

## Solar Irrigation for Agricultural Resilience in South Asia (SoLAR-SA)

### Minutes of the 6<sup>th</sup> Project Steering Committee (PSC) Meeting

September 02, 2022, | 3:00 pm - 4:30 pm (IST)

Venue: Online meeting on Zoom

#### A) Attendees

Name and designation	Designation at PSC	Attended
Corinne Demenge, Head of SDC, New Delhi	Chair	Yes
Mark Smith, Director General, IWMI	Co-Chair	Yes
Divya Kashyap Sharma, Deputy Head and Project Manager, SDC	Member	Yes
Vidhisha Samarasekara, Strategic Program Director, Water, Climate Change and Resilience, IWMI	Invited	Yes
Tushaar Shah, Emeritus Fellow, IWMI (Special Advisor to the SoLAR-SA project)	Member	Yes
Alok Sikka, Country Representative, India, IWMI	Member	Yes
Aditi Mukherji, Principal Researcher, IWMI and Regional Project Leader, SoLAR-SA	Member	Yes
P.C. Sharma, Additional Director, International Solar Alliance (ISA)	Co-opted Member	Yes
Kifayat Zaman, Director General, FWMC, MNFS&R, Pakistan	Co-opted Member	Yes
Monirul Islam, Deputy CEO, IDCOL, Bangladesh	Co-opted member	No
Laxman Ghimire, Assistant Director, Solar, and Wind Energy Efficiency, AEPC	Co-opted member	No
Akhilesh Magal, Head of Advisory and Consulting, GERMI	Co-opted member	No
Biswajit Roy, Director General, GERMI	Co-opted member	No
Sunipa Das Gupta, IWMI	IWMI-Comms Support	Yes
Aariz Raza, IWMI	IWMI-Comms Support	Yes
<b>Abbreviations:</b> AEPC: Alternative Energy Promotion Centre; FWMC: Federal Water Management Cell; GERMI: Gujarat Energy Research and Management Institute; IDCOL: Infrastructure Development Company Limited; ISA: International Solar Alliance; IWMI: International Water Management Institute; MNFS&R: Ministry of National Food Security and Research; SDC: Swiss Agency for Development and Cooperation		

## **A) Agenda**

**Corinne Demenge (SDC), Chair of PSC:** She opened the session with her welcome remarks. She expressed her satisfaction with the project's progress – the extent of data collection and the results obtained – despite the challenging circumstances in the past years due to COVID-19. However, there have been some delays; hence, a no-cost extension has been given, and the project will now end in June 2024. She noted that the PSC members and partners like the Alternative Energy Promotion Center (AEPC) are already applying the insights from the project results in Nepal in adapting their future work modalities. She welcomed P.C Sharma from ISA as a newly co-opted member of the committee, in place of the erstwhile member from ISA, Rajeev Gyani. She then opened the floor for the members to introduce themselves. Aditi Mukherji, Regional Leader, SoLAR-SA, IWMI, presented a synthesis of the project outputs and plans to the committee members.

As members introduced themselves, some of them made observations about the strategic relevance of the project and its extension to a second phase:

**P.C Sharma, ISA:** Not only is solar irrigation a subject matter of interest for African countries, but it is also garnering the attention of various Latin American countries. However, clean energy transition is one of the key focal points in South-South cooperation. Currently, the United Nations Development Program (UNDP), India, is steering an initiative that has seen USD 2 million in funding for ten countries, of which nine are in Africa. UNDP country offices will manage the country-specific activities, and ISA is a part of this project.

**Alok Sikka, IWMI:** Findings from the SoLAR project can provide necessary inputs for South-South cooperation for the clean energy transition. IWMI is willing to collaborate with ISA for that purpose.

**Divya Kashyap Sharma, SDC:** The SoLAR project is keen to collaborate with ISA to take the learnings to other parts of the world, such as Africa. The ICT materials generated by the IWMI team as a part of the SoLAR project can provide insightful background material for the extension of the project into the next phase as well as for ISA.

**Aditi Mukherji, Regional Leader, SoLAR-SA, IWMI:** Aditi Mukherji synthesized the project in a “just energy transition” framework, highlighting that the project outputs pertain to three strategic areas of energy transition: viz. (i) the nature (pace, mode, and effectiveness) of transition; (ii) impacts of the energy transition on water, land, and food systems; (iii) justice or the gender and social equity of this transition. The project outputs on the nature of energy transition can be categorized under three broad heads: (a) technology, scale, and conditions for the uptake of solar irrigation pumps (SIPs); (b) national policies,

financing models, and utility governance of SIPs; (c) mitigation potential versus the achieved mitigation, including the cost-effectiveness of mitigation. The project has reviewed country-specific policies for SIPs, including micro-grid policies, SIP subsidy delivery mechanisms (in Nepal), factors determining the generation of energy (e.g., utility governance of grid-connected SIPs in Gujarat, or the various business models of off-grid SIPs in Bangladesh), (black) carbon emissions in the Indo-Gangetic plains/mitigation potential and actual mitigation from SIPs in Bangladesh. All these studies point to two significant findings. First is the emerging demand for on-grid SIP pilots, especially from countries with a predominance of off-grid SIPs, like Nepal and Bangladesh. Second, increasing demand for operations and maintenance training for farmers and local technicians from all countries where the project operates.

The studies on SIPs' impact on the level of crop production, crop choices, and irrigation water use (mainly groundwater) have shown that results are context specific. While in Gujarat, India, there is no perceptible change in cropping patterns due to the adoption of SIPs, its impact on groundwater is likely negligible. In Nepal, however, there is an increase in cropping intensity. But the project does not monitor groundwater impacts in Nepal since groundwater stress is not as much an issue in the country as in the rest of South Asia. In Bangladesh, on the other hand, the early estimates of groundwater monitoring data from the *boro* (summer paddy) 2022 season do not reveal any significant differences in the application of groundwater across SIP-using and non-SIP-using farmers. The impact evaluation reports from each of the countries are ongoing, while various other outputs, such as a meta-review of the impact of energy pricing on pumping behavior in South Asia, observational and model-based studies on groundwater use in India, Bangladesh, and Pakistan, SIPs impact on informal water markets in Gujarat and Bangladesh, are in the pipeline.

In the area of justice and gender and social equity, the project explores three questions. (i) Are energy transition policies “gender” transformative? (ii) Who ends up paying for the SIPs (various financial models)? and (iii) What are the impacts on the livelihoods of small farmers, sharecroppers, women farmers, etc.? Country policy reviews from the gender equity and social inclusion (GESI) lens find that, at best, policies are gender aware or responsive but not transformative. On the other hand, primary surveys across the countries show that subsidies play a crucial role in SIP adoption in three (India, Bangladesh, and Nepal) of the four countries studied – though at varying proportions of the SIP prices (almost 100% in Nepal to 30% in India) – while in Pakistan these are entirely financed by the farmers themselves, without any overarching SIP subsidy policy in place. Consequently, larger, relatively well-off farmers could benefit from the SIP schemes in India and Pakistan, while in Bangladesh and Nepal, smallholder farmers and sharecroppers have some benefits. An important insight emerging from these studies is that those paying for the energy transition are not necessarily the larger emitters. It also raises the question of what role international climate finance can play in this context.

Referring to the PSC members' recommendation for dissemination of the research findings, as raised in the previous PSC meeting dated March 2, 2022, Aditi Mukherji also presented some of the communication activities that the project has taken up in the past few months to amplify these in the coming months:

- 1) **Newsletters:** The project has so far published eight quarterly newsletters that are sent to 1000+ stakeholders
- 2) **Issue briefs:** Four issue briefs have been finalized, and four more are in the pipeline. All issue briefs are to be circulated via newsletter(s) and shared with partners.
- 3) **Doodle videos:** Two videos have been prepared to date, and several more are in the pipeline. These videos will concisely simplify the issues discussed in the briefs (#2) above) for a more general audience.
- 4) **Country fact sheets:** One under preparation and three in the pipeline. There will be one fact sheet per country, which will be infographic representation of the country-level findings.
- 5) **Policy briefs** will focus on the policy recommendation from research.
- 6) **Website updating:** This is an ongoing activity.
- 7) **National and Regional Forums:** The project started in-person or hybrid mode meetings with its C-PMC meeting in Bangladesh on July 25, 2022. A similar strategy will be adopted for the national forums. A regional forum is planned for December 2022, to be held in India.

The project has also taken important strides for capacity building through IWMI training and SDC's innovation fund grants.

- 1) In 2021-22, around 647 participants (including 107 women) took part in various IWMI and partner organization training.
- 2) In 2022, ~2000 farmers in Gujarat will be trained on operations and maintenance of SIPs under the state government's Suryashakti Kisan Yojana through an IWMI-GERMI collaboration.
- 3) In 2021-22, 1017 participants (40% women) joined the training sessions organized by the SDC-IWMI innovation fund grantees.
- 4) **Regional training for senior to mid-level officials:** This event will be held back-to-back with the Regional Forum in partnership with ISA. The planning of the event is ongoing

The project is already making considerable impacts among the stakeholders. For instance, the Alternative Energy Promotion Centre (AEPC) in Nepal is using IWMI's reports to revise their subsidy delivery policy; the country project management committee (C-PMC) meetings in Bangladesh have emerged as an essential interactive platform for the stakeholders in Bangladesh; there is a demand for IWMI's research findings among other donors (e.g., Asian Development Bank (ADB), Kreditanstalt für Wiederaufbau (KfW)) working in the solar irrigation sector in South Asia.

## A) Discussions

**Kifayat Zaman, FWMC Pakistan:** The Government of Pakistan is planning to solarize the agricultural tube wells. They are looking for some input from IWMI. Some early findings from IWMI's pilot project on solar tube wells, particularly the impacts on groundwater use, will be beneficial.

**Aditi Mukherji, IWMI:** IWMI is happy to share relevant research findings and issue briefs with the government.

**P.C Sharma:** IWMI's SoLAR project is important for ISA on two grounds. First, it addresses the gap in empirical evidence underlying the discourse on the impact of solar pumping on groundwater use. ISA has advocated that solar pumps may not lead to groundwater overuse without empirical support to strengthen its claims. IWMI's work can provide the relevant empirical basis for ISA's work in this sector. Second, ISA is already working on the capacity building of stakeholders on solar pumping. Collaboration with IWMI for this purpose will further strengthen such efforts.

**Corinne Demenge, SDC:** Given that the data on groundwater use is highly context-specific, what should be a strategic way to communicate this data to a broader audience, credibly, avoiding the trope of generalization? Should IWMI conduct more surveys in various other countries before publicizing these results?

**Aditi Mukherji, IWMI:** Groundwater is indeed a context-specific issue. In Gujarat, for example, the SIP farmers do not use more groundwater vis-à-vis the non-SIP farmers. The fact that farmers do not use more groundwater could also be the credit of the SKY program, which allows the SIP farmers to sell back power to the grid. In other words, there is an incentive for the SIP farmers not to increase groundwater usage. We do not have the counterfactual of SIP farmers not having such an incentive. So, we do not know what would have happened to the SIP farmers' water use if they had no incentive to sell back the electricity. Similarly, in Bangladesh, there is no opportunity for increasing water use because the ET of the crop governs the water use, and they are already growing very high water-intensive Boro paddy. So irrespective of whether you irrigate with diesel pumps or SIPs, the water requirement for that paddy is the same. So, we must write these results carefully and get them peer-reviewed and published. And one more year of data will be critical.

**Divya Kashyap Sharma, SDC:** While the available results show that SIP-using farmers in both Gujarat and Bangladesh have not increased their water use, what has not come out very clearly yet is whether SIPs can be effective in delivering the underlying policy objective of efficient water use in Gujarat, and Bangladesh government's long-term goal of cutting down on Boro cultivation. Perhaps one year of data may not be sufficient to make inferences about SIPs impact on these policy objectives.

**Alok Sikka, IWMI:** The project team needs at least three years of data and data from better-instrumented sites to make such inferences. Going forward, we may also study the impact of other water-saving technologies on energy consumption, the effects of direct incentives, such as increasing pumping efficiency, on energy saving, and scale up our groundwater models to a regional level.

**Mark Smith, IWMI:** There is already some uptake of the research results in the policy circuit. A real-time example was Mr. Zaman's question. What do you find to be the most effective in creating that research-policy bridge?

**Aditi Mukherji, IWMI:** The most effective way is how the project has been conceptualized. The project has the project steering committee (PSC) and the country project management committees (C-PMC), where the project has brought together the most important solar irrigation players. These are platforms where the project team shares the findings from the research as and when the team arrives at these. So, the partners are aware of the project's work, and on these platforms, the project team often gets requests like the one that Mr. Zaman made today. In those cases, the project team shares a quick two-pager and a PowerPoint presentation or has a meeting with the relevant agency. This has been most effective in connecting with the policy and practitioners, while the policy and issue briefs increase the credibility of the project's research to an external audience.

**Mark Smith, IWMI:** The project approach of catalyzing engagements through networks and then using formal communications products to reinforce the engagements is fascinating and seems to be working. This is contrary to the usual way of first generating formal communication outputs and then going to the policymakers with those.

**Divya Kashyap Sharma, SDC:** With the project's first phase in its mid-way, the project not only has some significant results but, more importantly, is already finding traction with the policymakers. The project will continue beefing up the research findings and develop more comprehensive reports in the remaining two years of this phase of the project and will be happy to share those with ISA. The "just energy transition" angle could also support ISA in positioning their work in this emerging framework of global energy transition in the context of climate change. The curriculum the SoLAR project uses for training farmers and technicians can also be helpful in ISA's capacity-building initiatives. Today's discussions gave us an understanding of where this project can go beyond 2024, and our partnership with ISA can play a critical role. SDC Ethiopia has expressed interest in this project. The Ethiopian government has asked them to collaborate, which can provide a window of collaboration with ISA in the project's next phase.

#### **D) Closing remarks**

**Mark Smith, IWMI:** Dr. Smith congratulated the SoLAR team and partners on the project's achievements in generating tangible evidence of solar irrigation's impact on income and productivity gains, groundwater use, and GESI-related outcomes relevant to policies. He appreciated the project design that effectively created a research-policy bridge.

## Annexure 1: Activity-wise progress by countries

Activity	Status as of August 2022	Planned for 2022-23
<b>Bangladesh</b>		
#1.1.1 (Impact Evaluation and GESI case studies)	<ol style="list-style-type: none"> <li>1) Baseline report (circulated for internal review)</li> <li>2) 3 issue briefs prepared</li> <li>3) 5 rounds of SIP surveys (telephonic) completed</li> </ol>	<ol style="list-style-type: none"> <li>1) 2 more rounds of SIP surveys</li> <li>2) 2 journal articles in the pipeline</li> </ol> <p>a) Decarbonizing agriculture through private solar irrigation services</p> <p>b) Co-benefits of SIPs to farmers</p>
# 1.2.1 (Groundwater monitoring)	<ol style="list-style-type: none"> <li>1) Monitoring data for Boro season 2022 collected; analysis is ongoing</li> <li>2) Groundwater models set up; calibration ongoing</li> </ol>	<ol style="list-style-type: none"> <li>1) Report on monitoring data</li> <li>2) Scenario analysis for SIP upscaling based on the numerical groundwater models</li> </ol>
#2.1.1 (Case study on different SIP models in Bangladesh)	Qualitative interviews completed (18 FGDs with SIP beneficiaries, 46 KIIs with various stakeholders)	<ol style="list-style-type: none"> <li>1) Transcription of the qualitative interviews</li> <li>2) Qualitative studies with BSERT on the informal water markets in Bangladesh and the impact of the Upazilla permits on these</li> </ol>
#2.2.1 (Demonstration pilots for grid connecting SIPs)	<ol style="list-style-type: none"> <li>1) Monitoring framework co-developed with IDCOL</li> <li>2) Data collection is ongoing at 2 (pre-existing) Sun Home Energy Limited (SHEL) sites</li> <li>3) 2 sites (WAVE) grid-connected; 4 sites (GAZI) physical installation done (awaiting connection from REB)</li> </ol>	<ol style="list-style-type: none"> <li>1) Gridding to begin at 3 shell sites</li> <li>2) Stakeholders' exposure visit to Gujarat</li> </ol>
Other activities	<ol style="list-style-type: none"> <li>1) 2nd farmers' training completed Oct 2021</li> <li>2) 2nd National Forum Webinar Feb 2022</li> </ol>	<ol style="list-style-type: none"> <li>1) 3<sup>rd</sup> farmers' training</li> <li>2) 3<sup>rd</sup> National forum (Both in the fourth quarter of 2022)</li> </ol>
<b>India</b>		
# 1.1 (Impact evaluation)	<p>Research publications</p> <ol style="list-style-type: none"> <li>1) 2 issue briefs under internal review</li> <li>2) What are the drivers of electricity generation under SKY? (Incorporated internal reviewers' feedback in the manuscript and finalized it for journal submission)</li> <li>3) Report on the quick assessment of Maharashtra's Saur Krishi Vahini Yojana</li> </ol> <p>Data collection</p>	<p>Research publications (timeline)</p> <ol style="list-style-type: none"> <li>1) Understanding the SKY scheme? How do the technical and financial models of SKY work on the ground? (By November 2022)</li> <li>2) Identifying farmers who evacuate and earn through the SKY scheme? (By November 2022)</li> <li>3) <i>Extensive</i> and intensive margin Impacts of SKY on</li> </ol>

	<ul style="list-style-type: none"> <li>4) Telephonic surveys for collecting socio-economic characteristics (in progress)</li> <li>5) DISCOM official interviews (in progress)</li> </ul>	<p>agricultural outcomes? (By March 2023)</p> <ul style="list-style-type: none"> <li>4) Impact of SKY on the pumping behavior of farmers? (By March 2023)</li> </ul> <p>Data collection (timeline)</p> <ul style="list-style-type: none"> <li>5) Household surveys in Gujarat (October 2022 - December 2022)</li> </ul>
#1.2 (Groundwater monitoring/sustainability)	Monitoring was completed at two sites – Botad and Anand, in Gujarat. Analysis ongoing.	<ul style="list-style-type: none"> <li>1) Monitoring (and data collection) to continue for another year</li> <li>2) Efficiency under different scenarios of pump modification</li> </ul>
#3.1 (Training – in Gujarat, this involves the training of SIP farmers under the Suryashakti Kisan Yojana (SKY))	<ul style="list-style-type: none"> <li>1) Training for farmers in five feeders</li> <li>2) A pre-training survey of farmers to assess their awareness level about SKY</li> <li>3) Analysis of pre-training survey of farmers</li> <li>4) Monthly energy accounting data collection (ongoing)</li> <li>5) Training workshop with stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>1) The training of farmers in ~90 feeders</li> <li>2) Report on the impact of training on electricity generation, evacuation, and income of SKY farmers</li> </ul>
<b>Nepal</b>		
#1.1 (Impact evaluation and GESI-related outcomes)	<p>Research publications</p> <ul style="list-style-type: none"> <li>1) Journal article on qualitative analysis of SIPs through GESI-lens (under internal review)</li> <li>2) Journal article on the review of SIP policies through GESI-lens, Nepal vs. Bangladesh (under internal review)</li> <li>3) 2 issue briefs</li> <li>4) Draft report on Water-Energy-Food policy review in Nepal and India through GESI-lens (under internal review)</li> <li>5) Baseline reports on household and telephonic surveys (under review)</li> </ul>	<ul style="list-style-type: none"> <li>1) Desk assessment of country-specific emissions</li> <li>2) Journal article based on results from qualitative surveys</li> <li>3) IWMI summary research report</li> </ul>
# 2.2 (Demo pilots for grid-connected SIPs)	<ul style="list-style-type: none"> <li>1) Stakeholders’ exposure visits Gujarat, India</li> <li>2) Consultant/ vendor for micro-grid installation</li> <li>3) Monitoring of various parameters (ongoing)</li> </ul>	Installation of grid connection at SIP sites (1-2)
# 3.2 (Training of farmers / local technicians/stakeholders)	<ul style="list-style-type: none"> <li>1) Questionnaire for training (double version – English and Nepali)</li> <li>2) Onboarding of consultant for 2-3 days training/workshop/school</li> </ul>	<ul style="list-style-type: none"> <li>1) Orientation workshops for local governments (in partnership with NARMIN)</li> </ul>



#3.3 (Knowledge exchange and policy dialogues)		<ol style="list-style-type: none"> <li>1) Multi-stakeholder dialogues for net-metering</li> <li>2) National forum</li> </ol>
<b>Pakistan</b>		
# 1.2.3 (Groundwater status)	<ol style="list-style-type: none"> <li>1) Report on behavioral surveys</li> <li>2) Provincial studies of SIP outlook in Baluchistan, Sind, and Khyber Pakhtunkhwa</li> <li>3) Field instrumentation for groundwater monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1) Research manuscript(s) to be finalized for journal submission(s)</li> <li>2) Report based on groundwater monitoring data</li> </ol>
# 2.2.4 (Grid pilot)	<ol style="list-style-type: none"> <li>1) Choice experiments design</li> <li>2) ODK-based questionnaire pre-testing</li> </ol>	<ol style="list-style-type: none"> <li>1) Final data collection</li> <li>2) Report</li> </ol>
Training and other dissemination activities	<ol style="list-style-type: none"> <li>1) Farmers' training curriculum is being prepared in collaboration with Pakistan Agriculture Research Council (PARC)</li> </ol>	<ol style="list-style-type: none"> <li>1) Farmers' training</li> <li>2) National forum</li> <li>3) Country project management committee meeting</li> </ol>

*Meeting notes prepared by Sunipa Das Gupta, Communication Consultant, IWMI.*