

task_f64r8g2jf4pdomfi_with_calculation

Student Group

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conversions, energy, power, area, chapter1 1

Exercise E1 Conversion: Energy, Power and Area

2. How many panels and storage (in kWh) does a car need for a (dist. in km) over 100 km? Result

\$1~\rm m^2\$ in average in December \$0.2~\{\{\rm kWh\}\over\{\rm m^2\}\}\$. The car is driven \$50~\rm km\$ per day. The size of a distinct Solar module with \$460~\rm Wp\$ (\$W_{\rm peak}\$) is \$1.9~\rm m \times 1.1~\rm m\$.

$$\begin{aligned} A &= 1.9 \cdot 1.1 \cdot 1000 \cdot 0.2 = 419.2 \text{ m}^2 \end{aligned}$$

.. What is the average power consumption of the car per day?

$$A = 419.2 \text{ m}^2 \cdot 0.2 \text{ kWh/m}^2 = 83.84 \text{ kWh} \quad \text{and} \quad W = 460 \text{ Wp} \quad \text{and} \quad 1 \text{ panel} = 2.1 \text{ m}^2$$

$$\begin{aligned} \text{Solution} \quad \frac{83.84 \text{ kWh}}{2.1 \text{ m}^2/\text{panel}} &= 39.92 \text{ panels} \quad \text{and} \quad \frac{83.84 \text{ kWh}}{460 \text{ Wp}} = 0.182 \text{ kWh/Wp} \\ &\Rightarrow 19.04 \text{ panels} \end{aligned}$$

$$\begin{aligned} \frac{W}{l} &= \frac{16 \text{ kWh}}{100 \text{ km}} = 0.16 \text{ kWh/km} \\ W &= 50 \text{ km} \cdot 0.16 \text{ kWh/km} = 8 \text{ kWh} \end{aligned}$$

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