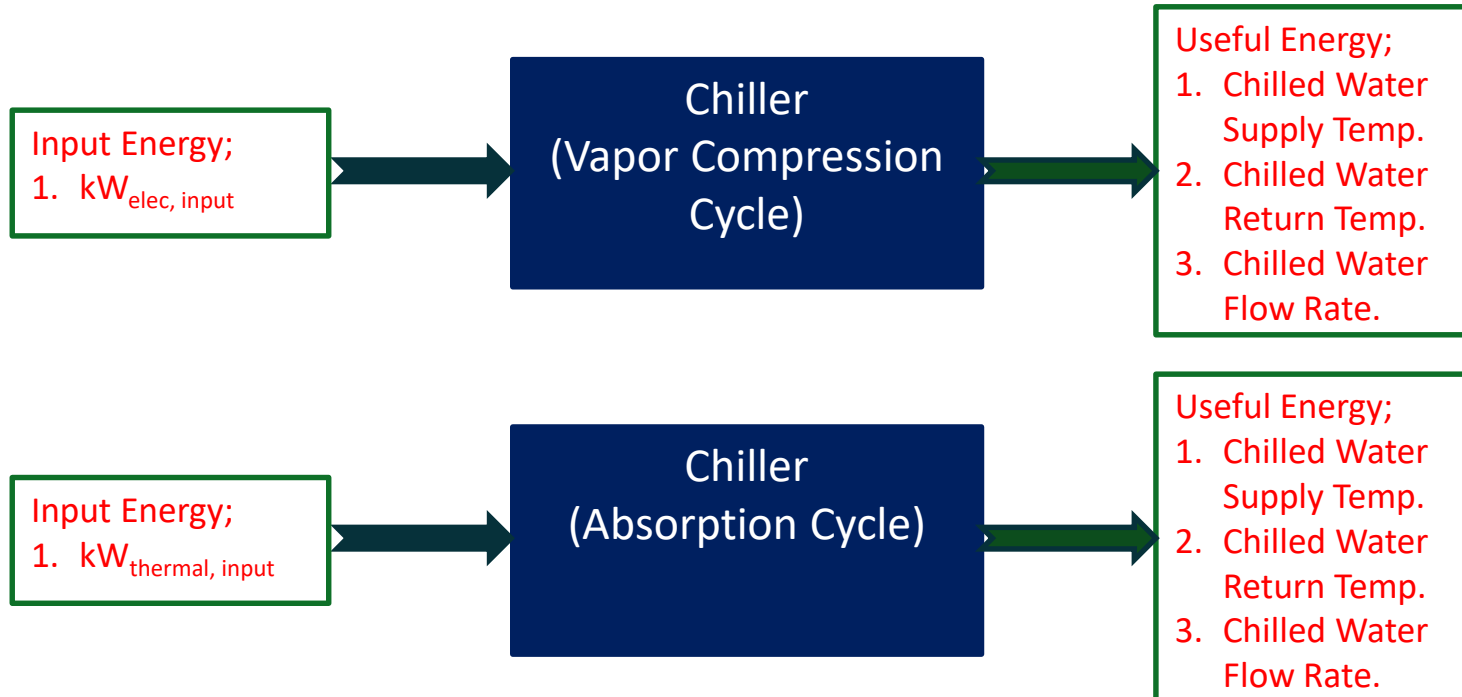
# How to Measure Facility Performance?

- The Facility Performance is measured through the efficiency;
  - The service/productivity performance efficiency.
  - The energy performance efficiency.
- Productivity should consider all inputs related to the processed material to get final product.
- Energy should consider all inputs of energy to process to compare with the useful energy exerted in the process.
- The performance efficiency is then compared to benchmarked values to similar processes or to the best practices.

# Equipment in SMEs to Measure the Performance

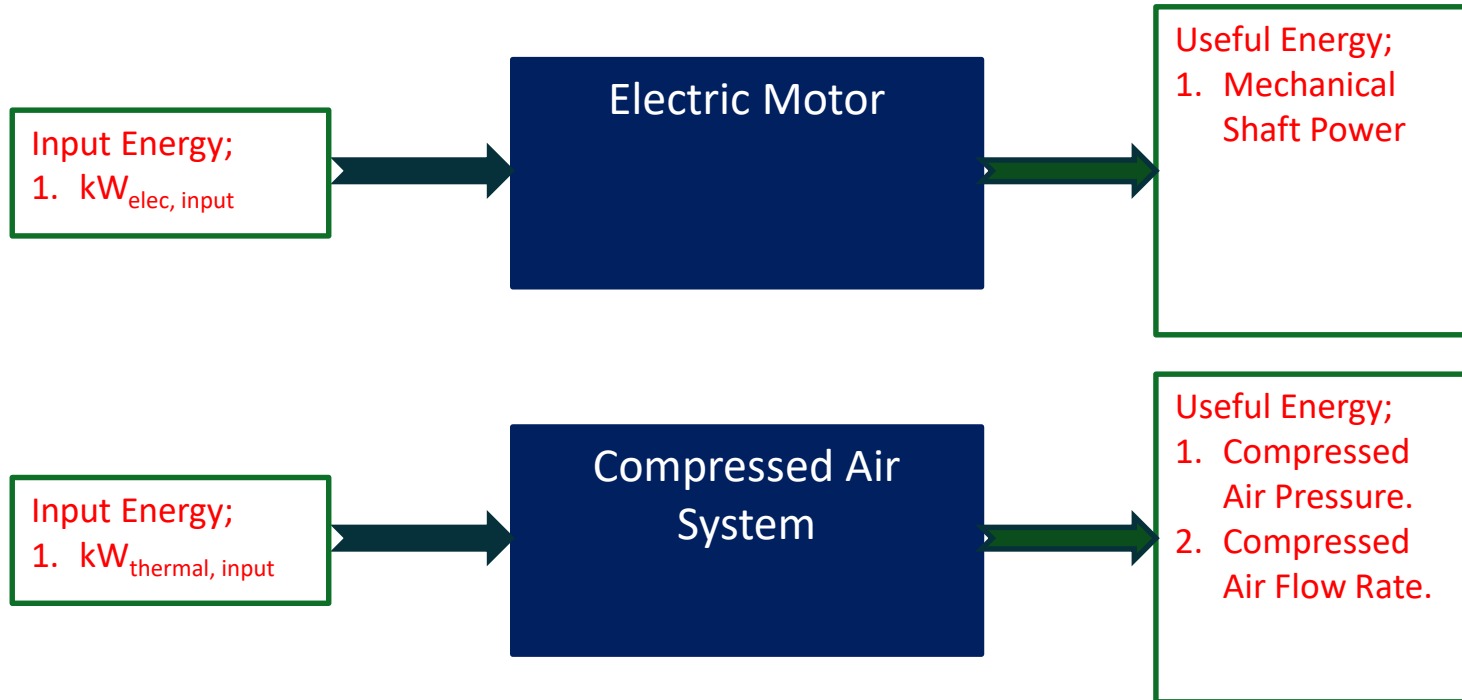
- For a process or activity, the equipment are;
  - Cooling Systems (Chillers, Refrigeration Processes).
  - Heating Systems (Hot Water Generators, Steam Boilers, Solar Water Heating, etc.)
  - Lighting System (Lighting Source Technologies – Efficacy).
  - Motors (Drives and Controllers).
  - Appliances (Washers, Fridges, etc.)
  - Compressed Air Systems.

# Systems Way of Measure



$$\text{Coefficient of Performance (COP)} = \frac{\text{Useful Energy}}{\text{Input Energy}}$$

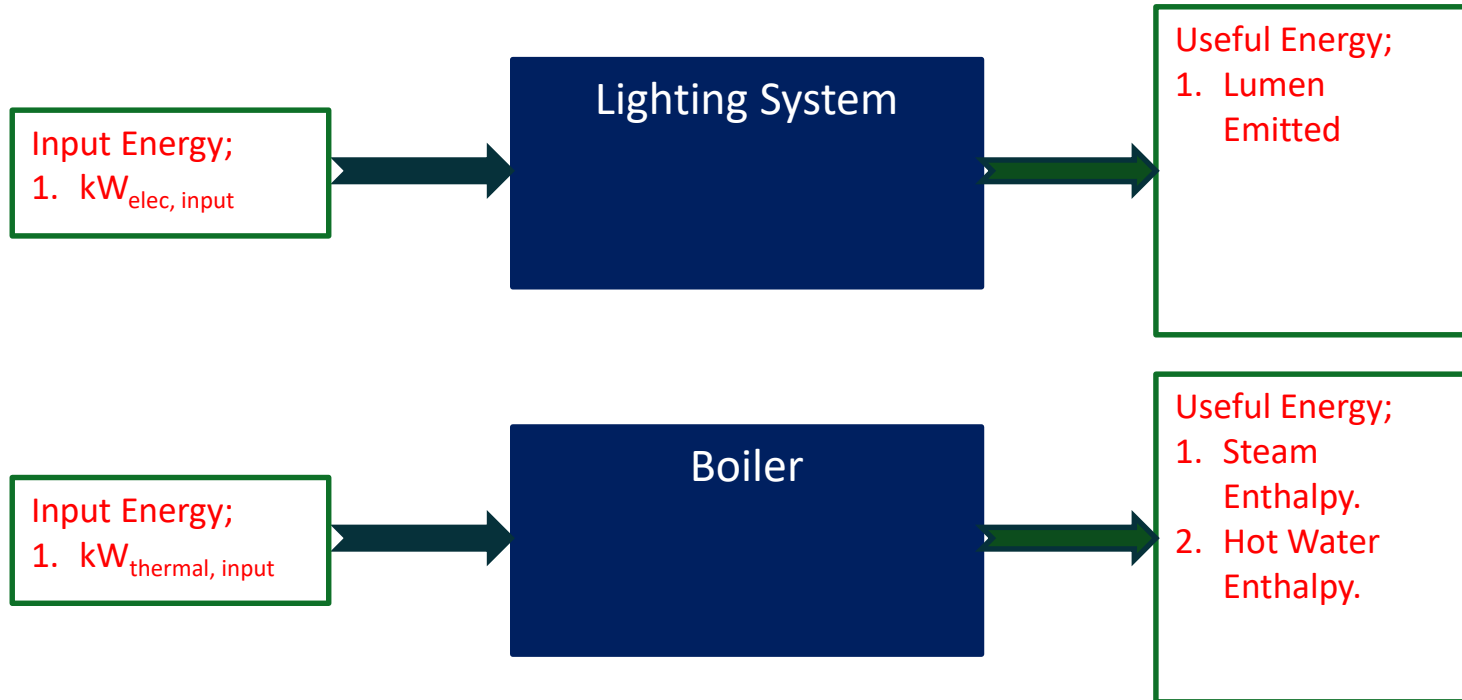
# Systems Way of Measure



$$EUI = \frac{\text{Input Energy}}{\text{Air Flow Rate}}$$

$$\eta_{motor} = \frac{\text{Mechanical Shaft Power}}{\text{Input Energy}}$$

# Systems Way of Measure



$$\text{Lamp Efficacy} = \frac{\text{Useful Energy (Lumen)}}{\text{Input Energy (Watt)}}$$

$$\eta_{\text{Boiler}} = \frac{\text{Useful Energy}}{\text{Input Energy}}$$