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IWMI International Water Management Institute

Solar Irrigation for Agriculture Resilience in South Asia (SoLAR-SA) Project

Bangladesh - Country Project Management Committee (C-PMC) | 4th Meeting

Date: 25 July 2022|Time: 11:00 -13:30 hours (BST)/11:30-14:00 hours (IST)

The meeting was convened in hybrid mode, with some participants on Zoom and some being physically present at the venue: Level -16 Multipurpose Conference Room, IDCOL.

A) List of attendees

Sl no	Name	Role	Institution
1.	Divya Kashyap Sharma	Member	SDC
2.	Dr. Aditi Mukherji	Member	IWMI
3.	Archisman Mitra	Member Secretary	IWMI
4.	Md. Ahasan Habib	Member	NGO Forum
5.	Ashok Kumar Biswas	Member	DAE
6.	Engr Md Nazirul Islam	Member	BMDA
7.	Md Sarowar Hossain	Member	BADC
8.	Md Rashedul Alam	Member	SREDA
9.	Mofazzal Hossain	Member	IDCOL
10.	Dr. Nazmul Nahar Karim	Member	BARC
11.	Md Sakil Ibne Sayeed	Member	BREB
12.	Badrul Alam Khan	Invitee	Gazi Renewable Energy Ltd.
13.	Md. Shahinur Rahman	Invitee	Gazi Renewable Energy Ltd.
14.	Gopinath Dass	Invitee	Gazi Renewable Energy Ltd.
15.	Md. Sharif-Al-Amin	Invitee	Sun Home Energy
16.	S.M Shamin Reza	Invitee	Wave Foundation
17.	Bilal Siddique	Invitee	IDCOL
18.	Raquib-Ul-Mesbah	Invitee	IDCOL
19.	Md. Abdullah Al Matin	Invitee	IDCOL
20.	Manish Kumar	Invitee	IWMI
21.	Shisher Shrestha	Invitee	IWMI
22.	Md Faiz Alam	Invitee	IWMI
23.	Smaranika Mahapatra	Invitee	IWMI
24.	Aariz Raza	Invitee	IWMI
25.	Sunipa Das Gupta	Invitee	IWMI

Abbreviations: IWMI: International Water Management Institute, BADC: Bangladesh Agricultural Development Corporation, DAE: Department of Agricultural Extension, IDCOL: Infrastructure Development Company Limited, SREDA: Sustainable and Renewable Energy Development Authority, BMDA: Barind Multipurpose Development Authority, BREB: Bangladesh Rural Electrification Board, SDC is Swiss Agency for Development and Cooperation.

A) Agenda

Welcome Remarks

- Dr. Aditi Mukherji, Regional Lead, IWMI-SoLAR project in South Asia, welcomed all the participants to the fourth Bangladesh CPMC meeting. This was followed by a brief and formal introduction by all the members and invitees, including the online participants.
- Dr. Mukherji emphasized that the larger goal of the SoLAR project in South Asia is to contribute to the climate-resilient, gender-equitable, and socially inclusive agrarian livelihoods in South Asia by supporting government programs and policies on solar irrigation. She further mentioned that the outcomes and deliverables of the said project are centered around impact evaluation and gender equity and social inclusion (GESI) of the SIPs. Various business models have been designed to promote solar irrigation pumps (SIPs). In Bangladesh, the main aim is to replace diesel pumps with SIPs in off-grid areas, saving foreign exchange, reducing the government's subsidy burden, and reducing GHG emissions. Groundwater sustainability is another important aspect that will be explored through this project.
- Based on the project's findings, there is a growing need for gid-integrating the SIPs so that the surplus power can be evacuated back to a national utility grid and not wasted, and the SIP sponsors can make the SIPs financially viable by selling surplus power. Grid integration is crucial from the perspective of the scalability of the SIPs and, in turn, the government's target of increasing the share of renewables in the country's energy mix. In this context, Dr. Mukherji welcomed the representatives from the SIP sponsor companies participating in the meeting.

Bangladesh Project Progress and Year 4 Workplan

Archisman Mitra, Bangladesh Country Leader, SoLAR, IWMI, gave an update on the current status in Bangladesh and the plans for the project's fourth year.

Activity 1.1.1 deals with the impact evaluation and GESI case study of existing and new SIP programs in Bangladesh.
A baseline survey was completed in 2021, and an endline is in the pipeline for 2023. The surveys cover about 900 farming households under SIP and diesel-based pumps. Furthermore, telephonic surveys for 82 IDCOL SIPs will be furnished. It started in Aman 2020 and is repeated after every crop season till Boro 2023, covering three surveys for three seasons in the country.
Deliverables achieved: The following have been achieved in the past year:

- Baseline report completed - currently under internal review.
- 5th SIP survey completed – telephonic interviews of SIP operators.
- Articles in progress –
    1. Decarbonizing irrigation through privatized solar irrigation service.
    2. Estimating the Co-benefits of SIP at the farmer level.

Planned deliverables for the next year:

- Collection of 6th and 7th rounds of SIP-level primary data using phone interviews.
- Journal articles to be completed.

Activity 2.1.1 deals with the case study of different SIP promotion models in Bangladesh. Three models, viz., the fee-for-service model by IDCOL, group ownership models by BADC, BMDA, RDA&DAE, and individual ownership model by BREB, are currently in place targeting different modes of irrigation and the type of crops grown.

Deliverables achieved: The following have been achieved so far:

Qualitative interviews completed

- 18 FGDs with SIP beneficiaries.
- 25 KIIs with diesel/electric pump owners.
- 10 KIIs with SIP officials.
- 11 KIIs with other stakeholders (BREB, donors, sponsors, researchers).
- Transcribing + Transcription ongoing – **to be completed this month**.

Planned activities:

- Article based on these qualitative interviews for a "Comparative case study of different SIP models" + "SIP influence the local groundwater market."
- A separate qualitative study with BSERT to complement this research. It will review the informal water markets, the impact of rapid electrification of pumps, implementation, and implications of the Upazila permit of SIPs.

Activity 1.2.1 deals with groundwater sustainability studies in Bangladesh. The overarching aim is to examine the possible impacts of large-scale adoption of SIPs on groundwater resources.

Deliverables achieved:

- Monitoring data for Boro season 2022 collected, analysis ongoing (Mohammad Faiz Alam, IWMI, later presented the early findings from the data analysis to the CPMC, minuted later in this document).
- Numerical GW model set-up for simulating SIP upscaling impact – calibration ongoing.

Planned activities:

- Monitoring to continue + report on preliminary analysis of 2022 monitoring data.
- Calibrated groundwater model for the region with SIP upscaling scenarios to be finalized.
- Set up and calibrated the vadose-zone flow model to estimate irrigation return flows.

Activity 2.2.1 deals with demonstration pilots for grid connection of SIPs. Under this activity, grid integration modalities entail clustered SIP sites via an HT line. A maximum of 4 sites/clusters is a site selection criterion, wherein the maximum output <= 10 MW and the output power <= 70% of the transformer rating. Distance of SIP sites was another criterion considering the cost of installation. Both overhead and underground cabling are allowed. Grid integration and net metering are piloted under this activity.

Deliverables achieved:

- Grid implemented in 6 out of 9 sites (Raquib Ul Messiah, IDCOL updates the CPMC on the status of the pilot grids, minuted later in this document).
- Monitoring framework co-developed with IDCOL; data collection started at 2 SHEL sites (Shisher Shrestha, IWMI updates the CPMC on the framework, minuted later in this document).
- SIP survey ongoing – for understanding the SIP level impacts.

Activities planned for year 4:

- Data monitoring to start as REB gives connection, and technical report to be submitted for grid pilots.
- Two new site locations with SHEL to be finalized instead of KHM sites.
- Bangladesh stakeholder exposure visit in Gujarat SIP sites (this also came up as a recommendation from the CPMC members, minuted later in this document).

Activity 3.1.1 deals with the training of local technicians and farmers. Third farmer's training to be done around October 2022

Activity 3.2.2 deals with National Forum. The second National forum was organized as a webinar in February 2022. Third to be organized in December 2022/ Jan 2023

B) Q&A

Divya Kashyap Sharma, SDC

Given that SIP use is concentrated in Boro cultivation, why do you not present your results on diesel usage in terms of Boro versus non-Boro seasons? Why are there two graphs on the same analysis of seasonal use of SIPs vs. diesel and electric pumps in your presentation?

Archisman Mitra, IWMI

"Kharif 1" in our study is the boro season, while Kharif 2 is mainly the " aman" season. The first graphical analysis shows the season-wise use of various pumps in the SIP command area. In contrast, the second shows the use of SIPs vs. other pumps in the overall area: SIP command plus areas outside command areas.

Divya Kashyap Sharma, SDC

How are farmers outside the command areas having access to SIPs?

Aditi Mukherji, IWMI

These are plot-level analyses here. So, a SIP farmer can have plots outside the SIP catchment area where he uses other types of irrigation pumps (diesel or electric) only or in combination with SIP.

Dr. Nazmun Nahar Karim, BARC

From your Situation Analysis Report, I understand that the business models of SIPs are heavily Boro-reliant. But from the perspective of groundwater use and sustainable agricultural practices, concentrating on Boro farming alone could be detrimental. Our agricultural policies recognize the need for crop diversification for sustainable agriculture. Given that, the grid-connection policy for SIPs should also consider crop diversification in its agenda. What are your thoughts on this?

Archisman Mitra, IWMI

Yes, that is a valid suggestion. However, let me add some clarity here. IDCOL has chosen the boro areas for their SIP sites. But whether SIPs have led to any significant changes in the boro area or production has not yet been studied by our project. We hope to come up with a more conclusive finding on this in the future course of our work.

Mofazzal Hossain, IDCOL

Although IDCOL is focusing on the Boro areas, even then, we are encouraging crop diversification within the SIP command areas. At 140 SIPs, we have introduced/supported diversification to Aus. We also promote water-saving technologies, build local technical capacity through training, and collaborate with other organizations like BADC to promote these technologies.

Badrul Alam Khan, Gazi Pump

In your cost comparison estimates, which year's prices for diesel have you considered? Please note that diesel (pump) sellers can revise their pricing accordingly with fluctuations in the global price of

diesel. But for the SIP companies, price adjustment is not so flexible. More so when the costs of panels are coming down globally.

Archisman Mitra, IWMI

Our baseline survey estimates use 2019-20 prices. However, we can extrapolate those numbers using more recent price data to capture current price trends. Besides, our endline survey estimates will be based on more up-to-date price data. With this, one can get prices at two different points to make relevant inferences about price changes over time.

Md. Sarwar Hossain, BADC

While calculating the costs of diesel irrigation, did you factor in the operational and maintenance costs of the diesel pumps?

Badrul Alam Khan, Gazi Renewable Energy Ltd

Here I will further add the depreciation costs of the diesel pumps. The pump sets barely last for more than 2-3 years, and we even get phone calls from farmers that pumps have stopped functioning in the middle of their irrigation process.

Dr. Nazmun Nahar Karim, BARC

What is the size of the command area that a SIP can service? It should be mentioned in your report.

Archisman Mitra, IWMI

We have estimated the buyers per acre buying / renting costs. What you are asking me here is about the seller's price. We have not looked at whether he includes these costs – operational, maintenance, and depreciation – in the price he sets for his buyers.

We have noted your comment and will include the SIP command area size in our report.

Dr. Nazmun Nahar Karim, BARC

What could be the possible implications of increasing SIPs panel size, other than the implication for sponsors' business / financial viability that you've mentioned in your report? Will there be any impact on water usage?

Dr. Aditi Mukherji, IWMI

IDCOL has increased the panel size to minimize the variability of water flow during morning and afternoon hours. They have not increased the pump size, though.

Md. Abdullah Al Matin, IDCOL

Water usage in SIP could be higher because of the number of irrigations for which farmers use these. You must note that if boro requires 30 irrigations, then a diesel pump user might cover the irrigation schedule in 20 rounds. While for SIPs, the user will use 30 or more rounds of irrigation

Dr. Aditi Mukherji, IWMI

We also heard the same thing from farmers during our field visits.

Md Sarowar Hossain, BADC

Is it possible to include some cost of cultivation estimates for SIP versus diesel farmers in your research? That kind of estimate will help us recommend to our users the optimal number of irrigations from SIPs that they should apply to their crops.

Secondly, exposure visits or knowledge exchanges with other countries, like India, that are implementing SIPs will be helpful for us to understand the drivers and constraints in SIP management.

Badrul Alam Khan, Gazi Renewable Energy Ltd.

We want to share some of our insights for your cost estimates; as sponsors of SIPs, we have certain observations about the costs of operating and maintaining these systems, which we would like you to include in your research, more so when we double our panel and pump sizes to ensure uninterrupted water flow.

Dr. Nazmun Nahar Karim, BARC

With SIP system sizes increasing, I think there is a need to net meter these systems to ensure they are optimally used. This can also be considered in the policy guideline.

Archisman Mitra, IWMI

Yes, there is an overall demand for net metering for the financial viability of SIP. Perhaps our colleagues from SREDA would like to talk about it now.

Rashedul Alam, SREDA

There is a provision for net metering of SIPs under the Net Metering Guidelines. Also, a requirement for exclusive power export to the grid under the Grid Integration Guidelines is dedicated to SIPs. However, our concern is that grid power availability may adversely affect efforts to operate and maintain the SIPs. Our objective is to create enabling conditions for scaling up the uptake of SIPs in Bangladesh. In this context, we request IWMI to develop some evidence-based recommendations for 1) alternative use of grid power and alternative use of the SIPs, 2) technical and financial feasibility of location-specific grid integration projects, and 3) a unified water tariff for SIPs.

Mofazzal Hossain, IDCOL

So now it is clear that net metering of SIPs is possible. Many of us would assume that grid integration is possible but not net metering.

My question to Archisman is, what kind of changes are you expecting in crop coverage or pattern with grid integration sans net metering?

Archisman Mitra, IWMI

There may be changes in the personal consumption of energy vis-à-vis energy evacuated to the grid, the quality-of-service provision, or the rate.

Coming to your points about uniform water tariff, we have collected the crop-wise cost of irrigation data and can share the analysis with you. But my concern is that more than a unified tariff for solar across crops, a unified tariff across different types of pumps (diesel, electric, SIPs) will be more effective.

Rashedul Alam, SREDA

But can you provide insight into the cost saving from SIPs for a farmer vis-à-vis other types of pumps?

Dr. Aditi Mukherji, IWMI

We are collecting the detailed cost of cultivation data; we can share estimates with you urgently.

Archisman Mitra, IWMI

Rashed Bhai, do you have dedicated guidelines for SIP grid integration, or is it a standard guideline for solar in all sectors?

Rashedul Alam, SREDA

No, it is a standard guideline for all.

C) Grid Pilot

Raquib Ul Mesbah, IDCOL

Mesbah presented a brief update on the IWMI-IDCOL grid pilot project. Of the three sponsors, Gazi, Wave, and Shel, on all four sites of Gazi and two out of the three of Wave, a grid has been set up. These sites are awaiting a connection from REB. However, Shel is yet to begin work. It was onboarded only lately by replacing the previous collaborator, KHM, who could not get clearance for net metering from the local authority (see 1.1 and 1.2 in the annex for details).

	Gazi	**Wave**	**Shel**
No. Sites	4	3	2
Cluster	Yes	No	No
District	Dinajpur	Chuadanga + Jhenaidah	
Progress	Installation is almost complete at all sites, minor works remaining ➔ then REB to give connection.	Two sites completed installation (waiting for REB to give connection) + One site installation is to be started after the first connection.	

Shisher Shrestha, IWMI

Shisher presented a monitoring framework for the pilot grid sites. The monitoring indicators he recommended included the daily energy production, consumption, and evacuation data, daily irrigation use data, bi-month operations, maintenance information, and information on operators' earnings from water sales and energy evacuation (See 2 in the annex for details).

Q & A

Sharif – Al-Amin, Sun Home Energy

From September 2021 to June 2022, we could earn around BDT 1.5 lakhs by evacuating power to the grid from 2 sites. At this rate, it would take us around 10-12 years to recover our initial investment.

Divya Kashyap Sharma, SDC

Do you have any plans for profit-sharing with farmers?

Sharif – Al-Amin, Sun Home Energy

We can only think about that after the gestation period of 10-12 years.

S.M. Shamim Reza, WAVE

Without a competitive buy-back tariff, the long-run sustainability of grid-connected SIPs is threatened.

D) Groundwater use and SIPs

Mohammad Faiz Alam, IWMI

Based on the data on groundwater use for Boro 2022, Faiz presented some of the early estimates on groundwater usage by SIP and diesel pump users across six SIP command areas in the Boro growing regions. The calculations show no significant difference in groundwater use for Boro paddy across SIP and diesel pump users.

E) Dr. Aditi Mukherji, IWMI

Dr. Mukherjee presented some quick observations on the benefits and challenges of the SIP models of IDCOL, BARC, BMDA, and BREB based on her visits to these sites. She concluded her presentation with some crucial questions that summed up the deliberations of the day:

1) What are the future targets and plans for the SIP programs in Bangladesh?
2) How to make SIPs more attractive and financially profitable?
3) Are grid integration and net metering possible options?

From the discussion among the participants, the following general recommendations arose:

1) There is a need for an integrated agriculture development model to make SIPs sustainable. Unless overall agriculture is profitable, initiatives like SIPs cannot be successful.
2) Site selection for grid integration should consider the potential demand for excess energy in the command area beyond the crop/irrigation season
3) Water tariff for SIPs should be made competitive vis-à-vis the water tariff from electric pumps
4) Instead of a uniform model for SIPs, Bangladesh should go with various models suitable for its diverse cropping patterns
5) Webinar/zoom meeting discussing the cross-country models of solar irrigation, knowledge sharing on the South Asian solar sector through a regional forum (December 2022), and exposure visit of Bangladesh delegates to GUVNL SIP feeders in Gujarat.

The meeting ended with a vote of thanks from Ms. Divya Kashyap Sharma, SDC, and Dr. Aditi Mukherjee, IWMI.

Annex:

1.1 Status of grid pilot on Gazi sites				
Implementation Segments	**Chapri Kandor, Birganj, Dinajpur**	**Bochapukur Math, Birganj, Dinajpur**	**Kajol Poschim Kandor, Birganj, dinajpur**	**Boro bochapukur Balakandor, Birganj, Dinapur**
Grid-tied inverters	25 kW inverter installed	25 kW inverter installed	25 kW inverter installed	25 kW inverter installed
Transformers & Accessories	200kVA Core type, Oil immersed transformer installed			
Combiner Box	Installed	Installed	Installed	Installed
Main distribution box	installed	installed	installed	installed
DC side Cabling	6rm NYYF cable connected	6rm NYYF cable connected	6rm NYYF cable connected	6rm NYYF cable connected
AC side cabling (LT)	16rm BYM-FR cable connected	16rm BYM-FR cable connected	16rm BYM-FR cable connected	16rm BYM-FR cable connected
AC side cabling (HT)	Connection ongoing	Connection ongoing	Connection ongoing	Connection ongoing
Protective devices	Installation on going	Installation on going	Installation on going	Installation on going
Metering & Monitoring	No water flowmeter, energy meter & remote monitoring feature installation on going,	No water flowmeter, energy meter & remote monitoring feature installation on going,	No water flowmeter, energy meter & remote monitoring feature installation on going,	No water flowmeter, energy meter & remote monitoring feature installation on going,

1.2 Status of grid pilot on WAVE sites		
Implementation Segments	**Padma Pukur, Moheshpur, Jhenaidah**	**Kulpala, Alamdanga, Chuadanga**
Grid-tied inverters	33 kW inverter installed	33 kW inverter installed
Transformers & Accessories	3pcs of 25KVA transformers are ready to install	3pcs of 25KVA transformers are ready to install
Combiner Box	Installed	Installed
Main distribution box	installed	installed
DC side Cabling	4rm BYA cable connected	4rm BYA cable connected
AC side cabling (LT)	25rm XLPE cable connected	25rm XLPE cable connected
AC side cabling (HT)	Awaiting connection from REB	Awaiting connection from REB
Protective devices	2 SPDs, one lightning arrestor, and two earthing connections done	2 SPDs, one lightning arrestor, and two earthing links done
Metering & Monitoring	water flowmeter available, energy meter & remote monitoring feature installation ongoing,	water flowmeter functional, energy meter & remote monitoring feature installation ongoing,

2. Monitoring framework for grid pilot in Bangladesh				
Key Monitoring Parameter	**Unit**	**Equipment to be measured**	**Medium**	**Frequency of Monitoring**
Energy Parameters are to be monitored through Inverter Remote Monitoring Unit (RMU) portal.				
Energy yield from the PV micro-grid system	kWh	RMU	Online / Local Storage	Daily / Monthly / Yearly
Energy sold to Grid	kWh	RMU	Online / Local Storage	Daily / Monthly / Yearly
Energy consumed by the Pump	kWh	RMU	Online / Local Storage	Daily / Monthly / Yearly
Net-Energy (energy balance of Outflow and Inflow amount)	kWh	RMU	Online / Local Storage	Daily / Monthly / Yearly
Peak Power	kW	RMU	Online / Local Storage	Daily / Monthly / Yearly
Other Parameters to be monitored through Inverter Remote Monitoring Unit (RMU) portal				
System Downtime (Entire System)	Hours/Days	RMU	Online / Local Storage	Hourly / Daily
Frequency and duration of system failure trends	Nos.	RMU	Online / Local Storage	Monthly
System Parameters to be monitored manually by the SIP Operator				
Energy Sold to Grid	kWh	Utility Energy Meter	Physical Logbook	Daily
Energy Consumed by Pump	kWh	Analog Energy Meter	Physical Logbook	Daily
Water Discharge from the Pump	Liters	Flowmeter	Physical Logbook	Daily
Area Irrigated	acres	Manual	Physical Logbook	Daily
Energy Sold to Grid	kWh	Utility Energy Meter	Physical Logbook	Daily
Energy Consumed by Pump	kWh	Analog Energy Meter	Physical Logbook	Daily
Operations and Maintenance Parameters are to be monitored manually by the SIP Operator.				
Grid Downtime	Hours/Days	Manual	Physical Logbook	Event Occurrence
System Downtime (Entire System)	Hours/Days	Manual	Physical Logbook	Event Occurrence
SIP Downtime (Pump Only)	Hours/Days	Manual	Physical Logbook	Event Occurrence
Grid-tie inverter Downtime	Hours/Days	Manual	Physical Logbook	Event Occurrence
Scheduled Maintenance of System	Nos.	Manual	Physical Logbook	Event Occurrence
Unscheduled Maintenance of System	Nos.	Manual	Physical Logbook	Event Occurrence
Time taken for maintenance/ activities conducted.	Hours/Days	Manual	O&M Report	Half-yearly
Economic Parameters to be monitored manually through Sponsors				
Sponsors earning from sales of Irrigation water	BDT	Number of Farmer / Plots	Physical Logbook	Monthly / Yearly
Sponsors earning from sales of Surplus Energy	BDT	DISCOM monthly bill	Physical Logbook	Monthly
Feed-in Tariff	BDT	DISCOM monthly bill	Physical Logbook	Monthly
Total Amount paid by DISCOM to Sponsor	BDT	Cheque / Transfer / Bank Statement	Physical Logbook	Monthly

Participants at the meeting

Image credit: IDCOL

This meeting note is prepared by Sunipa Das Gupta, Communications Consultant, IWMI, New Delhi.