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Solar pump technology with Drip irrigation systems implementation for Water Resources Management in Ethiopia

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Presentation Layout

- **Introduction to Solar Pump Irrigation**
- **Previous Practices of IWMI on Solar Pumps for irrigation**
- **Recent interventions of the solar pump for irrigation**
 - ❖ Solar pump with water storage
 - ❖ Solar pump with drip irrigation system for high-value fruit trees

Opportunities and challenges

- ❖ Opportunities
- ❖ Challenges
- **Critical considerations to implement solar pump for irrigation**
- **Conclusion**
- **Recommendations**

Introduction

- Research findings identified technologies and practices helps to enhance the AWM in various value chains.
- However, the actual supply chains to ensure delivery of the technologies, and expertise are not well developed yet.
- To reduce poverty and enable economic growth, many of the studies proposed the scope for expanding small-scale irrigation using technologies.
- Development partners, researchers, and policymakers are proposing solar energy-based pumps as a ‘cost-effective’ and ‘clean’ approach to irrigation.
- Studies suggest that solar-powered pumps provide an alternative for farmers to overcome energy-related access and cost constraints for adopting and benefiting from irrigation.

Solar Pump Irrigation in Ethiopia

- The Ethiopian government's strategy is to transition existing motor pump users to solar while introducing new solar pump irrigation to those not currently irrigating.
- Given the number of existing and potential pump users, the scope for expanding the solar pump market for irrigation appears significant.

Previous Practices of IWMI on Solar Pumps for irrigation

- Since 2015, IWMI, through many projects has piloted solar pumps for smallholder irrigation combined with different water application methods.

Cont...

- The overall result under IWMI pilots shows that investment in solar irrigation is profitable as the technology is very much consistent with the Ethiopian Climate Resilient Green Economy (CRGE) strategy.
- Although high initial investment cost is potentially a barrier for smallholder farmers to adopt the technology, cost sharing can be a solution, especially if additional investment is made like the drip and storage system



Cont...

For a small-scale irrigation system to be successful, it requires a reliable water source, efficient water application mechanisms, and a suitable cropping system

This implies that investment in a solar pump for smallholder irrigation will be more profitable and effective when it is used in combination with other technology packages (i.e. drip)



Recent interventions of the solar pump for irrigation



- ❖ Solar pump technology is highly desirable despite farmers' lack of familiarity with solar irrigation with only the perceived benefit of time and labor-saving alternatives.
- ❖ The IWMI studies indicated that technology campaigns and loan arrangements for smallholders may encourage them to adopt and be interested in using technologies.
- ❖ Based on the above reasons, IWMI in collaboration with partners piloted more than 250 pumps (30 pumps were piloted directly and the rest were based on loan arrangements).
- ❖ Critical considerations for the solar pump implementations were :
 - ✓ Farmers who do have an interest
 - ✓ Water sources and availability,
 - ✓ Sufficient land as per the solar pump cultivation capacity to cultivate high-value cash crops) in the central Rift Valley basin.



Solar Pump with water storage and the implementation of drip irrigation system for high-value crop cultivation

- Improper on-farm water management may result in unequal water distribution within the field, water logging, leaching of nutrients, non-uniform crop growth, wastage of water, and computation of the water sources.
- Considering the above issues, IWMI integrated and piloted solar pump technologies with water storage tankers and drip irrigation systems for the selected households in the Central Rift Valley.



- => This integration helps to improve the farmer's water use efficiency

Solar Pump, storage, and drip system implementation



Challenge of pushing factors



- Delay in the provision of maintenance and after-sales service untimely delivery of some replacement parts and equipment; and
- Lack of qualified personnel for the maintenance of systems.
- One key limiting factor is the access of farmers to energy sources for pumping water during the right time of water application.

Discussion Point: Many of the solar pumps do not have battery storage to use the energy during the evening and morning (when evaporation is less). For this, there are two options:

- A. Use big storage tanks and store water when energy is available
- B. Encourage solar pump suppliers to produce and/or supply pumps that have battery storage. So that farmers can irrigate whenever they want.

Which one is economically feasible? – it seems, not done from the economic perspective

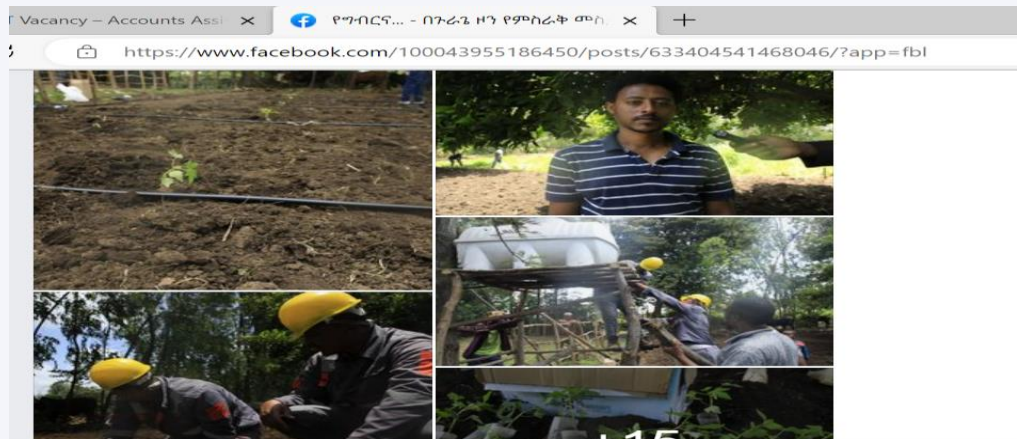
Conclusion

- ✓ A key component of AWM is ensuring that technologies
- ✓ Most notably, solar pump irrigation offers the environmental benefit of mitigating agricultural GHG emissions and can thereby contribute to cleaner, mechanized smallholder farming systems.
- ✓ solar pumps in smallholder farmer irrigation showed high potential compared to the various water lifting technologies in terms of irrigation labor, water use, and profitability
- ✓ Many farmers in Ethiopia continue to perceive solar technology as expensive and technically difficult to manage, but those with exposure to or awareness of solar pumps express strong interest

Recognition of the technology's implementation done by IWMI



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Recommendations

- ❖ Although high initial investment cost is potentially a barrier for smallholder farmers to adopt the technology, cost sharing can be a solution, especially if additional investment is made in the drip system.
- ❖ **Criteria that need to be considered while planning to use the solar pump for irrigation**
 - ✓ Farmers who do have an interest
 - ✓ Water sources and availability,
 - ✓ Sufficient land resources
 - ✓ Protection of the well/pond/water sources
 - ✓ Land cover
 - ✓ Elevation
 - ✓ Depth of the well and the water level in the well
 - ✓ Groundwater storage capacity
 - ✓ Radiation
 - ✓ Solar pump water withdrawals tend to be used for high-value crops,



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THANK YOU!