Nov 2
Photovoltaic (Solar) Cell Engineering

Insolation $\approx 220 \text{ W/m}^2 \text{ avg US}$

$\text{Violet light } = 3.1 \text{ eV}$
$\text{Red light } = 1.8 \text{ eV}$
$\text{Average sunlight } = 2.5 \text{ eV}$

How many photons per second per square meter?

$$\frac{2.5 \text{ eV} \times 1.6 \times 10^{-19}}{2.5 \text{ eV}} = 4 \times 10^{-19}$$

$$\frac{220 \text{ J/s}}{4 \times 10^{-19}} = 5.5 \times 10^{20} \text{ photons/s/m}^2$$
\[
\frac{5.5 \times 10^2 \text{ photons}}{5 \text{ m}^2}
\]

Photocells are 11%-12% efficient

\[220 \text{ W/m}^2 \] are daily usage

How big a photocell would you need to generate this

\[25 \text{ W/m}^2 \text{ of useful energy} \]

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\frac{18000 \text{ Wh}}{\text{day}} = \frac{18000 \text{ Wh}}{24 \text{ h}} = 750 \text{ W}
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\frac{750 \text{ W}}{25 \text{ W/m}^2} = 30 \text{ m}^2
\]

\[15 \times 6 \text{ m}^2\]
Ponderable: Sorry, I have a code…