

## **Towards a Solar Economy**

Rakesh Agrawal  
Winthrop E. Stone Distinguished Professor  
School of Chemical Engineering  
Purdue University

Fossil resources, including oil, coal, and natural gas, have played an unprecedented role in human history. The availability of fossil energy in large quantities has powered human civilization at an unprecedented rate for more than two centuries. However, in spite of a recent surge in fossil resource availability, with the ever-increasing rate of energy demand, it is certain that we will eventually need a sustainable source of energy. Solar energy is one such source. It is plentiful and its use can meet our daily needs for food, chemicals, heat, electricity, and transportation for any foreseeable future.

The challenge with the transition from a fossil resource-based economy to a solar economy is that we have to learn to harness, transform, and store solar energy to make it available when we need it. Because of the diluted intensity and intermittent availability of solar irradiation, this has been a problem. Methods to collect and transform solar energy have to become both efficient and inexpensive to support widespread use. This lecture will address these challenges and an interdisciplinary approach for finding potential solutions. Sustainable solutions for transportation, production of fuels and chemicals, large-scale storage, and around-the-clock power generation will be presented. Co-production and co-use of hydrogen and electricity that can enable the entire solar economy will also be discussed.

We are living in an exciting time – a time to debate and prepare for the eventual transition from a fossil-based economy to a sustainable economy based on solar energy.