

Workshop Report



Stakeholders and participants gather for a group photo at the SoLAR Phase II Inception Workshop

Solar Energy for Agricultural Resilience (SoLAR) Phase II Inception Workshop in India

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SoLAR
Solar Energy for
Agricultural Resilience

Solar Energy for Agricultural Resilience (SoLAR) Phase II Inception Workshop in India

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Highlights of the workshop

- The inception workshop marked the launch of Phase II of the Solar Energy for Agricultural Resilience (SoLAR) project, bringing together policymakers, researchers, development partners, and practitioners from India, Bangladesh, Kenya, and Ethiopia to align priorities for scaling solar energy solutions in agriculture.
- Key discussions reaffirmed solar irrigation as a critical entry point for addressing the water–energy–food nexus, with evidence from Phase I demonstrating gains in farmer incomes, energy efficiency, and climate resilience, while challenging assumptions around groundwater over-extraction.
- Country representatives highlighted diverse policy and implementation pathways, including integration with national programs such as PM-KUSUM (India), IDCOL-supported models (Bangladesh), the National Irrigation Sector Investment Plan (Kenya), and Ethiopia’s national irrigation and livestock strategies.
- Participants emphasized the need to move beyond irrigation alone by promoting productive uses of solar energy such as agro-processing, cold storage, milling, and household electricity to improve utilization rates and enhance rural livelihoods.
- Strong consensus emerged on the importance of capacity building, including training for farmers, technicians, and extension systems, strengthening institutional platforms such as Krishi Vigyan Kendras and Skill Training for Agricultural Rural Youth Centres, and expanding South–South knowledge exchange and student engagement.
- Discussions highlighted the role of enabling policies, institutional convergence, and simplified decision-support tools to support planning, adoption, and scaling of solar irrigation across heterogeneous agro-ecological contexts.
- Financing challenges, particularly high upfront costs, limited access to affordable credit, and weak after-sales service ecosystems were identified as key constraints, alongside opportunities for blended finance, carbon-linked incentives, and private sector engagement.
- The discussion underscored the role of South–South collaboration in enabling the transfer of practical lessons from solar power implementation between South Asia and East Africa.
- The workshop concluded with agreement on key priorities for Phase II, including scaling successful pilots, strengthening evidence generation, advancing gender-responsive approaches, and deepening collaboration across countries and partners.

Summary

Project Background

SoLAR Phase II (2025–2028) is a regional initiative supported by the Swiss Agency for Development and Cooperation (SDC). Building on the foundational success of Phase I (Dec 2019–May 2025), the project aims to foster an enabling environment for the sustainable, socially inclusive, and climate-resilient scaling of solar agri-tech solutions. While Phase I focused on South Asia, Phase II expands its footprint to East Africa (Ethiopia and Kenya), facilitating meaningful South-South collaborations. The project operates across four pillars: evidence-based policy design, innovative finance acceleration, capacity building, and the establishment of "Living Labs" for real-world testing.

Rationale for the Workshop

The SoLAR Phase II inception workshop was convened to launch the second phase of the project and align stakeholders on priorities for scaling solar energy solutions in agriculture across India, Bangladesh, Kenya, and Ethiopia. It provided a platform to reflect on Phase I lessons, promote cross-country learning, and discuss strategies for policy alignment, financing, capacity building, and gender-inclusive approaches.

Participant Overview

The workshop brought together a diverse group of **52 participants**, including representatives from government agencies, research institutions, development partners, think tanks and the media across **India, Bangladesh, Ethiopia, Kenya, Sri Lanka, and Switzerland**, with **male (35) and female (17) participants**.

Participants included officials and experts from institutions such as **NITI Aayog, Indian Council of Agricultural Research (ICAR), Bangladesh Agricultural Development Corporation (BADC), the International Solar Alliance (ISA)**, and development partners including the **Swiss Agency for Development and Cooperation (SDC)**.

Workshop objectives

- To formally initiate Phase II of the SoLAR programme by aligning stakeholders around its expanded scope, geographic focus, and outcome-oriented implementation framework.
- Reflect on evidence, lessons, and innovations from Phase I to inform scaling strategies.
- Enable cross-country dialogue and South–South learning on policy, financing, technology, and institutional approaches.
- Identify practical pathways for implementation, including pilots, capacity building, and decision-support tools.
- To reinforce multi-stakeholder coordination and partnerships among government agencies, research institutions, development partners, and the private sector as a foundation for scaling socially inclusive and climate-resilient solar energy solutions for agriculture.

Summary of Sessions

Opening session

Ms. Divya Kashyap Sharma, Deputy Head of Cooperation in India, Swiss Agency for Development and Cooperation (SDC) delivered welcome remarks and introduced the workshop's objectives, followed by a symbolic workshop inauguration featuring the watering of a plant, representing the food-water-energy nexus and the life-giving potential of solar-powered irrigation.

She reaffirmed SDC's commitment to climate-resilient, socially inclusive agricultural development across South Asia and East Africa. Ms. Sharma highlighted that the SoLAR project seeks to scale water and solar based technologies that are not only technically sound but also socially embedded and responsive to local contexts in India, Bangladesh, Kenya, and Ethiopia. Drawing on recent field visits, she reflected on how solar irrigation initiatives are already contributing to improved water security, reduced dependence on fossil fuels, and enhanced livelihood opportunities for rural communities. At the same time, she acknowledged concerns that have emerged in policy discourse, including apprehensions around groundwater over-extraction and community resistance to large solar installations. She noted that Phase II would address these concerns through evidence of generation, participatory approaches, and dialogue with policymakers and communities. Emphasizing the programme's role as a collaborative platform, she stated that SoLAR Phase II would prioritize cross-country learning, innovation, and inclusive energy transitions within food systems.

MOU Announcement and launch of SolarReady Dashboard by Dr. Alok Sikka, Country Representative—IWMI India and Bangladesh/Senior Fellow

During the opening session, Dr. Alok Sikka, Country Representative—IWMI India and Bangladesh and Senior Fellow, announced key institutional partnerships to support Phase II implementation of the SoLAR project. These included E

Dr. Sikka also launched the SolarReady Dashboard, a decision-support platform designed to assess solar suitability and support planning for solar irrigation across India, Bangladesh, Kenya, and Ethiopia. The dashboard is intended to assist policymakers and implementing agencies in identifying suitable locations, aligning solar deployment with water availability and crop requirements, and supporting evidence-based scaling of solar energy solutions under Phase II.

Dignitaries released three knowledge products: a training manual for energy extension agents, the SoLAR Phase I Impact Pathways Report, and the SoLAR Phase I GESI Insights.

Keynote Address by her Excellency Ambassador Maya Tissafi, Ambassador of Switzerland to India and Bhutan

Her Excellency Ambassador Maya Tissafi, Ambassador of Switzerland to India and Bhutan, delivered the keynote address, emphasizing the importance of cross-country collaboration for building climate-resilient rural livelihoods. She highlighted that solar energy interventions under the SoLAR initiative go beyond infrastructure, contributing to improved livelihoods, reduced vulnerability to climate risks, and expanded economic opportunities, particularly for women as solar water managers and agri-entrepreneurs.

Drawing on field experiences from Phase I, she noted that solar irrigation has enabled more reliable water access, reduced dependence on diesel, and increased farm incomes, while strengthening women's agency and participation. She underscored the need for cleaner, decentralized energy solutions in agriculture and stressed that community-focused approaches must complement large-scale solar infrastructure. Introducing Phase II, she highlighted its expanded focus on productive uses of solar energy, stronger policy engagement, and South-South learning, concluding with the principle that no farmer or village should be left behind.

Keynote Address by Prof. Ramesh Chand, Member, NITI Aayog

Prof. Ramesh Chand delivered the keynote address as Chief Guest, focusing on the water–energy–irrigation nexus and the strategic role of solar irrigation in advancing India’s agricultural development and climate action. He emphasized the need to move beyond disciplinary silos, noting that water, energy, and agriculture are deeply interconnected systems. Initiatives such as the SoLAR project, he noted, reflect the kind of integrated, systems-based approach required to address contemporary agricultural challenges.

He highlighted solar irrigation as a powerful multiplier for agricultural productivity, climate resilience, and efficiency. By decentralizing energy production, solar irrigation gives farmers greater control over irrigation, enables the flexible use of groundwater, canal water, and stored rainwater, reduces operating costs, and creates opportunities for additional income through surplus power sales. These benefits, he emphasized, make solar irrigation a transformative solution for expanding irrigation coverage and improving water-use efficiency.

Addressing issues of agrarian inequality, Prof. Chand noted that access to reliable irrigation has historically favored larger farmers and well-resourced regions. Solar irrigation, supported by inclusive policies and targeted financing, offers a pathway to expand irrigation access for small and marginal farmers. He referred to the PM-KUSUM programme as a significant policy initiative promoting farmer-led adoption of solar pumps, while also highlighting ongoing gaps in inter-ministerial coordination, financing accessibility, and technical capacity.

Concluding his remarks, Prof. Chand underscored India’s vision of “Har Khet Ko Paani,” stating that scaling solar-powered irrigation alongside robust water governance, appropriate cropping patterns, and soil conservation measures can significantly contribute to equitable and climate-resilient agricultural growth.

Closing Remarks by Dr. Vidhisha Samarasekara (Program Director- Water, Climate Change and Resilience, IWMI)

Dr. Vidisha concluded the session by underscoring the critical elements for the project’s success: active engagement of government partners, strong scientific evidence, and a clear focus on farmers as the primary beneficiaries. She emphasized the importance of implementing socially inclusive and gender-responsive approaches and expressed gratitude to both the dignitaries and all participants. She closed by highlighting the collaborative nature of the initiative, noting that collective effort would enable the team to achieve outcomes beyond those envisioned at the project’s inception.

Session 1: Project Overview and partners perspective

Opening remarks from Swiss Agency for Development and Cooperation (SDC)

Ms. Mirjam Macchii Howell, Head of Climate, Disaster Resilience and Environment at SDC, was welcomed to the session. She explained that the initiative promotes the productive use of renewable energy for activities such as irrigation, agro-processing, and refrigeration, while emphasizing gender-responsive approaches that support women's roles in rural economies. She also highlighted Switzerland's Hardest-to-Reach Expansion Fund by Acumen, which shares early-stage investment risks to attract financing for solar solutions and mini-grids in remote areas for disadvantaged communities.

Ms. Macchii noted that these efforts help build resilient, inclusive, and low-carbon rural economies. She emphasized that the Solar2 initiative reflects the shared commitment of partners to expand renewable energy in ways that strengthen food systems, reduce emissions, and create opportunities for rural communities, and she wished all participants an inspiring workshop.

Lessons from Phase I, workshop objectives, expected outcomes and south-south collaboration

Presented by **Dr. Darshini Ravindranath**, Project Lead, SoLAR & Senior Researcher, and **Dr. Muluken Adamseged**, Deputy Project Lead, this session reflected key lessons and evidence generated during Phase I of the SoLAR project and outlined priorities for Phase II implementation.

A project video showcasing Phase I glimpses and achievements from pilot sites across India, Bangladesh, Nepal, and Pakistan was screened, setting the backdrop for Phase II's scaled ambitions. Presentations highlighted that solar irrigation interventions contributed to improved energy efficiency, reduced reliance on diesel, and increased farmer incomes, while enabling diversification into higher-value crops and strengthening climate resilience. Capacity-building efforts under Phase I including the training of master trainers and establishment of training centres were identified as critical enablers for adoption and scaling.

The session reiterated the objectives of the workshop, which included aligning stakeholders on Phase II priorities, promoting cross-country learning, and identifying practical pathways for scaling solar energy solutions across diverse agro-ecological and policy contexts. Expected outcomes included clearer implementation strategies at the country level, stronger institutional coordination, and the use of evidence and decision-support tools to guide planning and investment.

South-South collaboration was emphasized as a central pillar of Phase II, with a focus on sharing experiences across South Asia and East Africa on policy frameworks, financing models, technology choices, and capacity-building approaches. The session underscored the value of structured knowledge exchange, joint learning platforms, and partnerships among governments, research institutions, and development partners to accelerate inclusive and sustainable scaling of solar energy for agriculture.

Perspective from the International Solar Alliance (ISA) on Solar Deployment and Capacity Building by Mr P. C. Sharma, Joint Director, ISA

Mr. Sharma described the functioning of the ISA, which has 120 member countries and focuses on promoting solar energy adoption, particularly in Africa and least developed countries (LDCs). He highlighted ISA's programs, including promoting solar applications for agriculture, supporting policy change and advocacy, capacity development and training, and accelerating finance for solar projects. He noted that ISA has trained 120 master trainers and established 14 strategic centers to build capacity across member countries. Participants from LDCs

have received training at IIT Delhi, with 93 fellows completing programs, and online training is also provided. Mr. Sharma further explained that ISA accelerates financing for demonstration projects, such as solar cold storage, solar water pumping, and solar-powered hospitals, supported by the World Bank, UNDP, and the Government of India, to promote scalable and inclusive solar solutions.

Session 2: Project Implementation and Way Forward

The second session opened with an introduction to the Project Steering Committee, delivered by **Ms. Tripti Agarwal, Project Coordinator at IWMI**. She introduced the Project Steering Committee (PSC), which will provide overall strategic guidance and oversight to the project. She explained that the PSC will review and approve annual work plans, monitor progress, and provide advice on key strategic and policy-related issues. The committee will also review major project deliverables and support timely decision-making during implementation.

The presentation outlined the composition of the PSC, noting representation from the Swiss Development Cooperation (SDC), IWMI, and partner institutions from South Asia and Africa. This structure is intended to ensure coordination across countries and alignment with national and regional priorities.

Members of the Project Steering Committee (PSC) are as follows:

- Ms. Mirjam Macchi Howell, Head of Climate, Disaster Risk Reduction and Environment, Swiss Agency for Development and Cooperation (SDC): Co-chair
- Mr. Mark Smith, Director General, SDC Sri Lanka :Co-Chair
- Mr. P. C. Sharma, Joint Director, International Solar Alliance
- Eng. Vincent Kabuti, Irrigation Secretary, State Department for Irrigation, Kenya
- Ms. Suman Chandra (IAS), Director, Ministry of New and Renewable Energy, Government of India
- Eng. Md. Sarwar Hossain, Additional Chief Engineer, Bangladesh Agricultural Development Corporation (BADC)
- Mr. Elias Awol, CEO, Smallholder Irrigation Development Directorate, Ministry of Agriculture, Ethiopia
- Ms. Divya Kashyap Sharma, Deputy Head of Cooperation, Swiss Agency for Development and Cooperation (SDC)
- Dr. Darshini Ravindranath, Project Lead, SoLAR and Senior Researcher, International Water Management Institute (IWMI)
- Mr. S. M. Monirul Islam, Deputy CEO and CFO, Infrastructure Development Company Limited (IDCOL), Bangladesh

The co-opted members of the PSC are:

- Dr. Vidhisha Samarasekara, Program Director – Water, Climate Change and Resilience, IWMI
- Dr. Alok Sikka, Country Representative – India and Bangladesh / Senior Fellow, IWMI
- Dr. Muluken Adamseged, Deputy Project Lead, SoLAR, IWMI
- Dr. Abdulkarim Seid, Country Representative – Ethiopia and Kenya, IWMI

Country approaches for implementation

Following this introduction, the session moved into country specific presentations on planned approaches for implementation, -Country leads from Bangladesh, Ethiopia, India, and Kenya outlined their Phase II workplans, covering priority geographies, proposed solar irrigation and energy interventions, institutional arrangements, and linkages to ongoing national schemes and policies.

Dr Jayanta Bhattacharya, Country Lead – Bangladesh, set out a Phase II approach centered on expanding solar irrigation in areas where groundwater and surface water conditions permit- sustainable abstraction, while carefully managing pressures in more fragile zones. He emphasised collaboration with public agencies and local service providers to identify suitable command areas, aggregate farmer demand, and test fee for- service and group-based- business models that reduce upfront costs for smallholders and enhance benefits for women and poorer farmers. The Bangladesh plan also aims to integrate SoLAR investments with existing government schemes, strengthen monitoring systems for solar irrigation schemes, and feed evidence into national discussions on energy pricing, water governance, and agricultural diversification.

Ethiopia's approach was presented jointly by **Yidnekachew Zewde, Muluken Elias, and Amare Hailelassie**, representing the SoLAR Ethiopia country team, who underscored the country's significant untapped potential for solar powered irrigation alongside constraints such as limited rural electrification, low purchasing power, and technical capacity gaps. Phase II will build on emerging pilots to demonstrate- context appropriate solar- solutions across diverse agroecological zones, prioritizing smallholder and community managed- irrigation schemes.

The workplan combines technology demonstrations with institutional innovations such as cooperatively managed assets and service provider- models, complemented by capacity development for technicians, extension agents, and local officials, as well as efforts to improve coordination among water, agriculture, and energy institutions to inform national strategies on climate resilient- irrigation.

Dr Deepak Varshney, Country Lead – India, highlighted how SoLAR Phase I has generated strong evidence on groundwater sustainability, gender inclusion, and farmer livelihoods, which now underpins the Phase II strategy. Impact evaluations show that grid connected- solar irrigation pumps can reduce energy use for groundwater extraction when farmers are incentivized to feed surplus power into the grid, while off grid- systems have encouraged shifts toward higher value- crops and reduced diesel use. Building on these lessons, the India workplan focuses on addressing equity and inclusion gaps, improving financial sustainability, and strengthening convergence between energy, agriculture, and water institutions through water–energy–food–solar suitability mapping, a solar pump sizing tool, an energyextension- agent model, and tailored financial instruments and partnerships.

The Kenya workplan was presented by **Dr Josey Kamanda**, Innovation Scaling Researcher and Kenya Country Lead – SoLAR II and builds on Kenya’s position as a regional leader in solar technology while recognizing persistent barriers that limit inclusive agricultural use. The presentation noted that only a fraction of Kenya’s irrigation potential is currently developed and that constrained access to reliable, affordable energy remains a major bottleneck despite a vibrant solar market. In response, Phase II in Kenya will focus on generating water–energy–food–social systems analysis and composite maps to guide targeting, strengthening decision support- and capacity through tools, manuals and forums, and catalysing finance and partnerships for bundled solutions that link irrigation with services such as cold storage and agroprocessing-. Attention will be paid to collaboration with government agencies, universities, industry associations, and private providers, and to ensuring that women, youth, and marginalised groups can participate in and benefit from emerging solar markets.

The SolaReady tool was presented by **Faiz Alam, Senior Regional Researcher, IWMI**, and focused on enabling climate-responsive and sustainable upscaling of solar irrigation through spatially informed decision-making. The presentation situated solar irrigation within the water–energy–food nexus, emphasising that while solar pumps offer significant adaptation and mitigation benefits, their impacts on groundwater, energy use, and farm outcomes vary considerably across locations and solar models. He explained that SolaReady integrates datasets related to water availability, irrigation demand, energy infrastructure, farming systems, and utility performance to generate district-level suitability assessments aligned with three objectives: climate adaptation, greenhouse gas mitigation, and groundwater sustainability.

The presentation demonstrated how the platform allows users to visualise and compare suitability at national, state, and district scales, thereby supporting more targeted and context-specific planning. Preliminary outputs from Bangladesh were also shared, illustrating the tool’s potential applicability across multiple country contexts to guide policy, investment, and programmatic decisions.

Session 3: Stakeholder reflections and strengthening partnerships

Panel Discussion: Collaborative Pathways for Scaling Solar Energy in Phase II

Panelists

- Dr. Shikha Anand, World Resources Institute (WRI)
- Mr. Franklin Kiptoo, Research Associate, Strathmore University- Virtual
- Mr. Elias Awol, CEO, Smallholder Irrigation Development Directorate, Ministry of Agriculture, Ethiopia
- Dr. R. K. Singh, ADG (Extension), Indian Council of Agricultural Research (ICAR)
- Mr. Bart Minsaer, Vice Chairman, Ethiopian Solar Energy Development Association-Virtual
- Mr. Wakil Ahmed Arnob, Senior Officer, Infrastructure Development Company Limited (IDCOL), Bangladesh-Virtual



Panel discussion on scaling solar irrigation, featuring experts from government, research, and development sectors, moderated by Dr. Darshini Ravindranath (photo: Grover Event Management)

During the panel discussion moderated by Dr. Darshini Ravindranath, **Dr. Shikha Anand** from the World Resources Institute highlighted the importance of user-friendly, state-level decision-support tools for scaling solar irrigation. Drawing on experience with the Energy Access Explorer, she emphasized that limited technical capacity and data constraints within government departments require platforms that are simple to use, browser-based, and supported by sustained capacity building. She stressed the need for cross-departmental coordination and backend support to enable effective solar suitability mapping and planning.

Mr. Franklin Kiptoo, Research Associate at Strathmore University, shared evidence from East African smallholders, noting that modular and affordable solar irrigation systems tailored to farm size and water demand are most effective. He highlighted the promise of community-based and shared irrigation models but underscored persistent barriers such as high upfront costs, limited access to affordable credit, weak spare-parts supply chains, and inadequate after-sales service. He emphasized that strengthening maintenance ecosystems and awareness is critical for scaling.

Mr. Elias Awol, CEO of the Smallholder Irrigation Development Directorate, Ministry of Agriculture, Ethiopia, reflected on Ethiopia's transition from diesel to solar irrigation, supported by government investment and development partner financing. He highlighted policy measures such as tax exemptions on solar and irrigation equipment and the integration of solar irrigation into national irrigation and livestock programs. He also noted challenges related to credit access, technician capacity, and farmer awareness, while identifying opportunities for agrovoltaics, post-harvest applications, and value-chain integration.

Dr. R. K. Singh, ADG (Extension), Indian Council of Agricultural Research (ICAR), emphasized the critical role of India's extension system, particularly Krishi Vigyan Kendras (KVKs), in scaling solar irrigation. He highlighted KVKs' capacity to reach large numbers of farmers through demonstrations, training, and advisory services, while supporting farmers in navigating scheme requirements. He stressed the importance of integrating solar irrigation with broader soil, water, and climate-smart agriculture initiatives, with a specific focus on youth and women.

Mr. Bart Minsaer, Vice Chairman of the Ethiopian Solar Energy Development Association, highlighted financing and regulatory barriers to scaling solar solutions for productive use. He emphasized the need for accessible long-term financing, revolving funds, and clear risk-sharing mechanisms to incentivize private sector participation. He also

noted that high taxes on components, fragmented institutional responsibilities, and the absence of quality assurance frameworks increase costs and delay implementation.

Mr. Wakil Ahmed Arnob, Senior Officer at IDCOL Bangladesh, outlined IDCOL's role as a financial intermediary and technical facilitator for solar irrigation. He highlighted the use of grant subsidies to reduce capital costs, revisions to private sector equity requirements, and the exploration of grid-connected models to ensure financial viability. He also discussed opportunities for agrivoltaics, carbon credit mechanisms, and dual-use land models, while underscoring the need for stronger local maintenance networks and risk-mitigation measures such as crop insurance.

Group Learning and Participants' Reflections

During the session, **Dr. S. K. Srivastava**, a Senior Scientist from the Indian Council of Agricultural Research (ICAR) reflected on the strong evidence generated during Phase I across economic, policy, institutional, and capacity-building dimensions. He highlighted ICAR's ongoing research projects and student-led studies relevant to solar irrigation and suggested integrating these efforts under Phase II. He emphasized the need for structured knowledge-exchange platforms involving researchers and students across disciplines. Reflecting on India's energy transition, he noted the decline of diesel pumps, the dominance of electric pumps, and the growing viability of solar pumps. He raised strategic questions around whether solar efforts should focus on replacing electric pumps or targeting regions with limited grid access and stressed the importance of designing region-specific solutions and leveraging synergies across government programs such as micro-irrigation and farm pond schemes.

Dr. Priyabrata Santra, Principal Scientist and Head- Division of Natural Resources at ICAR highlighted ICAR's long-standing work on solar irrigation and agrovoltaics and noted that solar irrigation systems are used only during limited irrigation periods, leaving significant untapped potential. He emphasized the importance of promoting productive uses of solar energy beyond irrigation, including small-scale processing, cold storage, drying, milling, and household electricity. He also shared experiences from agrovoltaics pilots demonstrating dual land use and highlighted challenges related to surplus electricity buyback, underscoring the need for feasible feed-in arrangements. **Dr. Deepak Varshney** added that under PM-KUSUM Component C1, grid-connected systems offer feed-in tariffs, helping address surplus power issues.

Mohammed Sarwar Hossein from Bangladesh raised concerns regarding limited evidence on market mechanisms for solar irrigation pump production and sales, as well as constraints related to local manufacturing capacity in some countries. He highlighted cost disparities across countries, noting that solar pumps in Ethiopia are significantly more expensive than in India. He shared evidence suggesting that adoption can increase substantially when discounts of 17–25% are provided, often through carbon credit mechanisms, and emphasized the need for deeper research on cost structures, scale economics, and manufacturing ecosystems.

Amare Hailelassie, Principal Researcher at IWMI, emphasized that solar energy is increasingly viewed as central to the future of agriculture and highlighted the importance of trust among farmers, policymakers, and suppliers. He stressed the role of innovation and technology bundling, including integrating solar irrigation with water optimization, market linkages, and capacity building. He underscored the importance of demonstrations, hardware availability, and farmer-led experimentation through living labs.

Mallik E. V., Senior Associate in the Energy Policy and Regulations group from CSTEP shared findings from work across multiple Indian states, noting that concerns around groundwater over-extraction due to solar pumping are not supported by recent evidence. He highlighted that farmers generally use water responsibly, even when grid power is freely available. He discussed the benefits of off-grid solar systems in reducing grid load and infrastructure stress and highlighted that grid-connected solarisation is feasible in some states, while individual pump solarisation may be more appropriate in land-constrained regions. He noted that grid connectivity combined with solar enables dual income opportunities through surplus power exports.

Anuj Xess, Programme Lead with the Energy Transitions team from CEEW highlighted the persistent challenge of ensuring high utilisation of solar pumps and emphasized the need to link solar irrigation with appropriate livelihood applications. He suggested focusing Phase II research on identifying viable combinations of pumps and livelihood uses across regions. He also recommended developing simplified, farmer-facing decision-support tools with minimal input requirements, while retaining complexity at the backend for researchers, and stressed the importance of highlighting evidence showing lower-than-expected groundwater extraction under grid-connected solar systems.

Dr. Santosh Mali, Principal Scientist at ICAR shared that ICAR plans to expand the existing solar pump sizing tool into a broader solar unit sizing tool covering multiple enterprises. He emphasized the need for country- and region-specific data inputs and suggested expanding student internships across countries in Phase II to support data collection, fieldwork, and analysis.

Closing session

In the closing remarks, **Dr. Abdulkarim Seid**, Country Representative for Ethiopia and Kenya at the International Water Management Institute (IWMI), summarized the key themes emerging from the workshop discussions. He emphasized the importance of translating Phase I evidence into context-specific and scalable interventions under Phase II, supported by strong partnerships, institutional coordination, and sustained capacity building.

He underscored the value of cross-country learning and South–South collaboration in addressing shared challenges related to policy alignment, financing, technology deployment, and groundwater sustainability. He concluded by thanking participants for their active engagement and reaffirmed the project’s commitment to advancing inclusive, evidence-based, and climate-resilient solar irrigation solutions across participating countries.

Lessons learned

- **Evidence-based narratives:** Phase I evidence from project countries and stakeholder discussions demonstrated that well-designed solar irrigation systems can improve farmer incomes and reduce diesel dependence without leading to groundwater over-extraction. This finding is critical for addressing policy concerns and enabling wider adoption, particularly of grid-connected systems.
- **Utilisation Determines Viability:** A consistent lesson across sessions was that solar irrigation systems are significantly underutilized outside the irrigation season. Improving economic viability requires integrating productive uses beyond irrigation, including agro-processing, cold storage, household electricity, and agrivoltaics.
- **Capacity Building is a Core Enabler:** The workshop reinforced that technology deployment alone is insufficient for scaling. Sustainable adoption depends on strong extension systems, trained technicians, institutional capacity, and structured platforms for student and researcher engagement across countries.
- **Context-Specific Design is Non-Negotiable:** Country experiences highlighted that solar irrigation pathways must be tailored to local agro-ecologies, grid access, tariff structures, and institutional arrangements. Uniform models risk inefficiency and low uptake.
- **Financing and Maintenance Ecosystems Remain Bottlenecks:** Persistent challenges related to high upfront costs, limited access to affordable credit, weak spare-parts supply chains, and after-sales service gaps underscore the need for blended finance, risk-sharing mechanisms, and stronger private sector participation.
- **South-South Learning Adds Practical Value:** Cross-country exchanges between South Asia and East Africa provided actionable insights on policy design, financing models, and implementation approaches, reinforcing the importance of structured South-South collaboration for Phase II

Partnerships

The SoLAR Phase II project represents a strategic shift from pilot-led interventions to coordinated, multi-country scaling of solar energy solutions for agriculture across South Asia and East Africa.

Through strengthened partnerships with national governments, research institutions, development partners, and the private sector in India, Bangladesh, Kenya, and Ethiopia, the project aims to align solar energy for agriculture deployment with national and sub-national policies, financing mechanisms, and institutional capacities. These partnerships are central to bridging gaps between evidence generation, policy implementation, and last-mile adoption by farmers.

By strengthening collaboration across energy, agriculture, water, and climate institutions, and by integrating solar technologies with water management, productive uses, and capacity building, SoLAR Phase II aims to enable resilient, inclusive, and sustainable agricultural transitions that support food security, climate objectives, and rural livelihoods.

Annexes

Annexure – I Workshop Agenda

Time	Session / Item	Details / Speakers
09:30-10:00	Registration	Registration and networking
10:00-10:05	Welcome and workshop objectives	Welcome and introduction of workshop objectives – Ms. Divya Kashyap Sharma, Deputy Head of Cooperation, Swiss Agency for Development and Cooperation (SDC)
10:05-10:15	Inauguration	Workshop inauguration by watering a plant; Project video – Phase 1 glimpses
10:15-10:25	Inaugural address	Ms. Maya Tissafi, Ambassador of Switzerland to India and Bhutan
10:35-10:45	Address by Chief Guest	Prof. Ramesh Chand, Member, National Institution for Transforming India (NITI Aayog)
10:45-10:55	MoU announcements & launch	MoU announcements & launch of SoLARReady dashboard – Dr. Alok Sikka, Country Representative – India and Bangladesh / Senior Fellow, IWMI
10:55-11:00	Session closing	Session closing – Dr. Vidhisha Samarasekara, Program Director – Water-Climate Change and Resilience, IWMI
11:00-11:30	Group photo & tea break	Group photo followed by networking tea break
11:30-11:35	Session 1 opening	Session 1: Project overview and partner perspectives – Opening remarks by Ms. Mirjam Macchi Howell, Head of Climate, Disaster Risk Reduction and Environment, SDC
11:35-11:45	Lessons and objectives	Lessons from Phase 1, workshop objectives, expected outcomes & South-South collaboration – Dr. Darshini Ravindranath, Project Lead, SoLAR & Senior Researcher, IWMI; Dr. Muluken Adamseged, Deputy Project Lead, IWMI
11:45-11:50	Remarks	Remarks – Mr. P. C. Sharma, Joint Director, International Solar Alliance

11:50–11:55	Remarks	Remarks – Eng. Mohammad Sarwar Hossain, Additional Chief Engineer, Bangladesh Agricultural Development Corporation
11:55–12:00	Remarks	Remarks – Eng. Vincent Kabuti, Irrigation Secretary – State Department for Irrigation, Kenya
12:00–12:10	Session 2: PSC introduction	Session 2: Project implementation and way forward – Project Steering Committee introduction – Ms. Tripti Agarwal, Project Coordinator, IWMI
12:10–13:00	Country approaches	Country specific planned approach for implementation – 10-minute presentations by country leads followed by Q&A (Bangladesh, Ethiopia, India and Kenya)
13:00–14:00	Lunch	Networking lunch
14:00–15:00	Session 3: Panel discussion	Session 3: Stakeholder reflections & strengthening partnerships – Panel discussion on collaborative pathways for scaling solar energy by partner organizations in Phase 2; Moderator: Dr. Darshini Ravindranath, IWMI
14:00–15:00	Panelists	Mr. Elias Awol; Mr. Monirul Islam (virtual); Dr. R. K. Singh; Mr. Frankline Kiptoo (virtual); Mr. Bart Minsaer (virtual); Dr. Shikha Anand
15:00–15:15	Tea break	Tea break
15:15–16:30	Group learning	Group learning on: Policy pathways; Finance and sustainability; Pilots & living labs; Capacity building & South–South exchange – Moderator: Dr. Muluken Adamseged, IWMI
16:30–16:45	Reflections	Reflections by participants
16:45–17:00	Closing remarks	Closing remarks – Dr. Abdulkarim Seid, Country Representative – Ethiopia, IWMI

Annexure – II

List of Participants

S. No.	Name	Gender	Country	Organisation	Designation
1	Abdulkarim Seid	M	Ethiopia	IWMI	Country Representative – Ethiopia
2	Alok Sikka	M	India	IWMI	Country Representative – India & Bangladesh
3	Amare Hailelassie	M	Ethiopia	IWMI	Researcher
4	Anuj Hemant Xess	M	India	CEEW	Researcher
5	Anurag Banerjee	M	India	IWMI	Research Officer
6	Ashish Khanna	M	India	International Solar Alliance (ISA)	Director General
7	Birendra Gabadamudalige	M	Sri Lanka	IWMI	Portfolio Manager – Solar
8	Darshini Ravindranath	F	India	IWMI	Project Lead – SoLAR
9	Deepak Varshney	M	India	IWMI	Country Lead – India
10	Divya Kashyap Sharma	F	India	SDC	Deputy Head of Cooperation
11	Dr. K. C. Shukla	M	India	—	PSO
12	Dr. R. K. Singh	M	India	ICAR	ADG (Extension)
13	Dr. Rajkumari	F	India	—	SMS
14	Dr. Rupan Raghubanshi	M	India	—	SMS
15	Dr. Santosh Mali	M	India	ICAR	Principal Scientist
16	Dr. Priyabrata Santra	M	India	ICAR	Principal Scientist & Head
17	Dr. Priyanshi Chauhan	F	India	GIZ	Energy Advisor

18	Dr. Seema Yadav	F	India	—	Scientist (LPM)
19	Elias Awol	M	Ethiopia	Ministry of Agriculture, Ethiopia	CEO – Smallholder Irrigation Development Directorate
20	Faiz Alam Mohammad	M	India	IWMI	Senior Regional Researcher
21	Gaurav Tripathi	M	India	IWMI	Consultant
23	Josey Kamanda	M	Kenya	IWMI	Country Lead – Kenya
24	Kumar Preetam	M	India	CSTEP	Economist
25	Mallik E. V.	M	India	CSTEP	Engineer – Solar Irrigation
26	Manya Dikshit	F	India	—	—
27	Maya Tissafi	F	Switzerland	Government of Switzerland	Ambassador
28	Md. Sarwar Hossain	M	Bangladesh	BADC	Additional Chief Engineer
29	Mirjam Macchi Howell	F	Switzerland	SDC	Head – Climate, DRR & Environment
30	Muluken Adamseged	M	Kenya	IWMI	Deputy Project Lead – SoLAR
31	Nirmal Siwa	M	India	IWMI	
32	P. C. Sharma	M	India	International Solar Alliance	NFP / Country Programme Coordinator
33	Poulami Choudhury	F	India	TERI	RISE Fellow
34	Prabhat Kishore	M	India	NIAP	Scientist
35	Pratishtha Parasher	F	India	IWMI	Consultant
36	Praviin Kumar	M	India	GOGLA	Regional Representative – South Asia
37	Prof. Ramesh Chand	M	India	NITI Aayog	Member

38	Puja Das	F	India	DTE	Journalist
39	Ramsha Khan	F	India	—	Consultant
40	S. K. Srivastava	M	India	NIAP	—
41	Sarita Vijayvargiya	F	India	CSTEP	Senior Associate, Renewables and Energy Conservation
42	Vivek Saraf	M	India	SunSeed APV	CEO & Co-Founder
43	Shikha Anand	F	India	WRI	Senior Program Associate – Energy Access
44	Shivendra Srivastava	M	India	ICAR	Senior Scientist
45	Srinivas Ethiraj	M	India	Vasudha Foundation	Assistant Manager – Energy Transition
46	Sunil Mani	M	India	IISD	Advisor – Energy Program
47	Swati Jain	F	India	IWMI	Admin & Finance Officer
48	Tanmoy Bhaduri	M	India	IWMI	Communications Officer
49	Tripti Agarwal	F	India	IWMI	Project Coordinator
50	Vidhisha Samarasekara	F	Sri Lanka	IWMI	Program Director
51	Vincent Kabuti	M	Kenya	Government of Kenya	Irrigation Secretary
52	Yidnekachew Zewde	M	Ethiopia	IWMI	Country Lead – Ethiopia

Annexure – III

Acronyms

BADC	Bangladesh Agricultural Development Corporation
CEEW	Council on Energy, Environment and Water
CSTEP	Center for Study of Science, Technology and Policy
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICAR	Indian Council of Agricultural Research
ISA	International Solar Alliance
IWMI	International Water Management Institute
NITI Aayog	National Institution for Transforming India
SDC	Swiss Agency for Development and Cooperation
TERI	The Energy and Resources Institute
WRI	World Resources Institute



The International Water Management Institute (IWMI) is an international, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. Headquartered in Colombo, Sri Lanka, IWMI is a CGIAR Research Center with offices in 17 countries and a global network of scientists operating in more than 55 countries.

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