Tapping the Potential of Agriphotovoltaics in India

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Himanshu Chawla has an experience of around 16 years in the Power Sector across various domains and has served in various capacities at State Electricity Regulatory Commissions (DERC & HERC), Essar Power (Commissioning of 2X600 MW Power Plant) and ICRA (Consultancy) wherein he has effectively utilised his Techno-Commercial Educational qualifications of Management, Engineering and Climate Change from University of British Columbia. His last position was Joint Director (Tariff-Engineering) in DERC.

Himanshu specialises in Regulations including Tariff, Energy Storage, Supply Code, Performance Standards, Power Markets, Roof Top Solar through Net Metering, Virtual & Group Net Metering, P2P Trading, etc. He has represented his organisations across various forums like FOR, AEEE, EQ FOR, WRI, NPTI, ISGF, SKOCH, etc. as Keynote Speaker, Panellist, Expert Lecturer and also Policy Advisor to other States. He has been awarded the title of Renewable Energy leader in the country in the categories "Top 40 under 40" in 2022 and "Top 50 under 50" in 2025.

Nikita Gupta, Senior Associate – Research, Power Foundation of India
Nikita Gupta is an Economist with over a decade of experience in the research and policy domain, with a focus on the power and telecommunications sectors in India. Before joining the Power Foundation of India, she has worked with the Central Electricity Regulatory Commission, the Telecom Regulatory Authority of India, and India Infrastructure Publishing. Her expertise spans industry and market research, policy evaluation, data analysis and content development. She has led several flagship publications, including the India Infrastructure Report 2025, and has authored multiple articles in Power Line magazine. Nikita holds a Bachelor's degree in Economics from Shri Ram College of Commerce and a Master's degree in Economics from Delhi School of Economics.

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Tariq Habib is a Manager at CPI's Delhi Office, where his work focuses on analyzing solutions and insights to drive decarbonization and help businesses achieve their Net-Zero targets. Tariq has expertise in policy design, implementing reform measures, business turnaround strategy, electric mobility, and demand response.

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Anup Samal was an Analyst at CPI's Delhi Office, where his work focused on Energy Transition, Carbon Markets, and the Decarbonization of State Owned Enterprises. His responsibilities included detailed assessments of GHG emissions of the Indian PSUs, the Evolution of Carbon markets (Article 6), and finance flows for Just Transitions.

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EXECUTIVE SUMMARY

India's commitment to achieving its renewable energy targets marks a defining milestone in the country's clean energy transition. While renewable energy deployment has accelerated over the last decade, the growth remains geographically concentrated in a few states which leads to to improper price signals. In addition, issues related to land availability and evacuation infrastructure continue to pose challenges to large-scale renewable energy projects.

In this context, Agriphotovoltaics (Agriphotovoltaics), the co-location of solar power generation and agricultural activity, emerges as a promising solution that not only ensures balanced regional development but also optimises land use and strengthens rural economies. Agriphotovoltaics systems offer dual benefits by enabling solar power generation alongside agriculture, thereby ensuring diversification of income for farmers. A study by GIZ (2024) estimates that India's technical potential for Agriphotovoltaics ranges between 3,156 GW and 13,803 GW. With nearly 43% of India's land area under agriculture, the potential for Agriphotovoltaics deployment is immense.

This study by the Power Foundation of India (PFI), a registered society under the aegis of the Ministry of Power, GoI and the Climate Policy Initiative (CPI) provides an in-depth assessment of the regulatory, policy and financial landscape for Agriphotovoltaics in India. It is the first-of-its-kind study to model Feed-in Tariffs at varying Capacity Utilisation Factors (CUFs), taking into account the costs associated with elevated structures, land lease, and benefits to farmers. The modelled tariffs (based on CERC Renewable Energy Tariff Regulations, 2024), ranging between INR 3.67/kWh and INR 5.49/kWh, indicate that Agriphotovoltaics projects are economically viable Distributed Renewable Energy (DRE) systems.

The analysis further reveals that Agriphotovoltaics (DRE) projects offer lower levelized tariffs compared to non-DRE grid-connected projects, even after factoring in additional farmer benefits (INR 0.60/kWh). The impact of Transmission loss and Transmission Infrastructure in non-DRE is around INR 1.42/kWh, which gets avoided in Agriphotovoltaics projects. When compared with Rooftop Solar (RTS), prima facie Agriphotovoltaics appears costlier if farmer benefit is included, which is actually an economic benefit that may result in higher economic internal rate of return compared to financial internal rate of return comparison between projects. However, excluding this component, Agriphotovoltaics tariffs (INR 4.14/kWh + INR 0.75/kWh) are at par with RTS (INR 5.08/kWh). Agriphotovoltaics offers greater scalability, especially in dense urban areas, Group Housing Societies where rooftop potential is limited and shading issues arise.

The study recommends a multi-stakeholder approach for scaling up Agriphotovoltaics in India. Key recommendations include:

- **Ministry of Power:** Mandate the compulsory purchase of Agriphotovoltaics power under the Renewable Purchase Obligation (RPO) framework.
- **Ministry of New and Renewable Energy:** Define Agriphotovoltaics to facilitate eligibility for subsidies and streamlined approvals.
- **State Electricity Regulatory Commissions**: Adopt a feed-in tariff framework that includes elevated structure costs, land lease payments, and free power to farmers other than the Base Tariff, while mandating tripartite agreements between developers, farmers, and DISCOMs.

- **Ministry of Agriculture & Farmers Welfare**: Notify minimum agricultural yield thresholds, promote capacity building among farmers, and support pilot projects to identify shade-tolerant crops.
- **State Governments**: Amend land-use policies to allow Agriphotovoltaics installation on agricultural land without requiring land reclassification, or recognise it as a mixed land-use category.
- **Financial Institutions**: Structure loans based on PPA cash flows rather than land collateral.
- **Developers**: Align land lease tenure with PPA duration (25 years) and ensure transparent and equitable farmer compensation.
- **Farmers**: Engage in training and awareness programmes to strengthen local participation.

Agriphotovoltaics represents a win-win opportunity to enhance India's renewable energy capacity, augment farmer incomes, and promote a more inclusive and sustainable energy transition. It aligns closely with national priorities such as affordable and clean energy, land-use optimisation, rural development, and the Viksit Bharat @2047 vision.