Framework Convention on
Climate Change

Role of solar powered lift irrigation systems in augmenting livelihoods of small holders in eastern states of India

1. *Submitting organization:*
   BAIF Development Research Foundation (5)

2. *Short description of the study:*
   Timely irrigation is crucial for agriculture which is the primary source of income for a vast majority of rural population. Only about 49% of the net sown area is irrigated while the remaining is rain-fed (1). This is further critical for the states in the eastern part – Bihar, Jharkhand and Odisha, which are behind in the development index (2). Even for those farmers with assured irrigation facility, lifting water from source to the fields is a major challenge. Absence of water lifting applications leads to drudgery in fetching and carrying water from source. It also has an adverse effect on health. Electricity supply, though highly subsidized, is largely erratic in rural areas. Fossil fuel usage for water pumping is neither economical nor sustainable. Solar energy for water lifting is a good renewable energy alternative. Being a tropical country, available solar insolation can suffice most of the requirements. However, initial cost is a hindrance which often leads the potential user to overlook the negligible operational costs. But with the advances in technology over a period of time and various assistance schemes, initial cost burden is gradually reducing.

   It is in the above context that BAIF had initiated promotion of this renewable energy application through various programs. Use of solar energy for irrigation can make the farmers self – reliant. While the focus has been on clean energy and sustainability, it is imperative to ensure that the intended application is efficient. Hence, efforts have also been taken for integrating solar water pumping with water conservation and use efficiency initiatives. Since the quantity of water required is drastically reduced in efficient irrigation systems, pumping capacity too can be scaled down resulting in reduced initial costs. Shared usage among a group can be an added advantage.

   The pilot installations commenced about a decade ago and thereafter spread to other states where BAIF has an operational presence. In spite of higher initial cost, the pilot installations adopted an approach of partial contribution to instill a sense of ownership among participants for future sustainability. As a result, the initiative was not entirely dependent on subsidies. Moreover, replication as also been done through convergence with existing schemes.

   The proposed study aims to assess the transformational effects of clean energy powered de-centralized lift irrigation systems on the livelihoods of small farmers in the selected clusters of Bihar, Jharkhand and Odisha.

   (1) Cited from Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, GoI https://agricoop.gov.in/en/RainfedDiv
   (2) National Multidimensional Poverty Index: A Progress Review 2023, NITI Aayog

3. *Geographical Region:*
   Three states – Bihar, Jharkhand and Odisha in the eastern part of India

4. *Area of climate policy:*
   Renewable energy;

5. *Short description of the policy(ies):*
   Majority of the population in India belong to rural areas where the economy is primarily agrarian. To enable economic transformation and drive growth, it is essential to focus on agriculture sector as a catalyst for rural prosperity. Since about half of the cultivated area is rain-fed, agriculture faces the challenges of low cropping intensity and irrigation gap limiting its potential to grow. These bottlenecks are more dominant in the eastern states under consideration for study.

   The national and state governments are laying emphasis on enhancing the gross cropped area through additional cropping cycles for which irrigation is a pre-requisite. To fuel this expansion sustainably, harnessing renewable energy is the viable option. India has achieved over 40% of power generation from non-fossil sources and has an ambitious target of 500 GW renewable energy generation by 2030. De-centralized renewable energy generation is promoted to align with availability – accessibility – affordability triangle. Flagship schemes like PM-KUSUM focus on large scale adoption of de-centralized solar lift irrigation systems.

6. *Work programme Area to be covered by the Study:*
   Economic diversification and transformation; Assessment and analysis of the impacts of the implementation of response measures (with a view to understanding the positive and negative impacts);

7. *If the case study will cover assessment and analysis of the impacts of the implementation of response measures, the impacts to be studied:*
   Social; Economic; Environmental;

8. *If the case study will cover assessment and analysis of the impacts of the implementation of response measures, the type of assessment (Qualitative/Quantitative/Both):*
   Both

9. *If the case study will cover assessment and analysis of the impacts of the implementation of response measures, the methodology or tool used for impact assessment:*

The study will assess the aspects related to access to irrigation, crop yield, additional income accrued to the farming household, drudgery reduction, clean energy generation and fossil fuel substitution. Participating households' economic status as compared to the baseline will be recorded to evaluate the benefits. Structured questionnaires will be used to record the responses. Concurrent evaluation with a controlled group can also be taken into account as per feasibility. Negative outcomes, if any will also be tracked for learning and improvement.

10. ***Status of proposed case study:***

    Case study has not been undertaken and will be developed in collaboration with the KCI

11. ***If the case study is completed and published, link to the case study:***

    Not applicable.

12. ***Elaboration on how the submitter would contribute to the development of the case study:***

    BAIF has established presence in these areas and therefore will be able to deploy human resources for data collection. In-house thematic experts in collaboration with KCI will develop the case study by analyzing the data and assessing the impact.