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Solar Pump in Agriculture

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Abstract
India's agriculture sector is heavily dependent on monsoons for natural irrigation. Pumps are used as an artificial means to provide water for irrigation. Farmers rely on grid electricity or diesel gen sets to run the pump, which leads to huge delays and economic stress. Hence, for our farmers, an effective irrigation system such as the solar water pump is a great boon. It increases their crop yield by ensuring a reliable and perennial supply of water to their fields. A Solar water pump is an application of photovoltaic technology which converts solar energy into electricity to run the pumping system thereby, replacing erratic grid supply and pollution causing diesel powered versions. The solar water pump is powered by solar modules that helps draw surface or ground water out for irrigation.

Keywords: Irrigation, Solar pump, Renewable energy.

Introduction
Now, India is currently the world's third largest energy consumer behind China & USA. As well as India is the third largest power producer behind China and USA. Although we are the largest producer of India, more than 300 million people in our country do not have access to electricity, which means the overall size of the entire population of the US. So, we are looking for more sources that can provide electricity. Farmers are getting more affected nowadays for their farming activities. Most Indian farmers usually depend on the monsoon to water the crops; however, irrigation can increase crop yields by up to four times. But irrigation requires energy. And currently, it is estimated that 26 million diesel and electric pumps run on Indian farms, making them the major technology offerings today. We are also looking for renewable energy for farm work. Recently we have developed solar pump for agricultural irrigation.

Most farmers in India use diesel motors. Of the total 3 crore agricultural pump sets in the country, 80 lakh (26.5 per cent) are diesel-powered. The amount of polluted air they spew is one and a half million tons per year. Also, diesel fuel is expensive. As its price is increasing day by day, it is not possible for small farmers to use it. To get free electricity, the cost of construction and pump set goes up to about one lakh. 88 percent of farmers in India and 92 percent of farmers in Tamil Nadu are small and marginal farmers with less than 5 acres of agricultural land. In this case, solar pump set irrigation is the only eco-friendly alternative to diesel. The Ministry of New and Renewable Energy (MNRE) unveiled the PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha Evam Utthan Mahaabhiyan) Scheme, which aimed to add solar and other renewable capacities of 25,750 MW.

PM- KUSUM

Ministry of New and Renewable Energy (MNRE) has launched the Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan (PM-KUSUM) Scheme for farmers. XD

PM-KUSUM Scheme supports three different kinds of installations, known as three components of the Scheme as given below:

- Component-A: Setting up of decentralized ground/ stilt mounted grid connected solar or other renewable energy-based power plants up to 2 MW capacity
- Component-B: Installation of stand-alone solar agriculture pumps of capacity up to 7.5 HP
- Component-C: Solarisation of existing grid connected agriculture pumps of capacity up to 7.5 HP

Component A of PM- KUSUM Scheme: Under this component, solar or other renewable energy-based power plants of capacity 500 kW to 2 MW can be installed on barren or uncultivable agriculture land mainly. Agriculture land is also permitted under this scheme provided that solar plants are installed in slit fashion (i.e., raised structure for installation of solar panels) and with adequate spacing between panel rows for ensuring that farming activity is not affected.

Eligibility

- ✓ Individual farmers
- ✓ group of farmers
- ✓ cooperatives panchayats
- ✓ Farmer Producer Organisations (FPO)/Water User associations (WUA).
- ✓ Land on which the project is proposed to be installed should be within 5 km from the nearest electricity substation.

Component B of PM- KUSUM Scheme: Under this Component, farmers can replace their existing diesel-powered agriculture pumps with standalone solar pumps of capacity up to 7.5 HP in off-grid areas. Pumps of capacity higher than 7.5 HP may be allowed, however, the central subsidy will be limited to the subsidy applicable for pump of 7.5 HP.

Eligibility

- ✓ Individual farmers
- ✓ Water User Associations a community

cluster based irrigation system will be covered under this component.

Component C of PM- KUSUM Scheme: Under this Component, farmers can solarize their existing grid connected agriculture pumps of capacity up to 7.5 HP. Solar PV capacity up to two times of pump capacity in kW is allowed under the scheme. However, States may choose to allow lower solar PV capacity, which in no case will be less than pump capacity in HP. The farmer will be able to use the generated solar power to meet the irrigation needs and the excess solar power will be sold to DISCOMs.

Eligibility

- ✓ Individual farmers

- ✓ water user associations
- ✓ community/cluster-based irrigation system will also be covered under this component.

Subsidy for Installation of PM-KUSUM Scheme

For all states except for North-eastern States, Hill States/UTs and Island UTs, subsidy of 30%, each by Central and State Governments will be provided, and the remaining 40% will be invested by the farmer for solarization of existing pumps. Subsidy in percentage mentioned above is applicable on benchmark cost or tender cost, whichever is lower. For North-eastern States, Himachal Pradesh, Uttarakhand, Jammu and Kashmir/Ladakh and Island UTs, subsidy of 50% will be provided by Central Government and at least 30% will be provided by the State Government for solarization of existing pumps. Farmer will have to invest balance 20%.

Benefits of PM-KUSUM Scheme

This scheme provides the following benefits:

- The Indian Government initiated the construction of solar plants that can generate an aggregate of 28,250 MW of power.
- The Government will subsidise 60% and provide a loan of 30% of the total cost. This leads our farmers to bear only 10% of the total cost to install solar plants and solar pumps.
- As per KUSUM Scheme details, our government will provide subsidies to install state-of-the-art solar pumps. They improve irrigation as they hold 720MV of capacity.
- This scheme offers our farmers an opportunity of selling the extra power generated by the plants directly to our government. This ensures the scope of increase in the income of our farmers.
- A landholder in a rural area can get a stable source of income by utilising barren and uncultivated land for solar plant implementation for 25 years.
- The solar plants will be set up above a minimum height in cultivable lands. This way, our farmers will be able to continue with cultivation after installing the plants.
- KUSUM Scheme ensures increasing use of renewable energy helps to mitigate pollution in farms and opens a gateway to eco-friendly cultivation.

Conclusion

Under the 'PM-KUSUM' scheme launched in March 2019, 20 lakh solar motors are to be provided with subsidy by December 2022. But the painful reality is that only 3.6 lakh orders have been received till March 2022 and only 82,408 have been implemented so far.

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