Indo-German Energy Programme – Access to Energy for Rural Areas

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Terms of Reference (ToR) for assessing field trials of portable solar pumps (PSP) in Bihar and West Bengal and to consolidate pilot learning for its necessary technical - social upgradation and / or likely replication then after

1. Background

The Indo-German Energy Programme – Access to Energy in Rural Areas (IGEN-Access) is a bilateral technical co-operation measure between the Federal Ministry for Economic Co-operation and Development (BMZ), Germany and the Ministry of New and Renewable Energy (MNRE), Government of India. The programme aims to improve the access to clean energy in the rural areas of India. The IGEN-Access project is currently being implemented in Uttarakhand, Uttar Pradesh, Bihar, West Bengal, Assam, and Meghalaya.

2. Context

IGEN ACCESS under its commitment to energize agriculture value chain possibly through renewable energy technologies and practices. IGEN ACCESS, along with partner organizations, is working towards nurturing the necessary ecosystem for solar powered irrigation systems (SPIS) and focusing its related activities in Bihar, Uttar Pradesh and West Bengal.

Under this initiative, IGEN ACCESS is also working with innovative system integrators and civil society organizations to field test portable solar powered irrigation systems or portable solar pump (PSP). Unlike fixed solar water pumps and based on user's feedback on previous design, portable solar pumps (PSP) are designed by system integrators and are expected to provide additional benefit due to its mobility features. It is also expected that, portability features of PSP will lead to easy movement of the solar pump from one farm to another, to optimize its usage.

As most small and marginal farm holders in Bihar and West Bengal have access to fragmented lands, they often prefer small capacity diesel pumps to meet their irrigation need. These small

diesel pumps, both self-owned and/or rented, are mostly portable in nature and thus capable of irrigating fragmented lands without much difficulty. Unlike big pump sets, small capacity diesel pump also gives the advantage of accessing different water sources by carrying them to respective sources. Inspired by such practice and to develop appropriate irrigation delivery model, system integrators have designed/developed portable solar pump and presently carrying out extensive field testing to take farmers' feedback before fine tuning the technology package and to develop necessary business models to popularize the PSP.

Two private players have come up with their own design for portable solar water pumps with different specifications.

In the current times the Company A[1] is testing these portable solar pumps (of 2 HP capacity) in Bihar, where they are providing the services of their portable pump at the rate of Rs. 3 for every 1000 ltrs (1 KL) of water pumped and supplied in the fields of farmers. Each portable pump of company A is mounted on e-Rikshaw along with solar PV panels that are fitted to it. Currently one operator, who is not only driving the vehicle but also do all the necessary work like connecting the pump with water sources and irrigation fields. The farmers have to place their irrigation demand to the service provider (here the company) in a week advance. The service provider after analyzing the demand from a particular area and based on the requirement send their portable pump for the services. Farmers are given a smart card through which they can pay for the services, at times in the rural fields there is an unavailability of the mobile networks that time the operator collects the money from farmers in cash and the billing is done using the reading of the flow meter already fitted at the outlet of pump, as mentioned earlier the for one unit of water which is 1000 liters, Rs. 3 is charged.

On the other hand, Company B has partnership with NGOs in West Bengal and Bihar, who are having necessary access to farmer's group and community organizations. These portable solar pumps (of 1 HP capacity) are mounted on the three-wheeler cycle rickshaw. These pumps are placed with the community organizations. Based on irrigation demand of individual farmers, these community organizations provide irrigation service in their respective field. A mutually agreed business plan has been developed and is under use.

[1] The names of the companies are withheld intentionally at the proposal stage and will be disclosed with the selected bidder once the contract is finalized.

Currently more than 30 (thirty) pumps (cumulative) of both the companies are under different level of field trials.

System Integrators	Field Trial Location
Company A	Vaishali Block, Vaishali, Bihar Chehra kalan Block, Vaishali Bihar.
	Chakiya Block, East champaran
	Pusa Block,Samastipur, Bihar
Company B	Chakiya Block, East champaran
	Mahisa Sthali GP, BhagwanGola block, Mursidabad Dist., West Bengal
	Narayanpur GP, Nabagram block, Mursidabad Dist., West Bengal

Note * The no of PSP and field trial partners may change as respective system integrators are continuously looking for better prospective partners and field conditions to optimize their field trails. Additionally, there is likelihood that few more PSPs are to be tested in different parts of Bihar.

++ The selected firm's consultants are expected to travel each of the mentioned location in both the states. There may be a chance of change of location (states remain the same) which will be conveyed to the team in advance.

3. Objectives

The objectives of the assignment are to

a) Assess the current operational practices in respective agro-climatic and socio-economic ecosystem and then to evaluate user's acceptance / preference for the service charges against the services of the portable pumps.
b) Identify the existing challenges, opportunities for necessary modification for replication and improving the existing design of the system.

4. Scope of Work

The scope of work is based on the following assessment parameters.

The followings are indicative (and not exhaustive) assessment parameters the bidding firm might follow, while assessing performance and acceptance of portable solar pumps by farmers from different socio-economic as well as agro-climatic eco-systems. However, the bidding firm is expected to share his / her ideas for effective achievement of the said objective of the assignment.

5.1. Technical Suitability of PSP:

a. **Design robustness:** The firm is required to check how robust/rugged is the design of PSP and its suitability in the actual rural road/field conditions. Since this PSP is developed keeping in mind that it will be moved from one farm location to another, it is important to see how comfortably and effectively users can move the entire system and while doing such movements whether the system keeps itself physically intact and operational.

b. **Preventive / breakdown maintenance:** It is also important to check maintenance (both preventive / breakdown) incidents and their frequency so as to understand design the gaps and maintainable features of the PSP. Considering skill sets of user group and proximity of local market for spares and trained technicians, the selected firm is expected to comment on cost of maintenance on operational and financial viability of PSP, besides assumed capital cost

c. **Ease of Operation:** Considering skill sets of community/operator; local terrain; road conditions and location of water source(s) and farm lands, the firm is expected to develop the parameters to assess/evaluate operational ease of PSP. The selected firm is expected to comment on how mobility features and ease of mobility/operation has impacted the overall performance of PSP. The firm is also expected to suggest likely design modification, to address the existing issues, if any.

5.2. User Acceptance of PSP:

a. **Pumping capability to fulfil irrigation demand:** The PSPs are equipped with 1 and 2 HP pumps. It is required to check whether the PSP is meeting user's irrigation demand in different agro-climatic condition across varied cropping practices. The firm is expected

to comment on how best the user, can take advantage of given PSP system. The selected firm, based on local irrigation demand / pattern, can suggest us in developing a mechanism through which the pump utilization could be increased.

b. **Evaluation of service delivery model:** Implementing partners are developing and fine tuning suitable irrigation service delivery models in consultation with local user's groups. The selected firm is expected to assess how these service delivery models are effectively implemented in different field conditions. The firm, based on on-going service delivery model, is expected to assess existing / potential gaps and opportunities in the context of institutional viability. The firm is expected to provide necessary suggestion / feedback on the same, for improvement.

c. **Paying capacity:** The selected firm is expected to compare service charges of PSP with that of other prevailing irrigation services (using similar capacity AC/Diesel pumps) to understand farmer's ability and willingness to pay for the offered services. The firm should also explore and suggest various other ways and means to enhance paying capacity of users.

   It is also expected from the selected firm to give a clear picture about the cost benefit analysis based on the current service charges, and what should be the ideal service cost considering the capital investments as well as learning from other available/potential service delivery models.

5.3. Recommendations to upscale the PSPs:

As the basic objective of all field trials is to consolidate the learning to develop second generation technology and user-friendly irrigation delivery models. In this context, the selected firm is expected to contextualize the above learnings (as explained in 5.1. and 5.2) to develop various possible scenarios to highlight most favorable conditions for upscaling of the PSPs in a financially viable manner.

The bidding firm is expected to mention the **approach and methodology** so as to incorporate the above-mentioned indicative parameters.

In order to make justice to the selection process for the most suitable firm, we would expect the bidding firm to answer the following questions as part of the proposal.

- What would be the approach and methodology for the assignment, considering the fact that two different models of PSPs are being tested in the field.
- What are the different risk, the bidding firm is anticipating/envisaging under this assignment. What mitigation measures the bidding firm will undertake, so as to ensure the expected deliverables.
- To ensure quality of information, what field validation method will be followed by the firm.

5. Deliverables

The specific deliverables from the work package for this assignment includes

- Three knowledge products
    - A matrix of do's and don'ts for operating the pump in diverse field conditions for different pumping needs (primarily agricultural related needs).
    - A report for the scheduling criteria of the pump services for the maximum utilization.
    - An approach note, to address the grey areas to improve the operational efficiency of the service delivery mechanism and to upscale the number of pumps.
- Two roundtable meetings with the stakeholders to present the findings, one at state level, which can be in either of the states, and one at national level (preferably at New Delhi).
- Final report with learnings and recommendations based on the parameters mentioned in the section 4. The report should be in-compliance with all objectives as mentioned in the section 3.

6. Qualification, Timeframe and Reporting

The assignment requires diverse skill set, experience and the bidders need to ensure and prove that they have all the relevant skills needed for completing the assignment successfully.

The firm/team should have experience in undertaking performance analysis study of technologies for agricultural sector, expertise in undertaking the capacity gap assessments and understanding of the ecosystem for solar pump sector in India. The proposed team should have the following experience and expertise:

- Experience of working in the solar powered irrigation space and interactions with multi-stakeholders within the sector
- Experience of delivering and implementing high quality market assessment for emerging technologies in agriculture
- Experience in evaluating capacity gap assessments and acumen to suggest necessary capacity building initiatives for diverse stakeholders to develop market for emerging renewable energy technologies.

As the study is divided into two diverse knowledge segments i) Agro-social and ii) techno-commercial. Considering the same we are expecting a team of **two consultants along with 1 field co-ordinator (research analyst),** having experience and expertise on the respective field.

We are expecting the human resource days for the following experts for undertaking the assignment.

Human Resource	Approximate number of human resource days
Team leader / Expert on Agri-Social	20
Techno-commercial expert	15
Research analysts (Field co-ordinator)	25
Total Human Resource days	60

The identified resources are:

1. **Expert 1 (Agro-social expert)**

Core Competencies & Requirements
• Minimum of 10 years of work experience in the development sector particularly in agro value chain.   ○ Experience in the pumping sector is an added advantage. • Master's degree in rural development/ economics/ agricultural or related field. • Understanding and knowledge of various agricultural practices.

- Flexible and ability to multitask; can work within an ambiguous, fast-moving environment, while also driving toward clarity and solutions; demonstrated resourcefulness in setting priorities and guiding investment in people and systems
- Experience of working with rural communities especially in the eastern part of India.
    - Work experience in Bihar and West Bengal is an added advantage.
- Knowledge of spoken Hindi and Bengali is an added advantage.
- Strong analytical ability and report writing skills.

2. **Expert 2 (Techno commercial expert**)

Core Competencies & Requirements
• Minimum of 5 years of work experience in incubation/ field testing of technologies in rural context.   ○ Experience of designing/testing/piloting of clean technologies is an added advantage • Bachelor's degree in Engineering/Science/Management or related field. • Understanding and knowledge of commercial/business models. • Flexible and able to multitask; can work in emerging area of rural/economic development processes. • Experience of working with rural communities. • Knowledge of spoken Hindi and Bengali is an added advantage.

3. **Expert 3 (Field co-ordinator cum research analyst)**

Core Competencies & Requirements
• Minimum of 4 years of work experience in conducting surveys, assessments, data analysis. Should have qualitative and quantitative skills for developing survey questionnaires. • Master's degree in business administration/Science or related field. • Flexible and able to multitask; can work in emerging area of rural/economic development processes. • Strong report writing skills. • Experience of working with rural communities. • Knowledge of spoken Hindi and Bengali is an added advantage.

In addition to the above personal qualification the proposed team should have the following experience/expertise:

- Team member should have previous experience and expertise of executing field survey and assessment of techno-social pilot projects.
- The bidding firm should have proven track record to prepare quality report.

The bidding firm should **provide relevant documents to demonstrate the above-mentioned skill-sets**. We would need the team to have a set of professionals for technical backstopping to fulfil objectives as mentioned in section 3.

The bidder needs to demonstrate following ability through adequate references and documents.

- Provide evidence of at least 3 reference projects / assignments of similar nature and at least 2 similar projects in Asia. The commissioning value of the reference project must be a minimum of 6000 euros.
- Average annual turnover for the last three financial years for the firm should be more than 50,000 euros. Demonstrate ability to work in a highly collaborative environment with teams that are subject to time and skill constraints.
- The bidding firm should have at least 10 persons working as their employees.
- Firm should have experience in Public management and Business management and have done development studies. These experiences will be considered while evaluating the eligibility of the bidding firm.

The total duration of the assignment is expected to be around 60 human-resource days spread over 5 months, depending upon cropping cycle, starting from **October 2018**. The successful bidders will **be invited for a presentation at a venue in New Delhi** within 30 days after submission of the proposal. The bidders will be informed about the dates for the presentation at least a week in advance.

Technical Expert of IGEN-Access, will be the point of contact for the selected bidding firm.

7. Monitoring and Evaluation

Monitoring and evaluation is an integral part of all GIZ projects. Monitoring provides information on the results that the project activities achieve, thereby allowing to evaluate the strengths and weaknesses of the activities implemented.

The IGEN-Access programme uses a Results-Based Monitoring (RBM) system to continuously review the progress in achieving the objectives of the programme and to take corrective actions where necessary.

For this project, a project monitoring sheet (PMS) will be developed in consultation with IGEN Access. The format for the PMS and guidance on developing and maintaining it will be provided by GIZ. The firm has to update the PMS on a monthly basis and submit to GIZ. The PMS will help provide inputs to the RBM system. Thus, the firm is to provide evidence how it is going to measure the progress of the project and provide/update the respective data. The firm is expected to respond to changes flexibly, especially if the project is in danger of straying from the defined results corridor

RBM and PMS are key steering tools in this project.

8. Structure of the proposal

We would highly appreciate brevity in response to the questions mentioned in the ToR. The bidding firm needs to answer each of the questions under the different sections. Please elaborate roles and responsibilities of the different members of the implementing team as part of your proposal.