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

Regional Forum

23-24 Feb, 2021
Virtual

Solar Irrigation Pumps (SIPs) in Nepal
Update and results from Year 1

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Innovative water solutions for sustainable development

Food · Climate · Growth

Project plan vs. achievements

Activities planned	What we did in Y1	What remains to be done in Y2
Impact evaluation (IE) of SIP: 1. What are the impacts of SIP on crop production, irrigation hours, and livelihood outcomes? 2. Who receives government subsidy for SIP? Is subsidy delivery equitable?	**A**. IE design, sample size, site selection, vendor selection, survey questionnaire **B**. Rapid assessment of AEPC's SIP program, results shared with AEPC as a report and webinar	Survey of 675 farming households, IE report and a research paper
Qualitative Gender and Social Inclusion (GESI) study 1. How GESI responsive are solar energy related policies and programs in Nepal and Bangladesh? 2. Is SIP beneficial for women and marginal farmers?	**A.** Research methodology design **B.** Literature based GESI analysis [policies & programs]	GESI case studies in three different SIP models implemented by AEPC, IWMI and ICIMOD
A demonstration pilot Is Micro-grid connection a solution to full utilization of SIP?	**A.** Global literature based analysis on institutional modality **B.** National forum on institutional modality	Techno-institutional modality design and implementation for micro-grid connection
Capacity development of local technicians on SIP & knowledge forums	A. Curricula design and participants finalization B. National knowledge forums	Deliver the training National knowledge forum

Who received government subsidy for SIP?
Is subsidy delivery equitable?
Rapid Assessment results

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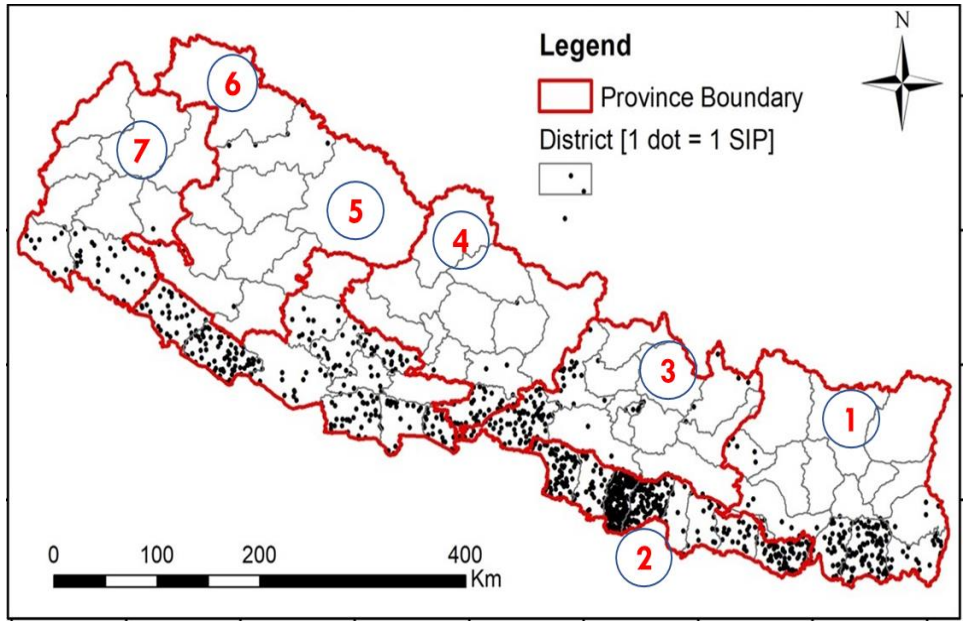
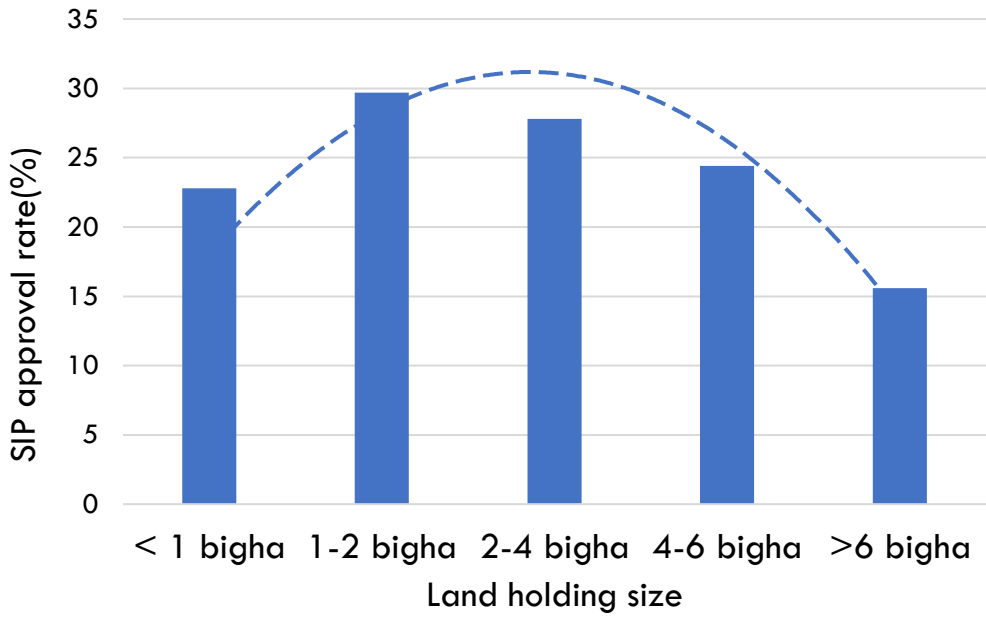
SIPs are mostly in Tarai. Average cost is 2.6 lakh rupees

- 1,384 SIPs installed with AEPC's subsidy; 1800 total
- Rate of approval of SIP subsidy is **31%,** slightly higher in provinces 2 and 5
- *Tarai* provinces (P1, 2, and 5) account for
  - 75% of applications and 85% of the subsidized SIPs. Same pattern for districts and palikas too.
- Avg. cost of SIP was **2.6 lakh** rupees, consistently high for all pump sizes across all provinces.
  - Even with 60% subsidy, small-scale farmers cannot afford SIP.



Who received SIPs? Among applicants, small-holders were prioritized

- From the pool of applicants, AEPC clearly prioritized small-holders (with farm size of less than 3 bigha).
- However, our discussion with farmers and some key informants in province 2 indicated that small holders and tenant farmers were discouraged from applying for SIPs, locally.
- Primary reason cited by the farmers was the mandatory submission of land holding certificate and local palika's recommendation.
- Another reason was lack of information. Only few large holders with better social connection knew about SIPs.



SIP approval rate by categories of land holding size

Who received SIPs? Female-headed households were prioritized

- The pool of applicant consisted 19% female-headed and 81% male-headed households, but 22% of SIPs went to female-headed households.
- AEPC did prioritize female-headed households if they met eligibility criteria.
- Even though AEPC prioritized small-holders and female-headed households in selection process, most beneficiary farmers were relatively well-off farmers. Probably because:
  - In the ground, small-holders, marginal communities, and tenant farmers were excluded in the application stage.
  - More than 80% of applications were received through vendors, thereby marginal farmers with poor social network were unware of the call.
  - According to local governments, it was very difficult for them to be as inclusive as they wanted to, due to very small number of SIPs available.

How GESI responsive are solar energy related policies and programs in Nepal and Bangladesh?

Presenting the case of NEPAL

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What did we set out to do and how?
Methodology and key questions

- How has GESI been considered in the national legal/policy frameworks?
- Has GESI been addressed in energy policies and documents from the chosen policy areas? If yes, what does this conceptualisation look like?
- What is the status of SIPs in the two countries (provision, incentive measures, key actors and beneficiaries)?
- What are GESI gaps and missing considerations in these policies and programs?

SECONDARY REVIEW:
National policies on Agriculture, Irrigation, Energy, Water, Gender. Related projects and scientific literature on the same.

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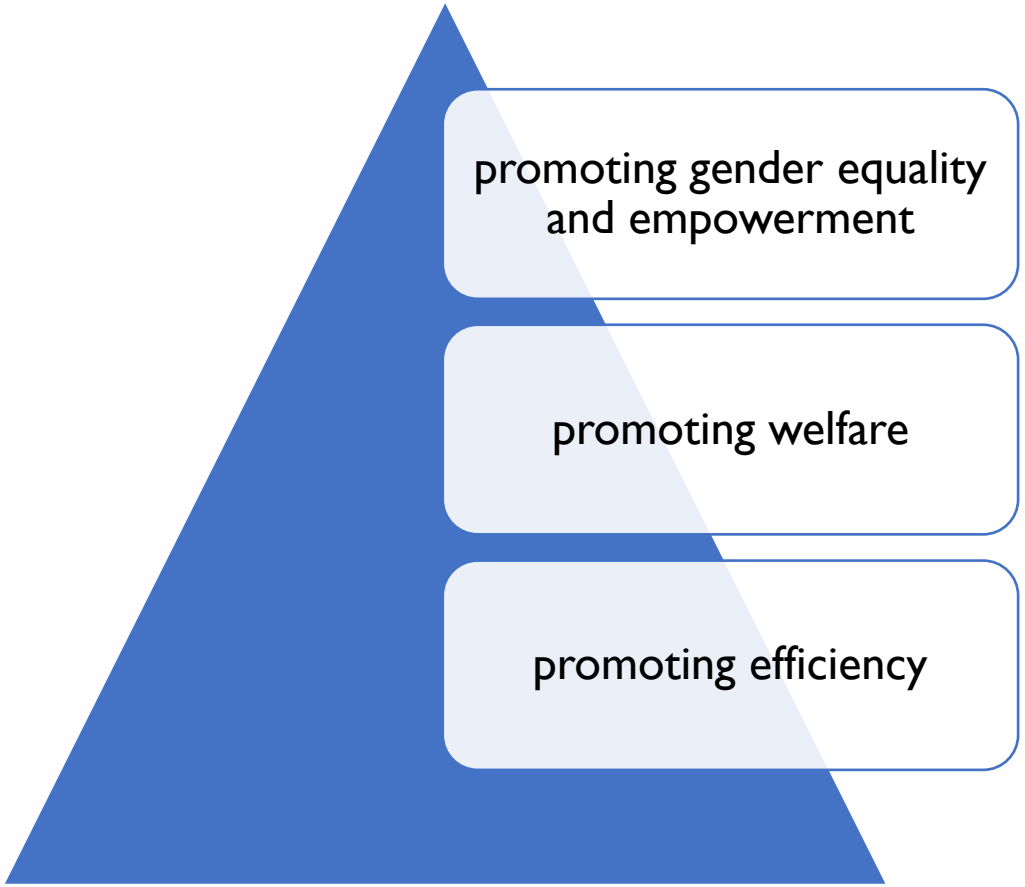
The characterization of GESI in some major Renewable Energy Policies

	Recognizes gender in some form	GESI is part of the policy explicitly	Women as bearers of traditional energy use burden	Recognizes energy need differentials	Understands barriers to participation in decision-making	Improve access	Inclusion linked to sustainability	Introduces ways to address barriers
Rural Energy Policy 2006								
National Energy Strategy 2013								
Renewable Energy Subsidy Policy and Delivery Mechanism 2016								
AEPC GESI Policy 2018								

Motivation for gender inclusion in energy policies



Skutsch (1998)

Major findings:

Assumption 1: Macro energy policies affect men and women equally

Assumption 2: Addressing gender in energy is related to promoting fuel-efficient cooking

Assumption 3: Increasing women professionals in energy sector will solve all problems

- Policies are welfare-focused than empowerment focused
- Access understood as a blanket monetary problem for all
- Lack of women or targeted minority specific approaches to increase RET for irrigation uptake
- Discretionary use of criteria – such as requirement of land ownership papers - makes marginalized farmers dependent on the 'benevolence' of the implementer
- Policy evolution shows greater understanding of gender progressively
- Implementing agency stands as GESI aware – implementation?

Is micro-grid (MG) connection a solution to full utilization of SIP?

Learning from national forum and scoping visit in demonstration pilot site in Nepal

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Relevance of MG connected SIP in Nepal in 2021

Reflection from National Forum

- **Availability of Grid** Infrastructure
- Farmers would probably **Prefer electric pump** due to low tariff of NPR 4.3
- Voltage fluctuation and **Capacity of Grid** infrastructure
- **Economic sense** for NEA
- **Sustainability** of Ground Water
- **Increase Capacity Utilization Factor of SIP** through Grid connection
- Role of **Local Government**

MG Connected SIP Pilot in Province 2

- Identifying suitable site for piloting → **Targeting**
- **Detailed Feasibility study**
- Procure a service provider for installing 15 kW Micro-Grid (M. G.) System & Install
- **Develop a framework for impact evaluation & parameters for monitoring**
- Continue **Monitoring** the parameters

Site Prioritization

Technical, Social, Economic
Environmental, Institutional

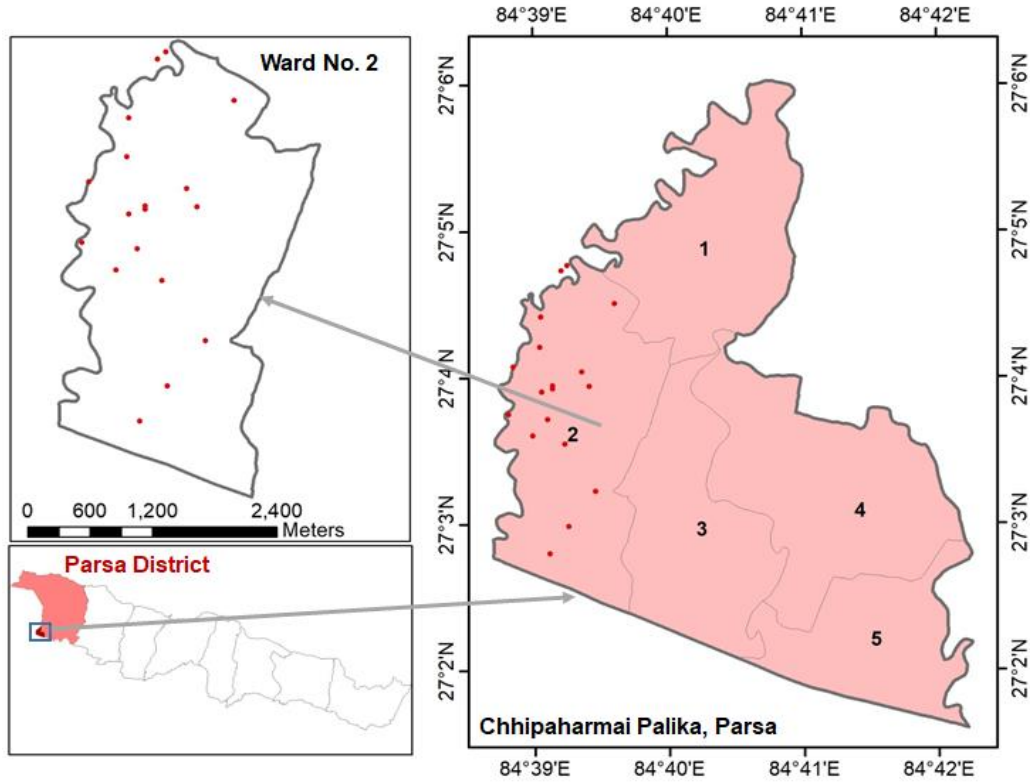
Parameters to Monitor

Energy, Income, Perception, GESI, Water output, etc

Site Identification

Sambhawata Village, Ward 2
Chhipaharmai Rural Municipality
Parsa district, Nepal

- **Public land available** for shifting Solar Panels
- RM willing to **invest additional funds**
- Female population: **48%**
- Number of Ethnicity: **22**
- Number of SIP installed: **18**
- Solar Panels: **50.18kWp**



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Grid-connected SIPs

Key Attributes - Institutional models

1. **Benefit**/Energy **Sharing** Mechanisms
2. **Regulatory** Approach
3. Capital **Investment**
4. **Business Model**
5. **Ownership Model**
6. **Beneficiaries**

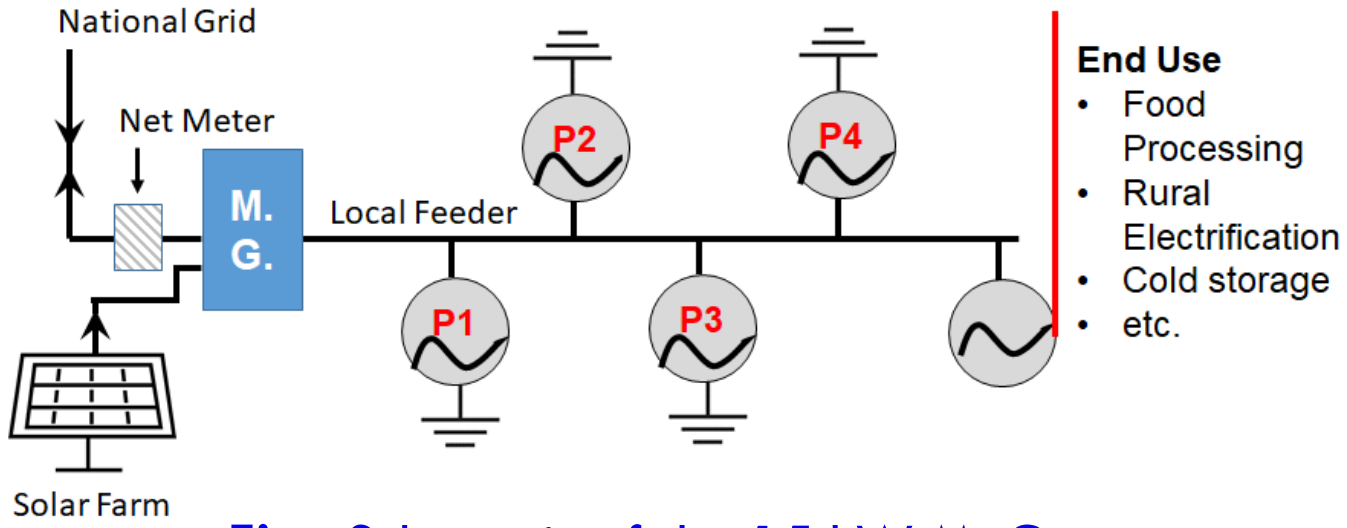


Fig.: Schematic of the 15 kW M. G. system

Typologies

1. **Direct net-metering** of solar pump system
2. **Solar micro-grid** (MG) system
3. Solar-powered **Agricultural feeder**
4. **On-Grid** Solar Pump Inverter

Activities for MG connected SIP

Site Identification

- Reviewed **22 Rural Municipalities** data
- Site Periodization Matrix and **shortlisted 8** candidate sites
- Field visit covering **5 districts**

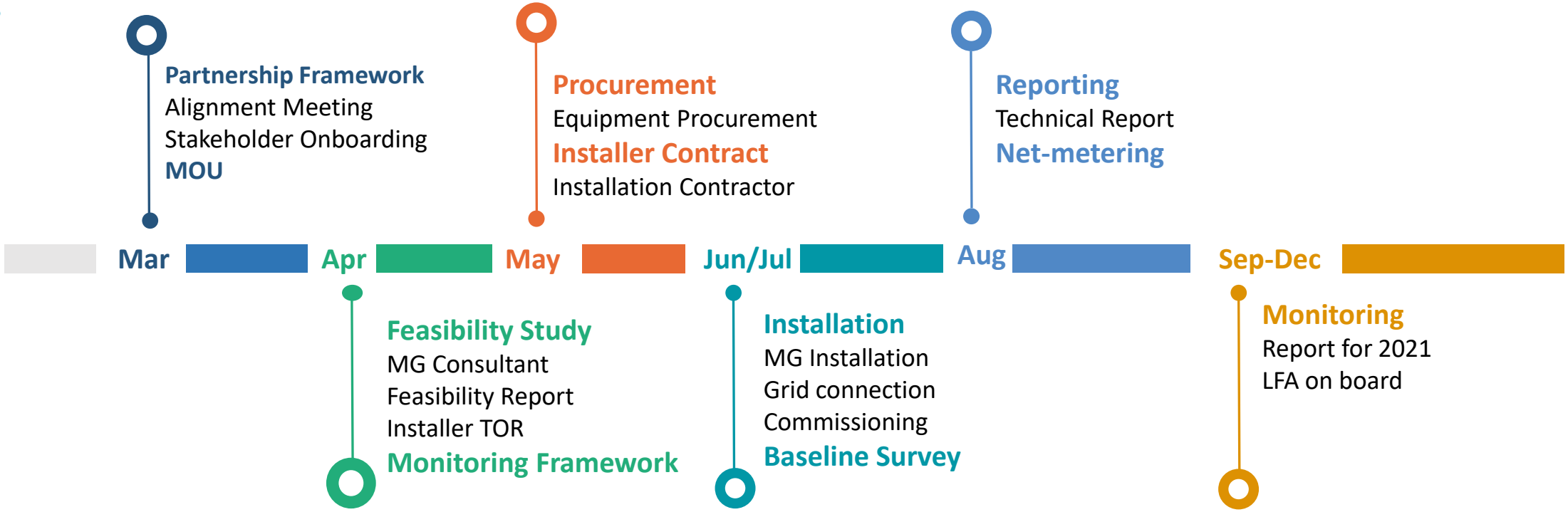
Institutional Models Review

- Review of **Institutional models**

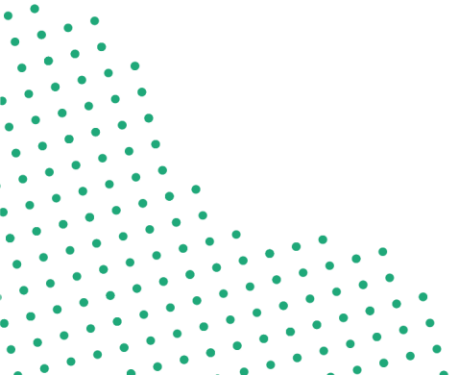
Alignment after the Covid19 Lockdown

- **Alignment meeting** between IWMI, AEPC and NEA
- Rural Municipality **Onboarding**

Roadmap for MG connected SIP Pilot



Capacity development and policy engagement in Nepal



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Learning exchange and policy engagement for inclusive SIPs in Nepal

- **42 hr. SIP training for local SIP technicians:** Improved access to SIP technical services timely and locally, and shifting gender roles through promoting women in SIP discourse and technical skills
- **Policy engagement and knowledge forum:** Institutional modality of MG-connection to SIPs [1], and rapid assessment findings sharing [1] and CPMC meeting [2]
- **Knowledge production and exchange:** subsidy mechanisms [2), Covid-19, agriculture and water nexus, [2] micro-grid institutional modality, [1] and GESI policy and program review [1]

SIP Technician Training Modules:

I. Basic concept of Solar PV and SIP, policies and barriers
II. SIP Installation/Maintenance and Load analysis
III. Battery, its sizing and specification
IV. SIP Inverter/Converter (Controller), Installation/ Maintenance and Sizing
V. Pumps types, suitability, causes of breakdown & O/M techniques, markets
VI. Other accessories, installation & post-installation safety
VII. Field trip
VIII. GESI barriers and opportunities for SIP access, adoption and sustainability

Takeaways

1. The AEPC SIP subsidy delivery mechanism is doing well in raising interest and awareness about the technology and is trying to prioritize those with relatively less land in their process; but actual smallholders are still not being tapped into by the project due to farmers' economic and social capital constraints
2. Energy policies are progressively intending to benefit women and marginalized groups by ensuring their access to energy technologies, but the conceptualization of GESI is often limited and dissuaded by lack of concrete measures.
3. Micro-grid connection to SIP can be a solution for full utilization of SIPs, but needs piloting to understand which institutional modality would facilitate MG connection and water allocation among farmers
4. SIP technician training can benefit SIP local technicians and farmers

Discussion: 20 min

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Thank you

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IWMI-Nepal: Out reach, knowledge products

- **OpEd-01**: Kashi Kafle and Marie-Charlotte Buisson (2020). Corona and possibilities of agriculture sector (in Nepali). Nepal Flash, 13th June, 2020.
- **OpEd-02**: Kashi Kafle and Marie-Charlotte Buisson (2020). Agriculture: Can it provide relief to returnee migrants and vulnerable populations? Himalayan Times, 03 June, 2020.
- **OpEd-03**: Vishnu Pandey & Sagar Gyawali. Can grid connected solar irrigation pumps be the future of irrigation in Nepal? (under review with Kathmandu Post)
- **OpEd-04**: Labisha Uprety & Vishnu Pandey. Why we need smarter subsidies to promote solar irrigation? Spotlight, 10 September, 2020.
- **Knowledge sharing:** Pandey, VP., Kafle, K., and Uprety, L. (2020). A rapid assessment of AEPC's subsidy delivery mechanism. Presented at a project meeting held between Alternative Energy Promotion Center (AEPC) and IWMI on 28th August, 2020.
- **Working paper** [draft ready]: GESI in policies of SIP in Nepal and Bangladesh