

Efficiency Examples (17:22)

Determine the output and losses for a 96.5% efficient inverter given 3kW input.

Determine the input and losses in units of W for a 62% efficient motor that is producing $\frac{1}{4}$ hp of useable mechanical output.

Determine the efficiency of a 3.3kW car charger that takes 8 hours to fully charge a 24kWh battery bank.

Determine the efficiency of a 5hp generator that runs at full capacity for 8 hours a day and in doing so consumes 2.5 gallons of gasoline. Assume 1 gallon of gasoline contains 33.4kWh of energy.

Determine the efficiency of a 77m diameter wind turbine that produces 1.5MW of useable electrical output at 12m/s. Assume air density of 1.225kg/m^3 .

$$\text{AREA} = \frac{\pi}{4} \text{DIAMETER}^2$$

$$P_{\text{AIR}} = \frac{1}{2} \text{DENSITY}_{\text{AIR}} \cdot \text{AREA} \cdot \text{VELOCITY}^3$$

Determine the efficiency of a solar panel with a 1.5m^2 surface area that produces 200W of useable electrical output when exposed to 1000W/m^2 .

Comment about the efficiency of renewable energy systems.

Determine the output of eight 15% efficient PV modules each having a surface area of 1.5m^2 when exposed to 1000W/m^2 .

Given the output of the above PV is transferred via wires that loose 50W, determine the efficiency of the wiring.

Given the output of the above wires is sent to a 98% efficient inverter, determine the useable output of the inverter.

Determine the total efficiency of the PV, wire, and inverter multistage system.

Determine the total efficiency and output of a 120m diameter wind turbine modeled in the following fashion. Assume 12m/s wind speed. Assume air density of 1.225kg/m^3 .



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