

Farmers Have Another Money, “Green Money”

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Abstract

In this article, we introduce a new income for farmers that is “Green Money” with the help of the PM KUSUM scheme launched in March 2019. The initiative promotes renewable energy by encouraging farmers to adopt solar power, enhancing energy security and sustainability. Farmers can generate income by selling surplus solar power. PM KUSUM has three components: decentralized solar power plants, standalone solar-powered agricultural pumps, and the solarization of grid-connected pumps. The scheme reduces electricity costs, boosts agricultural productivity, and generates additional income, playing a key role in India's energy transition and supporting farmers' financial stability.

Introduction

In recent years, the agricultural sector in India has witnessed a significant transformation with the arrival of sustainable and innovative policies aimed at empowering farmers. Among these initiatives, the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM KUSUM) scheme stands out as a game-changer. This program not only seeks to promote renewable energy adoption in the farming community but also introduces a new avenue for income generation—what can be termed as “Green Money”. Under the PM KUSUM scheme, farmers are encouraged to use solar energy by installing solar panels on their lands. These solar systems serve a dual purpose: providing clean energy for agricultural activities and offering an opportunity for farmers to sell surplus power to the grid. This shift not only reduces the reliance on conventional energy sources but also empowers farmers to become energy producers, contributing to their financial stability. As a result, farmers who once depended solely on crop yields now have a diversified income stream, making them less vulnerable to the uncertainties of agricultural productivity. The concept of “Green Money” symbolizes this new financial empowerment, where the sun not only nurtures crops but also generates a reliable and sustainable source of income. ‘Green Money’ represents more than a financial term; it symbolizes a shift toward sustainable farming practices, where energy independence aligns with the

broader goals of agricultural productivity and environmental conservation.

Green Energy Cultivation

By cultivating Green Energy, we can maximize our Income and minimize our Costs. For this government launched the PM KUSUM scheme. The Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyan (PM KUSUM) scheme, launched in March 2019, aims to enhance energy security in agriculture by promoting renewable energy. It helps farmers access sustainable energy, reducing reliance on conventional sources and allows them to generate income by selling surplus solar power to the grid.

The Union Minister for New & Renewable Energy and Power has informed that the main objectives of PM-KUSUM include de-dieselization of the farm sector, providing water and energy security to farmers, increasing the income of farmers, and controlling environmental pollution. The Scheme has three components targeted to achieve solar power capacity addition of 34.8 GW by 31.3.2026 with total central financial support of Rs. 34,422 Cr.

Component A: Decentralized Ground-Mounted Grid-Connected Solar Power Plants

This component focuses on setting up small-scale solar power plants, typically ranging from 500 kW to 2 MW, on barren or agricultural land. These plants are connected to the local grid, allowing farmers to generate and sell solar power directly to distribution companies (DISCOMs).

- **Implementation:** Farmers, cooperatives, and farmer producer organizations (FPOs) are encouraged to establish these plants, either individually or collectively. The income generated from selling solar power provides farmers with a steady and reliable revenue stream, referred to as “Green Money.”

Component B: Standalone Solar-Powered Agricultural Pumps

This component aims to replace conventional diesel and electric pumps used for irrigation with standalone solar-powered pumps, thereby reducing farmers' dependence on fossil fuels and electricity grids.

- **Benefits:** Solar pumps offer multiple advantages, including reduced energy costs, reliable water supply, and zero carbon emissions. Farmers can use these pumps to irrigate their fields during the day without worrying about electricity availability or fuel costs. The government provides a 60% subsidy for the installation of these pumps, while farmers are required to bear 10% of the cost, and the remaining 30% can be financed through bank loans.

Component C: Solarization of Existing Grid-Connected Agricultural Pumps

This component focuses on converting existing grid-connected agricultural pumps into solar-powered systems. The solar energy generated can be used to power the pump, and any surplus energy can be fed back into the grid.

- **Benefits:** Solarization reduces the burden on the grid, decreases electricity bills for farmers, and provides an additional source of income from the sale of excess power.

Data of Sanctioned and Installed solar power systems in India as below (Fig.1):

- Component A is in Solar Capacity (MW)
- Component B is in Standalone Pumps (No.s)
- Component C is in Individual Pump Solar - IPS (No.s)

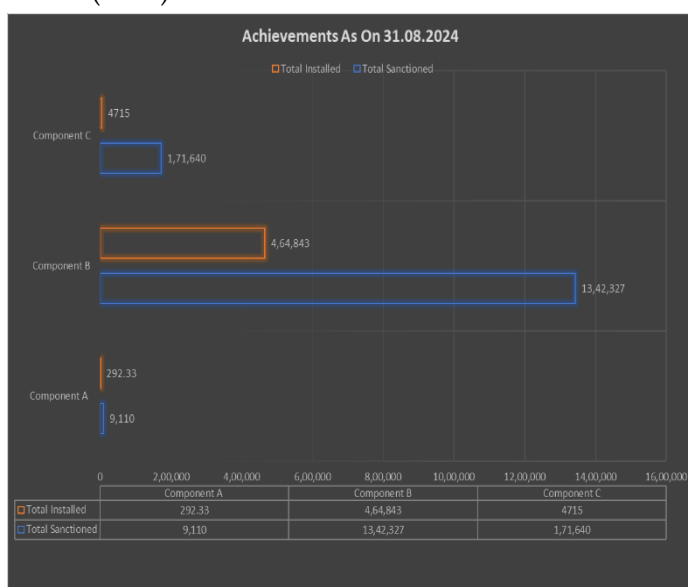


Fig 1 Data of Sanctioned and Installed solar power systems in India

As we see component B is more adopted by people rather than A and C this is because the majority of Farmers have small land holdings and, in that land, they do cultivation so they use solar pumps for irrigation purposes. Components A and C both need High Horse Power (HP) for their instalments.

Component B in Uttar Pradesh

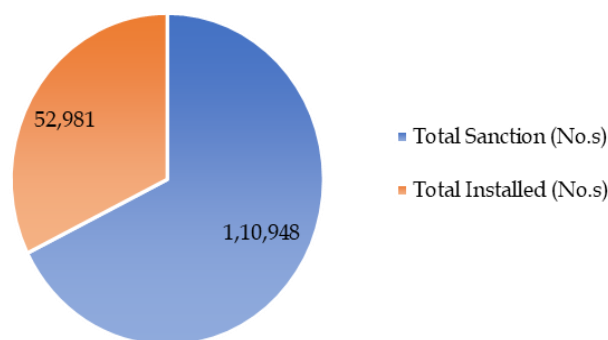


Fig 2 The Data of Component B in Uttar Pradesh is as (31.08.2024)

Financial and Implementation Details

The PM-KUSUM Scheme has been extended until March 31, 2026, with a total outlay of ₹34,422 crores. The central government provides a 30% capital subsidy, while state governments and financial institutions also participate to support farmers in adopting solar technology. By the end of 2022, over 4 lakh standalone solar pumps were installed under Component B, and around 1,500 MW of solar capacity was added through decentralized solar plants under Component A. Additionally, the solarization of existing grid-connected pumps is progressing, with thousands of pumps being converted to solar power across various states.

Earning Green Money

Farmers can earn Green Money by the PM KUSUM scheme in several ways, primarily through the generation and sale of solar power. The scheme is designed to provide multiple income opportunities for farmers by integrating renewable energy into their agricultural practices. Here's how farmers can earn through each component of the scheme:

Earnings from Decentralized Ground-Mounted Solar Power Plants (Component A)

- **Selling Solar Power to the Grid:** Under this component, farmers can install small solar power plants (500 kW to 2 MW) on their barren or agricultural land. The electricity generated from these solar plants can be sold directly to local power distribution companies (DISCOMs) at pre-determined tariff rates.
- **Income Potential:** The revenue from selling solar power provides a steady and reliable income. For instance, if a farmer installs a 1 MW solar plant, they can earn *approximately* ₹20-25 lakhs annually, depending on the

region and the tariff rate. This income is independent of agricultural output and adds financial security.

- **Lease Income:** Farmers who do not want to invest in setting up the plant themselves can lease their land to developers who install and operate the solar plants. In return, farmers receive a lease payment, providing them with another income stream.

Savings and Earnings from Standalone Solar-Powered Agricultural Pumps (Component B)

- **Savings on Fuel and Electricity Costs:** By replacing diesel or electric pumps with solar-powered pumps, farmers can eliminate or significantly reduce their fuel and electricity costs. This translates into direct savings, which can be considered as income.
- **Increased Crop Production:** The reliability of solar pumps allows farmers to irrigate their crops more effectively, potentially increasing agricultural yields. Higher crop yields lead to increased agricultural income.

Income from Solarization of Existing Grid-Connected Agricultural Pumps (Component C)

- **Selling Surplus Solar Power:** Farmers with grid-connected solarized pumps can use the solar energy generated to power their irrigation needs. Any surplus electricity that is not used for pumping can be fed back into the grid. The DISCOMs purchase this surplus power, providing farmers with an additional source of income.
- **Increased Energy Efficiency:** The solarization of pumps reduces the reliance on the grid, lowering electricity bills. These savings contribute to the farmer's income over time.

Comparison between Diesel and Solar Irrigation Pump Costs

The average cost of a 14 HP diesel pump is ₹ 35,667, and for a 7 HP diesel pump, it is ₹ 26,000. The cost of solar irrigation pumps is significantly higher, ranging from ₹ 2,61,183 for a 3 HP pump to ₹ 4,97,220 for a 7.5 HP pump. Solar pumps come with substantial government subsidies, covering a significant portion of the cost (e.g., 66.60% for a 3 HP pump, 69.13% for a 5 HP pump, and 40.45% for a 7.5 HP pump).

1. **Initial Investment:** Solar pumps have a significantly higher initial cost compared to diesel pumps, but this is offset by government subsidies.
2. **Annual Operating Cost:** Solar pumps eliminate the need for diesel, leading to substantial annual

savings (₹ 36,600.34 to ₹ 41,937.89 per farm, depending on the pump type).

3. **Payback Period:** The payback period for solar pumps ranges from 2.08 years (3 HP) to 7.06 years (7.5 HP), making them a viable long-term investment.
4. **Benefit-Cost Ratio:** The benefit-cost ratio is highest for the 3 HP solar pump (4.6), indicating it offers the most economic value.
5. **Net Present Value (NPV) and IRR:** The 3 HP solar pump has the highest NPV and IRR, making it the most economically advantageous choice among the solar pumps.

Farmers can significantly reduce their operational costs by switching to solar irrigation pumps, with potential savings of up to ₹ 41,937.89 annually per farm. The analysis (*Yash Gautam and O. P. Singh*) clearly shows that solar irrigation pumps are not only economically viable but also environmentally beneficial. The adoption of solar pumps, supported by government subsidies, provides farmers with significant cost savings and reduces their dependence on fossil fuels, contributing to a more sustainable agricultural sector in Rajasthan. Despite the higher initial investment, the economic and environmental benefits make solar pumps a more sustainable and cost-effective option in the long run.

The Only Solution

The PM KUSUM scheme is the only solution from the Government of India aimed at supporting farmers in adopting solar energy. By this farmers can earn Green Money and elevate their income. Its importance can be summarized as follows:

1. **Renewable Energy Adoption:** PM KUSUM encourages farmers to use solar energy, reducing dependence on fossil fuels and promoting sustainable energy practices.
2. **Reduced Electricity Costs:** By installing solar pumps, farmers can lower their electricity costs for irrigation, which can be a significant financial burden.
3. **Enhanced Agricultural Productivity:** Reliable and affordable irrigation through solar-powered pumps can improve crop yields and overall agricultural productivity.
4. **Income Generation:** The scheme includes provisions for farmers to sell surplus power to the grid, providing an additional source of income that is called Green Money or Income.

5. **Environmental Benefits:** Solar energy is clean and reduces greenhouse gas emissions, contributing to environmental conservation.
6. **Energy Security:** It helps in improving energy security in rural areas, where access to consistent electricity can be a challenge.
7. **Government Support:** The scheme provides financial support and incentives, making it more feasible for farmers to invest in solar technology. The central government gives 30%, the State government gives 30% (in Uttar Pradesh) and the rest 40% (10+30) is paid by the farmer (Fig.3). But in North Eastern States, Ladakh, Jammu & Kashmir, Himachal Pradesh, and Uttarakhand, Lakshadweep and Andaman and Nicobar Islands Central Government gives 50% Subsidy.

Share of Subsidy of (Component B) in Uttar Pradesh

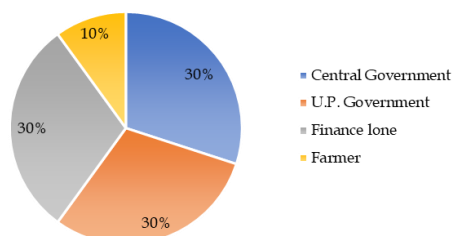


Fig 3

Overall, PM KUSUM is a step towards integrating renewable energy in agriculture, enhancing both economic and environmental sustainability.

Conclusion

PM KUSUM is more than just an energy scheme; it represents a holistic approach to rural development and agricultural sustainability. By enabling farmers to harness solar energy, the scheme addresses several critical challenges, including unreliable electricity supply, rising energy costs, and environmental sustainability. Moreover, the "Green Money" generated from solar power sales provides farmers with a stable and additional income source, contributing to their financial resilience.

Looking ahead, the success of PM KUSUM is expected to play a crucial role in India's transition to renewable energy, contributing to the national target of achieving a renewable energy capacity of 500 GW by 2030. The scheme's emphasis on decentralized solar power also aligns with the broader goal of enhancing energy access and equity in rural areas, ensuring that the benefits of clean energy reach even the most remote areas.

References

Economic Viability of Solar Irrigation Pump in Jaipur, Rajasthan: An Empirical Analysis (Yash Gautam and O. P. Singh)

Ministry of new and renewable energy

The data are taken from the National Portal PRADHAN MANTRI KISAN URJA SURAKSHA EVAM UTTHAAN MAHABHIYAN and then converted into charts Fig.1, Fig.2, and Fig.3.

Pump Type	HP	Initial Cost (₹)	Farmer's Share	Subsidy	Annual Diesel Cost (₹)	Payback Period (Year)	Benefit-cost Ratio	Net Present Value (₹)	Internal Rate of Return
Diesel	7 HP	26,000	-	-	41,937.89	-	-	-	-
Diesel	14 HP	35,667	-	-	36,600.34	-	-	-	-
Solar	3 HP	2,61,183	87,230	1,73,953	0	2.08	4.6	3,82,404.05	35.06%
Solar	5 HP	3,44,016	1,06,187	2,37,829	0	2.53	3.94	3,64,687.52	34.03%
Solar	7.5 HP	4,97,220	2,96,084	2,01,136	0	7.06	1.62	1,87,213.06	22.44%

(Yash Gautam and O. P. Singh)
