

Carbon-free irrigation for farmers: A case of Meskan Woreda in East Ethiopia













Summary

The SEFFA project supported a small smallholder farmers (SHFs) group in the Meskan district of Central Ethiopia to replace diesel pumps with a Solar Water Pump (SWP) on cost-sharing basis to enhance the adoption of sustainable energy. To achieve a successful outcome several parallel strategies were employed including exploring affordability strategies, developing sustainable business models, and providing customised solutions. The business model entertains a value chain approach that considers group dynamics and cluster irrigation to reduce the upfront cost of the SWP.

The positive outcomes of the project include improved agricultural productivity and crop yields, an increase in irrigable land, diversified crops, irrigation frequency, clean energy for irrigation, enhanced financial stability for SHFs, and a reduction in greenhouse gas emissions. Lessons learned from the case study include the importance of customised solutions and collaborative business models that engage stakeholders such as the Ministry of Agriculture, Ministry of Water and Energy, and Ethiopian Solar Energy Development Association, and synergies with related projects in the organisation to create a sustainable ecosystem for SWP adoption.

The Green Legacy Irrigation User Farmers Group in East Meskan district SWP project demonstrates the potential of sustainable energy solutions in the agriculture sector to promote economic growth, environmental sustainability, and improved livelihoods.

Quick Facts

-  Ethiopia, East Meskan
-  Green Legacy Irrigation User Farmers Group
-  Solar Water Pumps (SWP)
-  24,400 USD of this 33% farmers' cost share
-  SNV, Ministry of Agriculture & Ministry of Water and Energy
-  The objective is to assess the feasibility of replacing diesel pumps with solar water pumps for irrigation.
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 - Replaced the three diesel pumps used for irrigation
 - Increased irrigation land size from 2 ha to 3 ha
 - Diversification of crop production towards high-value crops, such as tomatoes
 - Increased harvest frequency per annum from two to three
 - In one cropping season obtained an estimated total revenue of 17,000 USD
 - Family access to nutritional food from producing diversified vegetable products
 - Created awareness among federal and regional government on SWPs which led to their purchasing more than 200 SWP technologies
-  Innovation Fund, Consumer Financing
-  242 m3/day is the water discharge of the submersible SWP
-  Plot size: 3ha
Water source: borehole or groundwater
Crop types: onion, tomato, pepper, head cabbage, beetroot, watermelon, maize and forage (alfalfa, elephant grass, brachiaria grass)



Problem statement

Persuading farmers to switch from diesel pumps to SWPs presents challenges:

- Lack of studies on potential SWP irrigation sites, appropriate sizing of SWP, and SWP designs for Smallholder Farmers (SHF).
- High upfront costs of SWP along with high interest rates, short loan periods, and the absence of suitable financial products.
- SHFs have less confidence in SWP technologies compared to their traditional diesel-based water pumping systems.
- Lack of "demo sites" where farmers can see SWPs in operation under local conditions.



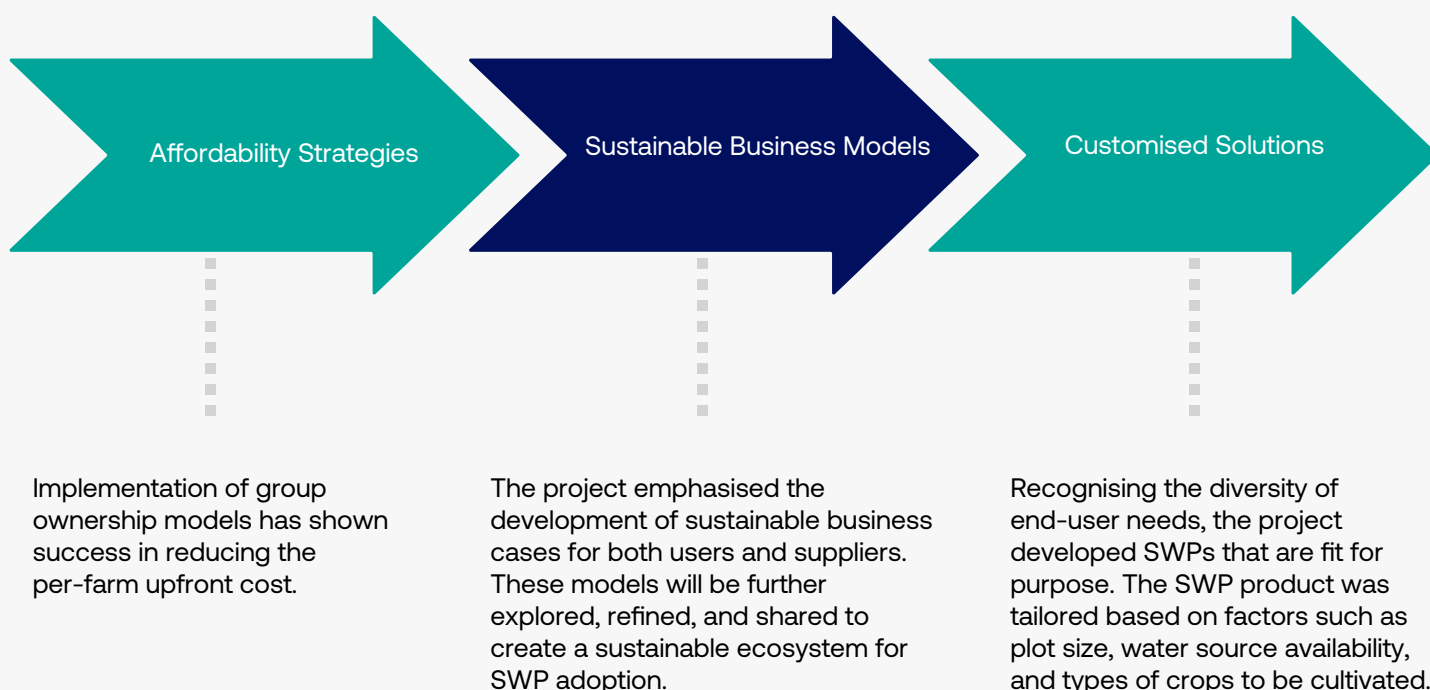
Assumptions

- Farmer groups / cooperatives operating on cluster irrigation through diesel-powered irrigation are willing to switch to solar.
- Farmer groups / cooperatives are willing to share the cost of the SWP system.

Business Case Details

Efforts to support the uptake of green irrigation technologies faced many barriers in Ethiopia. Suppliers and SHFs have limited knowledge or understanding of SWP technologies, and so they may exhibit a lack of confidence in adopting these solutions. By providing customised solutions and tailored SWP packages to the Green Legacy Irrigation User Farmers in the Meskan district of Central Ethiopia, this project addressed knowledge gaps and enhanced confidence in the technology such that the irrigation system could be used to demonstrate the use of the technology to other farmers, i.e. be used as a "demo site" .

Promoting the adoption of SWPs aims to improve agricultural productivity, crop yields, and financial stability for SHFs by providing consistent and efficient irrigation practices. To encourage a move away from diesel irrigation pumps, the project encompassed the following approaches:



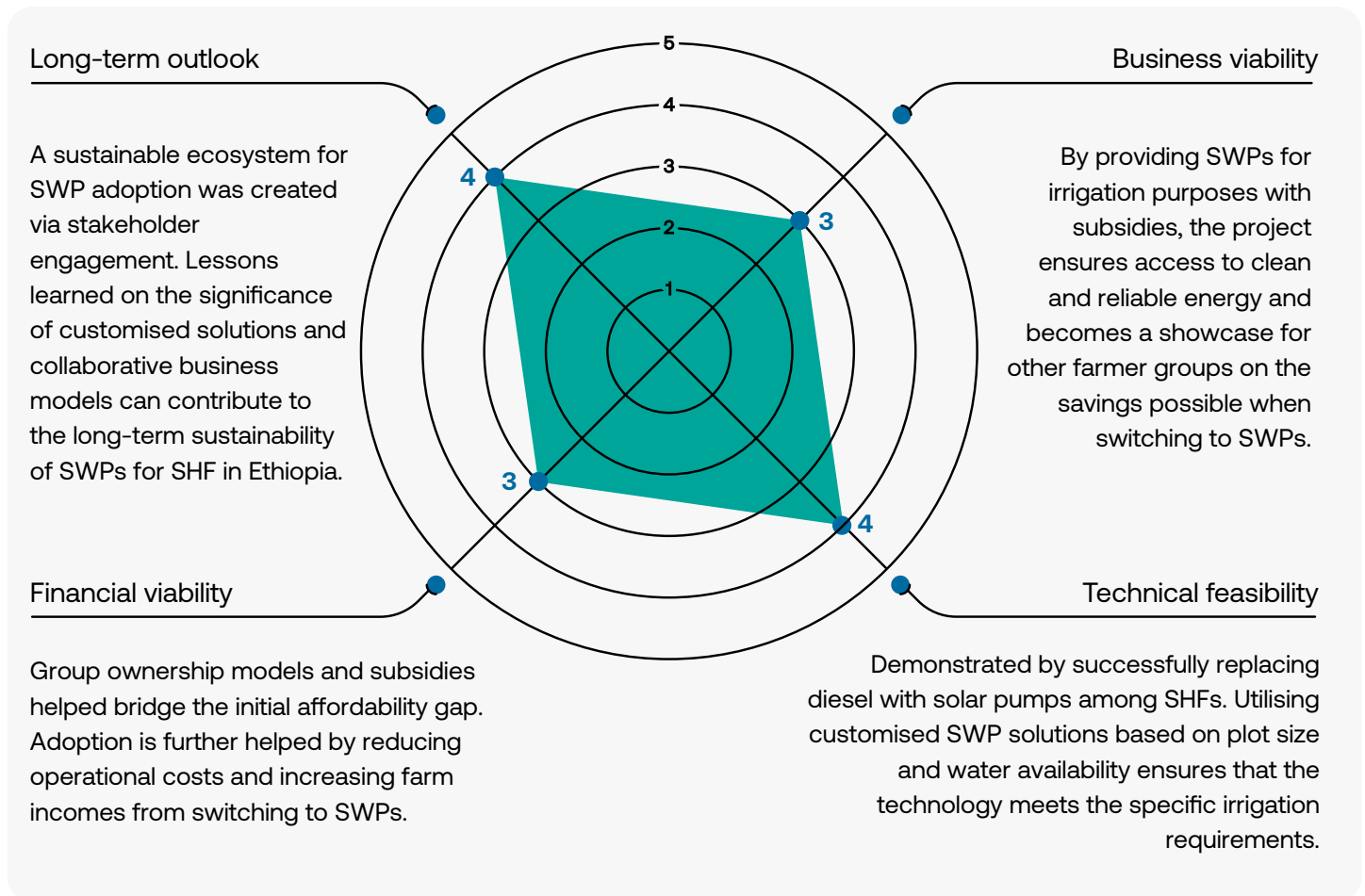
Specifically, below are details of the activities undertaken in parallel with affordable SWPs provision:

- Efficient irrigation water uses are coupled with SWPs to promote pipe conveyance (65% water efficiency) of least cost compared to drip and sprinkler systems, and better lifetime service to discourage furrow irrigation and reduce water loss from evaporation and seepage.
- Technical training was offered to farmers on SWP applications and agronomic practices. Attempts were made on output marketing of the vegetable produce grown through irrigation.
- After-sales service and maintenance were assured from nearby technicians and documentation was developed on SWPs to guide farmers.
- This project also benefitted from an enabling environment given by establishing a national SWP multi-stakeholders platform (MSP) for learning, experience sharing, and policy dialogue. Learnings from this demo site have been broadcast in local media to reach irrigation farmers across Ethiopia.
- Creation of capacity at local to district offices of Agriculture, Water & Energy, and Mines & Petroleum in designing and the installation of SWP systems, laying the ground for scalability of the technology.

The project effectively promoted the adoption of sustainable energy solutions among SHFs in the agriculture sector by offering a grant to subsidise the group purchase of SWPs by a farmers group.



Business Case Attractiveness



Outcomes

The project objective was replacing diesel pumps with SWP to promote the adoption of sustainable energy solutions among SHFs in the agriculture sector. The case study outlines several positive outcomes, including improved agricultural productivity, enhanced financial stability for SHFs, reduction in greenhouse gas emissions, and empowerment of rural communities through access to sustainable energy solutions.

- Improved agricultural productivity and crop yields through consistent and efficient irrigation practices.
- Enhanced financial stability for SHFs by reducing operational costs and increasing income generation.
- Reduction in greenhouse gas emissions and environmental impact associated with traditional irrigation methods.
- Empowerment of rural communities through access to sustainable energy solutions that contribute to economic growth and livelihood improvement.

Key Takeaways

Understanding the Context of SEFFA: Farmers' experience



Project Design

- Conduct a detailed study on potential SWP irrigation sites and appropriate sizing of SWP to meet the demands of SHFs.
- Develop a design that takes into consideration the specific needs and requirements of SHFs.
- Focus on providing customised SWP solutions that are fit for purpose based on factors such as plot size, water source availability, and types of crops to be cultivated.



Overcoming Financial Barriers

- Explore ways to reduce the high upfront costs associated with SWPs, such as implementing group ownership models and subsidies.
- Work with financial institutions to develop suitable financial products and consumer financing options that make SWPs more affordable and accessible for SHFs.



Overcoming Logistical Barriers

- Innovation grants are effective in encouraging the development of efficient supply chain management and distribution of SWPs to users.
- Provide training and support to suppliers as well as SHFs to enhance their knowledge and understanding of SWP technologies.
- Establish strong partnerships with relevant organisations and agencies to facilitate the implementation of the project.



Overcoming Farmers' Barriers

- Educate SHFs about the benefits and advantages of SWP technologies in improving agricultural productivity and crop yields as well as providing training and capacity building programmes in operating and maintaining SWP systems.



Overcoming Technology Specific Barriers

- Continuously assess and evaluate the technical viability and performance of SWP systems and the individual circumstances of the farmer.
- Conduct research and development to improve the efficiency and effectiveness of SWP technologies.



Overcoming Value Chain Specific Barriers

- Collaborate with stakeholders across the agriculture value chain to promote the adoption of SWP technologies.
- Sharing best practices and success stories of SHFs who have successfully adopted SWP technologies to inspire and encourage others in the value chain.

Several layers of barriers to the adoption of PUE technologies.

Technologies



Financial Barrier



Logistical Barrier



Farmer Internal Barrier



Farmers



Iconography

Financial Instruments



Result-Based
Financing



Innovation
Fund



Fee-for-Service



Consumer
Credit



Lease-to-Own

Types of Barriers



Farmer



Logistics



Technology
Related



Financial



Value Chain
Related

Agriculture Chain



Dairy



Horticulture



Irrigation



Cooling



Drying

Other



Total
Budget



Farm
Size



Ethiopia



Kenya



Uganda

Technologies

Location



About SEFFA

The Sustainable Energy for Smallholder Farmers (SEFFA) in Ethiopia, Kenya and Uganda project was designed by leveraging over 15 years of practical experience of EnDev. The strategic partnership identified lack of modern energy access as one of the critical development barriers in rural areas since it undermines agricultural productivity, exacerbates pre- and post-harvest loss, and makes it challenging to store and process produce. The IKEA Foundation has provided an €8 million grant to support EnDev's efforts. Learn more about the project [here](#).

About the IKEA Foundation

The IKEA Foundation is a strategic philanthropy that focuses its grant making efforts on tackling the two biggest threats to children's futures: poverty and climate change. It currently grants more than €200 million per year to help improve family incomes and quality of life while protecting the planet from climate change. Since 2009, the IKEA Foundation has granted €2 billion to create a better future for children and their families. In 2021 the Board of the IKEA Foundation decided to make an additional €1 billion available over the next five years to accelerate the reduction of Greenhouse Gas emissions.

Learn more at: www.ikeafoundation.org or by following them on LinkedIn or Twitter.

About EnDev

The Energising Development (EnDev) programme is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), the Netherlands Ministry of Foreign Affairs (DGIS), the Norwegian Ministry of Foreign Affairs and the Norwegian Agency for Development Cooperation (NORAD) and the Swiss Agency for Development and Cooperation (SDC). The programme is implemented in 20 countries across Africa and Asia in close cooperation with leading international organisations and key local stakeholders.

EnDev is jointly coordinated by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Netherlands Enterprise Agency (RVO.nl) with strategic partnership is with the SNV being one of the most prominent partners. Learn more at www.endev.info

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