

Agri-photovoltaics (AgriPV)

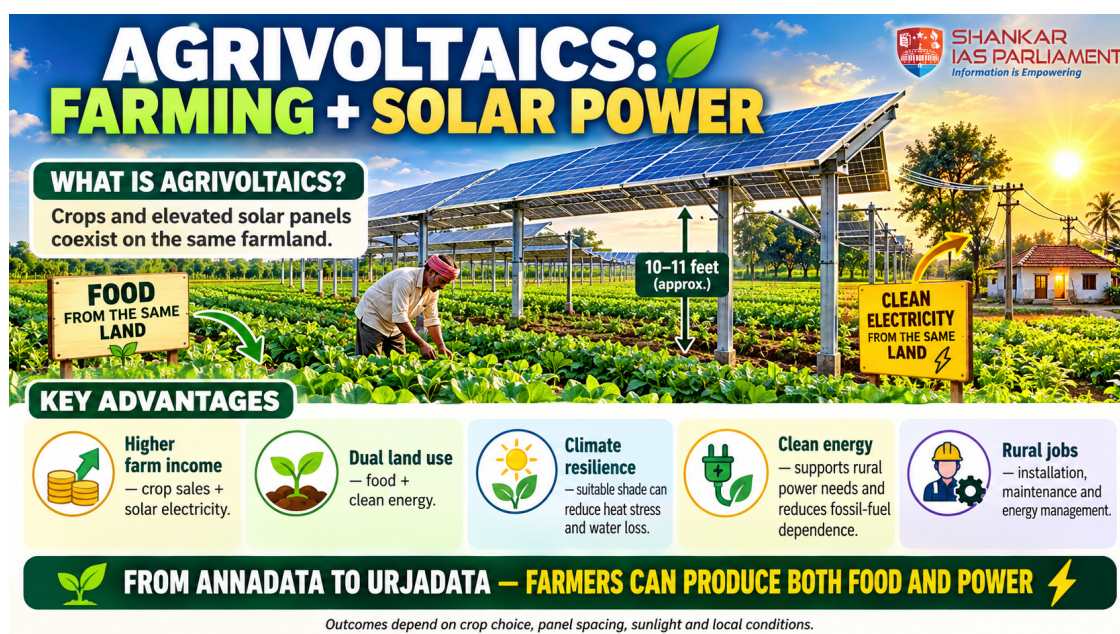
Mains: GSIII - Agriculture

Why in News?

The Agri-photovoltaics (AgriPV) is showing better opportunity for Indian agriculture future and with providing energy security.

What Is Agri-Photovoltaics (Agrivoltaics)?

- **Agri-photovoltaics** – It is a system in which agricultural crops and solar panels coexist on the same land.
- Solar panels are installed *at a height of approximately 10-11 feet*, with adequate spacing to allow sunlight to reach crops.
- **Enables** – Farmers to generate income from both agricultural production and solar electricity.
 - Farmers become both annadatas (food providers) and urjadas (energy providers).



What are Potential Benefits of Agri-Photovoltaics?

- **Higher farm incomes** – Farmers earn from crop sales as well as electricity generation.
- **Efficient land use** – The same land supports food production and renewable energy generation.

- **Climate resilience** – Panel shade may reduce heat stress and water loss for suitable crops, depending on local conditions and system design.
- **Clean energy transition** – Solar electricity can support rural energy needs and reduce dependence on fossil fuels.
- **Additional rural employment** – Installation, maintenance and energy management can create local economic opportunities.

An ICRIER pilot project in Rajasthan increased a farmer's income by 8 to 10 times.

How Can Agri-Photovoltaics Be Promoted in India?

- **Reforms PM-KUSUM** – Adapt the scheme to support agrivoltaic installations, drawing on the subsidy approach of PM-Surya Ghar.
- **Ensures remunerative electricity tariffs** – Provide a predictable feed-in tariff for surplus electricity supplied to the grid.
- **Promotes farmer participation** – Enable farmer producer organisations (FPOs), cooperatives and self-help groups to aggregate investments and share infrastructure.
- **Facilitates affordable finance** – Offer concessional loans, credit guarantees and suitable insurance to reduce initial investment risks.
- **Supports research and development** – Identify crop varieties and panel configurations suited to different agro-climatic regions.
- **Strengthens grid infrastructure** – Improve rural transmission and distribution networks to absorb decentralised solar power.

What Are the Major Challenges in Implementing Agrivoltaics?

- **High initial investment** – Solar panels, mounting structures and grid connections require substantial capital.
- **Land and design constraints** – Poor panel placement may reduce sunlight and agricultural yields.
- **Unequal access** – Small and marginal farmers may struggle to secure finance and technical assistance.
- **Grid connectivity issues** – Limited evacuation capacity and uncertain tariffs can reduce project viability.
- **Maintenance and technical capacity** – Farmers need training, reliable maintenance services and transparent power-purchase agreements.

What Is the Role of Government Schemes?

Scheme / initiative	Potential role in promoting agrivoltaics
PM-KUSUM	Supports decentralised solar generation and solar pumps; could be adapted to encourage crop-compatible installations.

PM-Surya Ghar	Offers a reference for subsidy design, although its existing residential rooftop framework does not directly cover agrivoltaics.
Agriculture Infrastructure Fund (AIF)	Can support eligible post-harvest infrastructure and related agricultural assets.
Kisan Credit Card (KCC)	Provides access to agricultural credit; additional financing arrangements may be needed for solar infrastructure.
Formation and Promotion of 10,000 FPOs	Facilitates collective investment, bargaining power and access to technical services.
PMKSY - Per Drop More Crop	Promotes micro-irrigation and efficient water use, complementing suitable agrivoltaic systems.

What is the Way Forward?

- **Adopt an integrated approach** - Link farmers' income enhancement with food production, water conservation and renewable energy.
- **Undertake region-specific implementation** - Design projects based on local crops, climate, soil and electricity demand.
- **Ensure equitable benefits** - Prioritise small and marginal farmers through FPOs, shared infrastructure and affordable financing.
- **Strengthen energy markets** - Ensure grid connectivity, timely payments and predictable electricity tariffs.
- **Evaluate outcomes** - Measure changes in net farm income, crop productivity, water use and environmental impacts.
- **Integrate crop diversification** - Encourage suitable pulses, oilseeds, horticulture and fodder crops alongside solar generation.

What lies ahead?

- Agrivoltaics can help transform Indian agriculture from a predominantly food-producing activity into a dual-income system combining food and renewable energy.
- However, its success depends on appropriate technology, viable electricity tariffs, affordable finance and protection of farmers' interests.
- Integrating agrivoltaics with existing agricultural and renewable energy programmes can contribute to sustainable rural development and the broader goal of doubling farmers' incomes.

Reference

[The Indian Express| Agri-photovoltaics \(AgriPV\)](#)



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