

## Solar: The way forward for sustainable Energy in India

**P.S.M Phanisri, K. Ravi Kumar, Jessie Suneetha W and V. Chaitanya,**  
Krishi Vigyan Kendra, Wyra Khammam District, PJT Agricultural University

ARTICLE ID: 47

### Introduction

India stands at a crucial position in its energy future, facing the challenges like rapid economic growth, largest population in the world and increasing energy demand, while confronting the global climate crisis. With its vast geographical diversity and a large number of sun-drenched days, India's position in globe is such a way that India can harness the potential of solar energy.

Solar Energy is radiations from the Sun capable of producing heat, causing chemical reactions, or generating electricity. The total amount of solar energy incident on Earth is vastly in excess of the world's current and anticipated energy requirements.

In the 21st century solar energy has become increasingly attractive as a renewable energy source because of its inexhaustible supply and its non-polluting character, in contrast to the finite fossil fuels coal, petroleum, and natural gas.

India's ambitious renewable energy targets and associated policy and reform framework have been an important factor for the sector's development. As the natural resources such as coal, petrol, diesel are. India's energy demand is high driven by the growing population, urbanization and industrialization. The International Energy Agency predict that India's energy consumption will grow significantly in the coming decades, potentially doubling by 2040.

IEEFA (Institute for Energy Economics and Financial Analysis) and CEF (Climate Energy Finance) forecast India's renewable energy capacity to grow rapidly with 35-40GW of new capacity additions annually through to FY2029/30, reaching 405GW. Due to the competition from variable renewable energy sources, hyperinflation in fossil fuel commodity prices and increased global capital. Historically country relied on fossil fuels, particularly coal, which accounts for around 55% of its electricity generation. However, due to depletion of non-renewable resources and environmental and health hazards due to fossil fuel consumption air pollution in Indian cities where millions suffer from respiratory illness leading to poor air quality.



India is already experiencing the effects of climate change with weather patterns droughts floods and rising temperatures affecting agriculture output and livelihood. As a part of Paris agreement India has committed to reducing its carbon emissions and increasing the share of renewable energy in its energy mix. India's has an abundance of sunlight receiving an average of 4 to 7 kilowatts of solar radiation per square metre per day with over to 300 sunny days annually in most parts of the country. Hence to utilise the solar in full potential the national solar mission launched in 2010 as a part of India's national action plan on climate change set an initial target of achieving 20 gigawatts of with connection solar power by 2022 this target was later revised 200 gigawatts as a solar sector gained momentum and technological advances made solar energy more viable and cost effective.

### **Creating a Sustainable World**

India is the 3rd largest energy consuming country in the world. India stands 4th globally in Renewable Energy Installed Capacity (including Large Hydro), 4th in Wind Power capacity & 5th in Solar Power capacity (as per REN21 Renewables 2024 Global Status Report). The country has set an enhanced target at the COP26 of 500 GW of non-fossil fuel-based energy by 2030. During its G20 presidency, India unveiled the 'Roadmap of Solar Energy for Universal Energy Access', highlighting solar energy's critical role in ensuring widespread access to electricity and driving socio-economic progress. The Interim Union Budget for 2024–25 further underscores this commitment by considerably increasing funding for green infrastructure. Specifically, the budget for the central sector scheme on grid-connected solar power has seen a substantial increase to US\$ 1,204 million (Rs. 10,000 crores) in 2024–25, up from the revised estimate of US\$ 572.6 million (Rs. 4,757 crores) in 2023–24, demonstrating the government's strong support for solar energy development.

### **Solar energy for Agriculture:**

The important benefit of solar energy in agriculture is its ability to provide a reliable source of energy, even in remote and rural areas where access to the electrical grid is limited or unavailable. This can be particularly important for irrigation systems, where access to water is critical for agriculture. The use of solar energy in irrigation systems can provide a reliable source of water, even during power outages or other disruptions, ensuring that crops are not affected (Azarpour et al., 2013). Demand for energy in the agriculture sector has increased significantly to meet the needs of a growing population and an increasing demand for food.

This demand along with the need for powering agricultural equipment like pumps, generators, motors, tillers, etc. calls for an alternative energy source that can decrease the dependency on fossil fuels and conventional energy.

### **Types of solar technologies available for agriculture:**

The use of solar energy in sustainable agriculture can help to reduce the environmental impact of farming while increasing crop yields and improving farm profitability. Solar energy can be used in a variety of ways in sustainable agriculture, including:

- ✚ **Solar-powered irrigation:** solar energy can be used to power irrigation pumps and drip irrigation systems, which can help to reduce water waste and increase crop yields.
- ✚ **Solar-powered greenhouses:** Solar energy can be used to power temperature control systems in greenhouses, allowing farmers to grow crops year-round and extend the growing season.
- ✚ **Solar-powered dryers:** Solar energy can be used to dry crops, such as fruits and vegetables, after harvest. This can help to reduce the need for fossil fuels and improve the shelf life of crops.
- ✚ **Solar-powered sensors and control systems:** Solar energy can be used to power sensors and control systems that monitor soil moisture levels, crop growth, and weather conditions. This can help farmers to optimize their farming practices and make more informed decisions.

### **Solar-powered cooling systems**

In many cases, farmers face huge losses due to the lack of availability of proper refrigeration and cooling systems in their farms. Even if they have a refrigeration system, it becomes very difficult to power them all day with constant power cuts and outages. Solar-powered cooling systems will help in tackling this problem.

### **Solar-powered electric vehicles:**

Solar energy can be used to power electric vehicles used on the farm, reducing emissions and fuel costs can be also be for small farm implements like brush cutter, sprayers, solar fencing system.

### **Electricity supply in rural areas**

Farms might be located in remote areas where the electricity supply is limited and farmers may constantly face issues related to power outages and shortages for running their equipment, and tools on the farms.



Solar PV systems in the farms will produce the required electricity that is stored in the batteries and used when required. This will not only help in reducing the power consumption from the electricity supply but also saves money for farmers in the long run Overall, the use of solar energy in sustainable agriculture can help to reduce the environmental impact of farming, increase crop yields and improve farm profitability.

Solar energy may change the way of farmers, from manual to modern equipment's further overcoming the pitfalls of labour shortages. This will make a way for sustainable agriculture which is need of the hour.

