Power Generation Terminology

Power Density $\rightarrow$ power per unit volume $[\text{kW/m}^3]$

Specific Power $\rightarrow$ power per unit mass $[\text{kW/kg}]$

Electric Power Output $\rightarrow$ Power $\times$ time $[\text{kW}_e\text{h}]$

Rated Power $\rightarrow$ power output of a plant at nominal operating conditions

Performance Factors:

Heat Rate $\rightarrow$ number of Btu’s required to produce 1 kW$_e$h of electricity $[\text{Btu}_t/\text{kW}_e\text{h}]$

$$3412 \text{ Btu} \equiv 1 \text{ kW}_t \text{h}$$

$$\eta_{th} = \frac{\text{electrical energy produced}}{\text{thermal energy consumed}} \text{ of the cycle} \left[\frac{\text{kW}_e}{\text{kW}_t}\right]$$

Heat Rate $\equiv \frac{3412}{\eta_{th}}$

Capacity Factor $\equiv \frac{\text{average power}}{\text{rated power}}$ per a specific time period

The Capacity Factor is the ratio of “the electrical energy produced by a generating unit for a given period of time” to “the electrical energy that could have been produced at continuous full-power operation during the same period.”

Load Factor $\equiv \frac{\text{average power}}{\text{maximum power}}$ per a specific time period

Availability Factor $\equiv$ fraction of time period that power generation system is available

Unit Fuel Cost $\equiv \frac{(\text{fuel cost})(\text{heat rate of plant})}{\text{efficiency}}$