

task_f64r8g2jf4pdomfi_with_calculation

Student Group

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Exercise E1 Conversion: Energy, Power and Area

2. How many panels and storage (in kWh) does a car need to be able to drive 100 km per day? \$ and an usable battery capacity of \$60~{\rm kWh}\$. Solar panels produces per

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

$$\begin{aligned} A &= 1.9~{\rm m} \times 1.1~{\rm m} = 2.09~{\rm m}^2 \end{aligned}$$

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

$$A \approx 2.1~{\rm m}^2 \quad \text{Energy per day} = 2.1~{\rm m}^2 \times 0.2~{\rm kWh/m}^2 = 0.42~{\rm kWh}$$

$$\begin{aligned} \text{Solution} \quad \frac{0.42~{\rm kWh}}{2.1~{\rm m}^2/\text{panel}} &= 0.2~{\rm kWh/panel} \\ \frac{60~{\rm kWh}}{0.2~{\rm kWh/panel}} &= 300~{\rm panels} \end{aligned}$$

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

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