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

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Terms of Reference (ToR) for national consultancy firm for undertaking a scoping study to access the market potential for renewable energy-based sub one-HP capacity of water pumps (both solar and non-solar pumps) in India.

The Access to Energy Programme under the Indo-German Energy Programme (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 project aims at improving the sector environment for inclusive rural energy enterprises. The IGEN-Access project is currently being implemented in four states of Uttarakhand, Uttar Pradesh, Bihar and West Bengal. The programme is being implemented over a period of four years (March 2015 – March 2019). BMZ has commissioned GIZ with the implementation of the project. GIZ is a federal enterprise based in Eschborn and Bonn, Germany.

CONTEXT

Agricultural growth in India has been fairly volatile over the past decade, ranging from 5.8% in 2005-06 to 0.4% in 2009-10 and -0.2% in 2014-15. It contributes to 17.5% of the GDP (at current prices in 2015-16) (MoAFW, GoI 2017)[1]. In spite of having 19 million electric pumps and 9 million diesel pumps[2], only 51% of the agricultural area cultivating food grains is covered by irrigation[3]. The rest of the area is dependent on rainfall (rain-fed agriculture). Sources of irrigation include groundwater (wells, tube-wells) and surface water (canals, tanks). It is also worthwhile to note that 86 % of the landholdings are of less than 2 hectares (ha)[4]. As per the

[1] MoAFW, GoI (2017) Annual Report 2016-17.

[2] Jain and Shahidi (2018) Adopting Solar for Irrigation Farmer's Perspectives from Uttar Pradesh Council on Energy, Environment and Water (CEEW) Working paper

[3] Despande T (2017) State of Agriculture in India; PRS Legislative Research Accessed from http://www.prsindia.org/administrator/uploads/general/1517552563~~State%20of%20Agriculture%20in%20India.pdf

[4] Pocket Book of Agricultural Statistics, 2015, Ministry of Agriculture and Farmers Welfare, http://eands.dacnet.nic.in/PDF/PocketBook2015.pdf.

Agricultural Census 2011, marginal farmers are defined as farmers having land sizes between .5 ha to 1 ha.while small farmers having land between 1 ha to 2ha. The small and marginal farmers (below 2ha) land holding have increased to 85.01% as per the Census 2011 as against the 83.29% in 2005-06. The land fragmentation is either due to divisions within a family or due to informal leasing by large landholders.

Majority of the irrigation deprived districts in India are concentrated in the semi-arid or arid plains of the Indian states of Assam, Bihar, Chhattisgarh,Jharkhand, Maharashtra, Karnataka, Andhra Pradesh (especially Rayasheema), Telengana and Odisha. Review of the secondary literature reveals that there are stark differences between the "irrigation-have" and the "irrigation-have-not" districts in India. The "irrigation have not districts" have 1/3rd of the agricultural output/ha, 25% of the lower cropping intensity, a quarter of energy use in agriculture and 1/5th of the groundwater pumping capacity compared to the "irrigation have districts"[5] A lot of marginal farmers especially from the tribal regions use manual labour to carry water from the nearby sources to irrigate their vegetable gardens. Diesel pumps are often too expensive for them while electric pumps are either unavailable or unreliable. Sub-one-HP solar pumps may be a perfect fit for these farmers. For farmers who have access to canal irrigation facilities, sub-HP pumps can provide the last mile irrigation water accessibility at an economic rate than that of a diesel pump. These pumps can cater to small patch of lands and is most suitable to substitute the manual labour of farmers who have limited access to water technologies. Some of the smaller sub-HP pumps are also portable and therefore do not need land for installation. The issue of theft and damaged can also be addressed to some extent due to it mobility features of sub-one-HP pump.

India has already installed around 1.47lakh solar pumps till December 2017 across different states of India[6]. Although there is no precise data on the capacity of solar pumps already installed, in majority of the cases, the installed capacity of the solar pump ranges between 2 HP to 5 HP. The market for solar powered irrigation systems in India is presently driven by government subsidies resulting in a market for "business to government (B2G)" sales. To participate in the subsidy based programme supported by the Central and State government, the farmers need to provide land holding certificate and also to have a boring for extraction of groundwater. For example in Bihar, the eligible farmers need to have upto 5 acres of land and

[5] Shah,T.,Verma,V.,Durga,N.,Rajan,A.,Goswami,A., Palrecha 2016 HAR KHET KO PANI (Water to Every Farm) Rethinking Pradhan Mantri Krishi Sinchai Yojana (PMKSY) IWMI-TATA Water Policy Program Policy Paper (June 2016)

[6] MNRE (GoI) 2018 Annual Report 2017-18.

4 inches of boring. Therefore, a lot of small and marginal farmers are unable to even participate in the government programme. Unavailability of adequate assets to be utilized as a collateral act as a key challenge for small and marginal farmers to have access to bank-finance. Therefore, due to the high price points and the essential pre-requisites, most of the marginal farmers are often unable to have access to solar pumps.

There is very little information available in the public domain about the ecosystem around the sub- one-HP solar pumps in India. Hence, this Terms of Reference would try to unpack the ecosystem and would also try to understand the market readiness of private sector, financial institutions and also the innovations around the service delivery models. This assignment is to assess the status of the market readiness for promotion of the technology along with affordable finance.

Objective :

- To have an improved understanding of the market potential for the renewable energy based sub-one-HP water pumps in India. The assignment would primarily focus on the solar and non-solar pumps in the sub-one-HP category available in India. The assignment should include sub-one-HP category pumps beyond accreditation by the Ministry of New and Renewable Energy (MNRE). Both fixed and portable pumps in this category would be considered for analysis as part of the assignment.

It is worthwhile to mention that we consider upto 1 HP solar pump as sub-HP category for this assignment. MNRE considers capacity of PV array in the range of 200Wp to 500Wp as Micro Pumps. MNRE has the technical specifications for solar micro pumps ranging between 0.25 HP to 0.5 HP. The details are already available from https://mnre.gov.in/file-manager/UserFiles/micropump-specs-030817.pdf. .

Scope of Work

The scope of work for the assignment is divided into three broad work packages. The first work package intends to outline the technology landscape involved in development of sub-one-HP solar pumps and from other suitable technologies. The second work package is focused on reviewing of the available financial instruments and financial institutions to provide affordable finance for small and marginal farmers, while the third work package reviews the institutional landscape for service delivery models and also evaluates the existing regulatory framework enabling deployment of sub-one-HP- water pumps. The states to be considered for in-depth assessment are Jharkhand, Odhisa, Assam and West Bengal. Out of the four suggested states, stakeholder consultation should be organized in one states based on indicators most suited for promotion of sub-one-HP pumps.

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Work Package 1

Review of the technology landscape for the sub-one-HP water pumps in India. The work package should primarily consider both fixed and portable sub-one-HP solar water pumps. Along with solar pumps, this work package should also explore alternative water pumps like Hydro powered pumps (e.g water powered pumps or hydraulic ram pumps).

Scope of work

- Review of the sub-one-HP solar water-pump technologies, alternative non-solar-pumps (using sub-one-HP-hydro or hydraulic ram pump) capable of providing around 20,000 litres per day and suppliers active in India
- Design a catalogue with specifications of the different sub-one HP solar water pump and sub-one-HP non-solar pumps available in India.
- Identify the most suitable key technical quality criteria for sub-one HP solar water pump (for capacities beyond the range specified by MNRE) and the necessary installation protocols to ensure long service life.
- Understanding the demand for the sub-one-HP solar pumps for agriculture and beyond irrigation; (demand as primary vs secondary pumps) and estimation of the deployment data/ sales data/ price range of sub-HP solar pumps across India
- Capture technological opportunities and challenges for sub one HP solar water pumps in India with special focus on the above mentioned shortlisted states.
- Capture innovation in product designing,remote monitoring and also for productive use of solar PV panels beyond irrigation

Approach

We would request the bidder to share an approach note on how they would like to go about the assignment for the work package 1. We would request the bidders to answer the following questions in course of developing the assignment. It is expected that all the bidders respond to the questions mentioned below.

How would you approach the companies to collect the data on the sub-one-HP solar pumps and non-solar sub-one-HP companies ? Can you name some of the sub-one-HP-pump companies which you would like to reach out too ? If you plan to collect data through a questionnaire, can you share a draft sample with a few key questions ?

What do you see as a potential risk in the proposed approach and how will you be mitigating the risk to ensure quality of data being collected from the private companies ?

What parameters should be applied for the sub-HP solar pumps to be classified? Can you provide an illustrative table for cataloguing of the sub-HP solar pumps in India ?

To develop a matrix for the companies on the market-readiness for promotion of sub-one-HP solar pumps, what features would you consider to develop the matrix ?

Deliverables:

1. A catalogue capturing the different technical features (AC, DC, fixed or portable,categorization of the sub-one-HP solar water pumps with specifications on water outflow at different heads, requirement of the solar array with water outflow of litres per day (LPD), portability features, availability of the remote monitoring system; after sales services provided, warranty period provided, use of the sub-one-HP pumps/ solar arrays beyond irrigation, number of deployments in states) of the accredited sub-HP solar pumps available in India and a state-wise list of the private sector along with the MNRE ratings based on the sub-one-HP pump rating efficiency. Other suitable parameters need to be developed for non-solar pumps in the same category. The features mentioned are indicative and we expert that additional features will be added by the bidder in course of the assignment. Water pumps in the similar category which are yet to be accredited also be categorized in the catalogue.

2. A brief report (max 10 pages) to capture innovations either in product development, highlighting alternate use of the asset beyond irrigation, remote monitoring of the asset or even innovation in service delivery with potentials for replication.

3. As per the MNRE guidelines, the manufacturers must develop Operational and maintenance guidelines both in English and in regional language. The bidders need to collect and review the O&M guidelines and also to compile an indicative quality assurance guidelines for technology and installation guidelines (which is pertinent to sub-one-HP solar systems available in India). The guidelines will be based on key quality features, component and installation recommendations and warranty stipulations as provided by suppliers active in India.

4. A roundtable has to be organized by the bidders with selected key private sector players (10- 15 members) in Delhi to understand their go-to-market approach for sub-one-HP solar water pumps.The workshop outcome report should be accompanied by an approach note highlighting the states which have the maximum amount of sub-HP pumps deployed along with brief details on the use of the pump for irrigation and beyond. The note should also have a section on the barriers and challenges on the marketing channels of the sector in general.

Work package 2

Review the financial landscape to provide access to affordable finance for promotion of the sub-one-HP pumps in general and sub-one-HP solar pumps in particular in India.

Scope of work

- Classification of the most appropriate and applicable financial products/ instruments to promote sub-one-HP pumps (Both solar and non-solar).
- Based on the above classification, highlight the most suitable and most possible new avenues for Financial Institutions to provide appropriate finance for promotion of sub-one-HP pumps (Both solar and non-solar) targeting small and marginal farmers.

- Review of the experience of the Financial Institution in promotion of sub-HP (including their apprehensions and challenges for promotion of sub-one-HP pumps and also innovations in developing and designing the financial products)
- Capacity Gap assessment of the Financial institutions to promote sub-one-HP pumps as a product for farmers.
- Suggest regulatory changes that would improve or facilitate the financing and scaling up of sub one HP pumps.

Approach

We would request the bidder to share an approach note on how they would like to go about the assignment for the work package 2. We would request the bidders to answer the following questions in course of developing the assignment. It is expected that all the bidders respond to the questions mentioned in the ToR.

Please share a template which would be used for categorization of the existing financial products for promotion of sub-HP pumps?

What parameters would be used for classification of the potential financial institutions most suited for promotion of sub-one-HP pumps?

What would be your approach to undertake the capacity gap assessment for the financial stakeholders?

What do you see as a potential risk in the proposed approach and how will you be mitigating the risk to ensure quality data being collected from the stakeholders ?

Deliverable

- Suitable matrix for classifying the diverse financial institutions (like Co-operative banks, Small Finance Banks, Micro-finance Institutions) as the most enabling/ suitable institution for rolling out the sub-one-HP pumps (Both solar and non-solar) based on relevant parameters.

- Develop a database of the financial institution already involved for promotion of sub-one-HP pumps (both solar and non-solar) in India. The database should also include FI which are also most likely to get involved in the near future.

- Capacity gap assessment report highlighting the knowledge gaps within the Financial Institutions for promotion of sub-one-HP-pumps (Both solar and non-solar). The report should also highlight specific training areas for capacity building within the financial institutions. The report should also mention the possible regulatory changes, if needed, to improve the financing as well as for scaling up.

- Constitute formation of an independent core advisory group with at the most 3-4 members for technical guidance and support during the period.

- The bidder should organize one round tables with roughly 10 -15 members from the appropriate financial institutions to validate the findings from the assignment in any one out of the four suggested states. The selection of the states should be followed by a suitable justification note.

Work package 3

To map and review the existing central government and state government subsidies programmes as well as institutions focusing on service delivery landscape (beyond financial institutions) for promotion of sub-one-HP water pumps (Both solar and non-solar).

Scope of work

- Review of the any two state government programmes for promotion of sub-one-HP water pumps (Both solar and non-solar).
- Classification of the organizations/ institutions who are either working or are capable of promoting the technology forward (pan-India basis)
- Innovations in the area of developing service delivery models for promotion of sub-one HP pumps (Both solar and non-solar)
- Estimate the potentials for the agri-equipment suppliers or custom hiring centres for agri-equipments as a means for promotion of the sub-one-HP water pumps.
- Review applicable regulations and possible regulatory changes to ensure greater off -take of sub-one HP pumps, considering economic attractiveness, environment friendliness, ground water development.

Approach

We would request the bidder to share an approach note on how they would like to go about the assignment for the work package 3. We would request the bidders to answer the following questions in course of developing the assignment. It is expected that all the bidders respond to the questions mentioned in the ToR.

Which parameters would you consider to classify the non-financial service delivery stakeholders who can play an important role for promotion of sub-HP pumps? Share a template for classification of the stakeholders.

Please also mention the key criteria for selection of the two most potential states for an in-depth review for promotion of sub-one-HP-pump.

Deliverable

- A report with classification and a SWOT analysis of the diverse stakeholders like agri-equipment service providers, Farmers cooperatives, civil society organizations working with farmers (like Pradan, BAIF etc) other agencies and corporate foundations (like Syngenta Foundation, Olam Foundation etc) regarding their interests, portfolio and strengths to reach out to the most appropriate end users in an affordable and sustainable manner.

- An report (not more than 10 pages) summarizing the key finding from the assignment for promotion of sub-one-HP pumps (both solar and non-solar) along with the most appropriate partners and stakeholders.

- A report on the present regulations influencing the use of sub-one-HP pumps (both solar and non-solar) and the potentials for enabling regulations leading to improved use of similar water pumps. The report should focus on national level and also for one of the states. The selection of the focused states from the 4 states mentioned before should be in consultation with GIZ .

- The bidder should be organizing one round table with about (10-15 members) the selected key stakeholders within the ecosystem in Delhi.

Composition of a core-advisory group

We would request the consulting firm to facilitate in setting up a core advisory group of technical experts (3-4) to comment on the outcomes of the project. We expect that the group would play an advisory role to the proposed intervention and would be independent of the core experts from the consulting firm. The consulting firm will be responsible for suggesting the names of experts for advisory group. GIZ will be responsible for finalizing the composition of the advisory group. We expect the consulting firm to organize two meetings with the advisory group during the project duration at the GIZ New Delhi office. It is worthwhile to mention that the consulting firm will have to co-ordinate with the advisory team. The travel & accommodation costs, honorarium and other associated costs of the advisory group will be borne by GIZ.The advisory group should remain active throughout the assignment duration. Hence the bidder does not have to bear any additional financial resources vis-a-vis core advisory group.

Qualification criteria, Team composition, Timeframe & Reporting

The assignment requires diverse skill set, experience and the bidder needs 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 scoping study for promotion 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.

The proposed core team for this assignment should have members with the following skills, experience and expertise:

- Three human resource with at least 4 years' experience of conducting market assessments, data analysis, qualitative and quantitative skills for conducting surveys and skills to analyse and interpret key market trends based on interactions with diverse stakeholders. All of the human resources should be skilled in conducting surveys and collecting and analysing the necessary data. Please refer to the excel sheet for more details. We expect that each of the experts would be anchoring one of the work packages mentioned in the assignment.
- A technical expert with at least 7 years of knowledge about solar water pump technology.
- A team leader with experience of at least 15 years for managing complex and multi-stakeholders in development sector and a sectoral knowledge in agri-financing.

The bidding firms should provide relevant documents to demonstrate that the above-mentioned skill-sets within the proposed team. The team suggested by the firm should remain available for the project duration. Changes within the team will only be allowed if one of the proposed team members leaves the bidding firm. In such a case, the bidding firm will be allowed to change the human resource in lieu of submission of CVs of at least two suitable human resources. GIZ would have the right to select and replace the human resource from the shortlisted CVs shared by the bidder.

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-finance	8
Expert on Solar pumps	12
Market analysts/ Data analysts (3)	25 *3
Total Human Resource days	95

We expect that the total duration of the assignment is expected to be around 95 human resource days spread over 4 months.The successful bidders may be invited for a presentation at GIZ New Delhi office within 30 days after submission of the proposal. If so, the bidders will be informed about the dates for the presentation at least a week in advance.

The selection process has some pre-selection criteria for the bidders. Please refer to the bidding guidelines for details. The bidders who are unable to meet the pre-selection criteria will not be evaluated any further. Hence, the bidder, will have to provide all the necessary documents/ evidence to meet the pre-selection criteria. The pre-selection process will be followed by the technical evaluation followed by the financial evaluation.

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