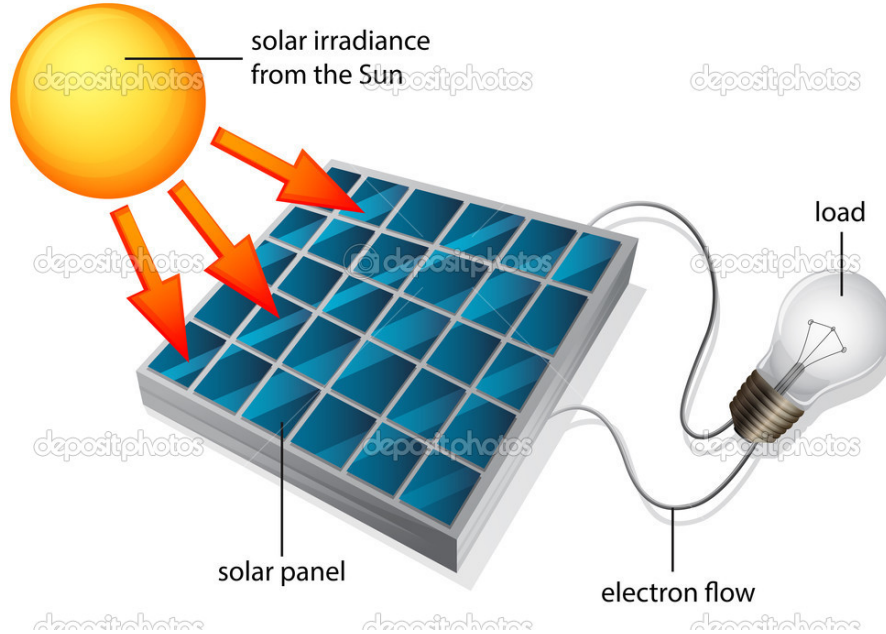# Solar Energy Diagram

A solar photovoltaic (PV) panel (or module) produces electricity by converting the energy from the sunlight (photons) into electrical energy (direct current) by using semiconductor materials, like silicon, that exhibit the photovoltaic effect. **Solar PV panel efficiency** is the ratio of the electrical output of a solar panel to the amount of sunlight energy hitting it. Current commercially-available multicrystalline silicon solar PV panels have efficiencies ranging from 14 to 19 %, which indicates the percent of sunlight energy that is converted to electricity.

The formula used to calculate the efficiency (η) in percent of a solar PV panel is: $\eta = \dfrac{P_{mp}}{E \times A} \times 100$

where, η = efficiency in percent

P_{mp} = maximum power output (electrical) of solar PV panel in watts (W)

A = surface area of the solar PV panel in square meters (m^2)

E = solar irradiance (strength of light energy hitting the panel) in (W/m^2)

1. What is the efficiency of a solar PV panel that has a surface area of 1.4 m^2 and produces 200 W maximum power when exposed to solar irradiance of 1000 W/m^2? **Round your answer to the nearest tenth of a percent.**

2. On a sunny, summer Texas day, the solar irradiance was measured at 1200 W/m^2. How much electrical power would a solar panel produce if it has a surface area of 1.5 m^2 and an efficiency of is 16%?