**Problem**

The demand for energy-efficient and sustainable sources of energy is mounting amidst the changing climatic conditions globally. The traditional methods for generating energy are predominantly based on fossil fuels and have created major shortcomings in terms of environmental degradation, greenhouse gas emissions, and availability. Fossil fuel extraction and burning emit high levels of carbon dioxide and other greenhouse gases into the atmosphere, contributing largely to the issue of global warming and, therefore, climate change. More greenhouse gases mean an increment in global temperatures, hence escalating occurrences and severity, melting polar ice caps, and increasing sea levels. Besides this, the practice is generally associated with deforestation, soil erosion, and water contamination; all activities leading to further destruction of ecosystems and biodiversity.

The photovoltaic cells are considered as a compromise towards sustainable energy. However, they have their disadvantages. Their efficiency is constrained by the quality of the semiconductor material, angle of sunlight as well as variations in temperature. under optimum conditions, most commercial PV cells can only be efficient within the range of about 15-20%, meaning that a large percentage of the energy from the sun does not get converted to usable electricity. Besides, solar energy is inherently an intermittent form of energy because solar intensity variation will tend to change with the respective time of the day, weather conditions, and geographical location. This intermittency leads to a problem of generating constant power and hence cannot be solely depended on in the absence of strong energy storage systems or complementing power sources. The advanced materials, such as silicon, employed in the manufacturing of current PV cells, are costly and need an energy-intensive process for their production. All of this hugely adds to the cost of the solar power system and makes it less amenable for general applications, especially in developing areas.