



Transforming mindsets to spark demand for solar PU



Introduction

The Sustainable Energy for Smallholder Farmers in Africa (SEFFA) project aims to increase access to and adoption of renewable energy and energy-efficient technologies for smallholder farmers (SHF) and agribusinesses in Africa. As such, it concerns itself with removing barriers to Productive Use of Energy (PUE) technology adoption for SHFs. Barriers to the adoption of PUE technologies among SHFs exist in three different areas:

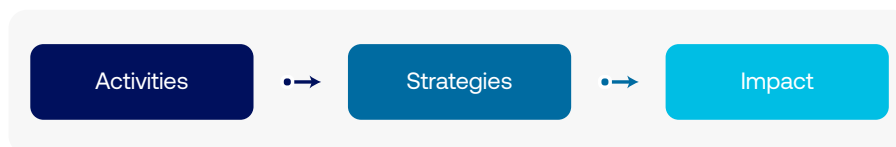
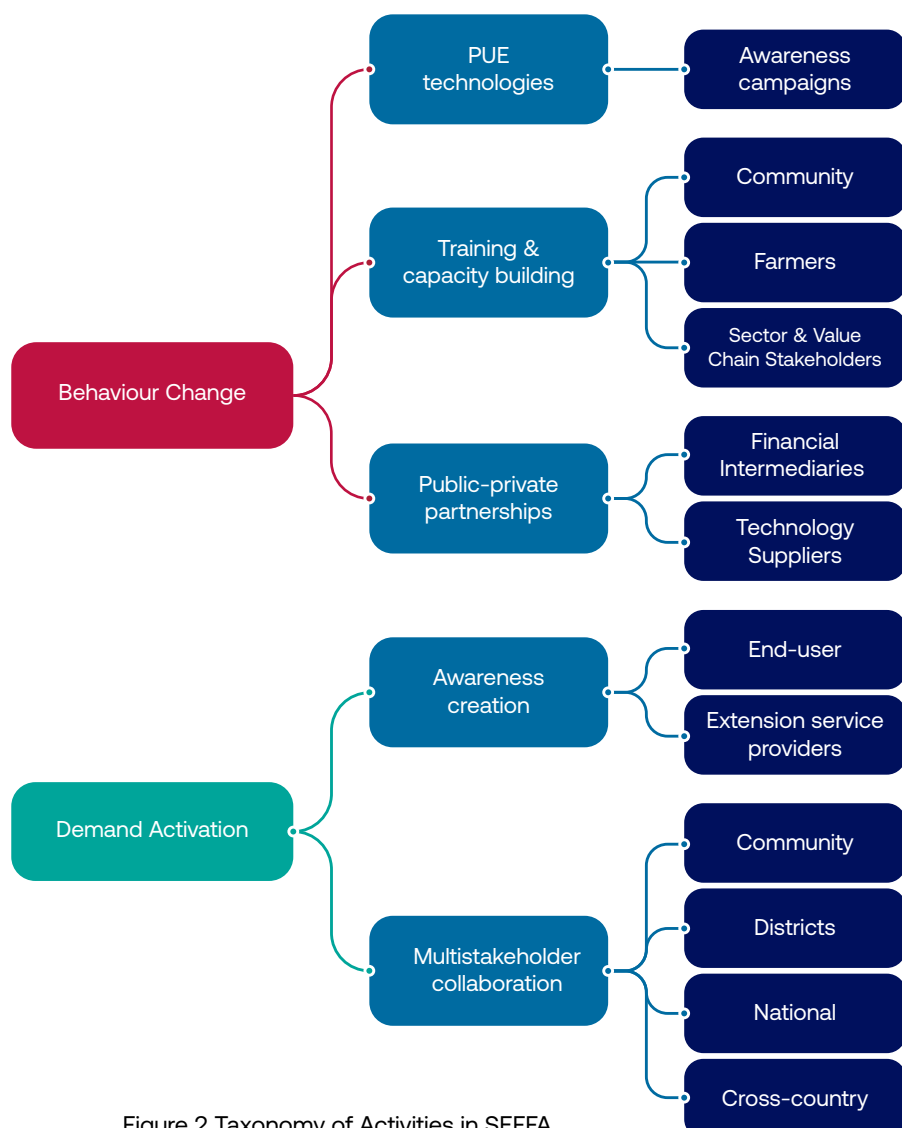


Figure 1: Activities to Impact

Farmer (e.g. isn't aware of the tech), Logistics (e.g. can't find a supplier of the tech locally), and Finance (e.g. can't afford the tech). Occasionally, barriers can also be seen on the national level, such as high import tariffs or lack of availability of Forex for importation, all of which affect the ability of farmers to access PUE technologies. The SEFFA project devised activities in behaviour change and demand activation to tackle these barriers. These activities are combined to form strategies and, throughout the project, the impact of the strategies was tracked as a regular part of project monitoring and evaluation.

Behaviour Change & Demand Activation: Definitions and Activities



Behaviour change is defined as the process of transforming the attitudes, beliefs, and actions of smallholder farmers and other stakeholders towards sustainable agriculture and renewable energy. The objective of behaviour change interventions is to encourage sustainable practices that will lead to increased productivity, reduced environmental impact, and improved livelihoods. It is also worth noting that the adoption of renewable technologies on the farm often requires SHFs to adapt their farming practices; a clear example can be seen in moving from manual flood irrigation to using solar water pumps with less water usage.

Figure 2 Taxonomy of Activities in SEFFA

In several interventions within the SEFFA project, especially in Uganda and Ethiopia, behaviour change is specifically related to the adoption of gender-sensitive approaches in project design and implementation. These efforts aim to transform gender norms and promote gender equality in smallholder farming as well as renewable energy adoption, with an overarching goal of creating more inclusive and sustainable communities.

Demand activation refers to the process of stimulating and creating demand for a particular product or service. In the context of SEFFA, demand activation involves engaging and motivating individuals, communities, and businesses to adopt and utilise sustainable practices and technologies.

Behaviour Change Communication (BCC) & Demand Activation

Behaviour Change Communication (BCC) & Demand Activation are interlinked when supporting the adoption and use of PUE technologies in smallholder farming. Demand activation without behaviour change initiatives may result in the technology being abandoned by a farmer, which ultimately harms community adoption. On the other hand, introducing behaviour change initiatives around productive use technologies for farming without also engaging in demand activation will almost certainly lead to frustration as the technologies are desired but out of reach, either logistically, financially or both.

The activities needed for behaviour change and demand activation are overlapping and often an activity will show results in behaviour change and demand stimulation simultaneously. Shown here is an overview of the strategies used for both to achieve the SEFFA desired outcomes.

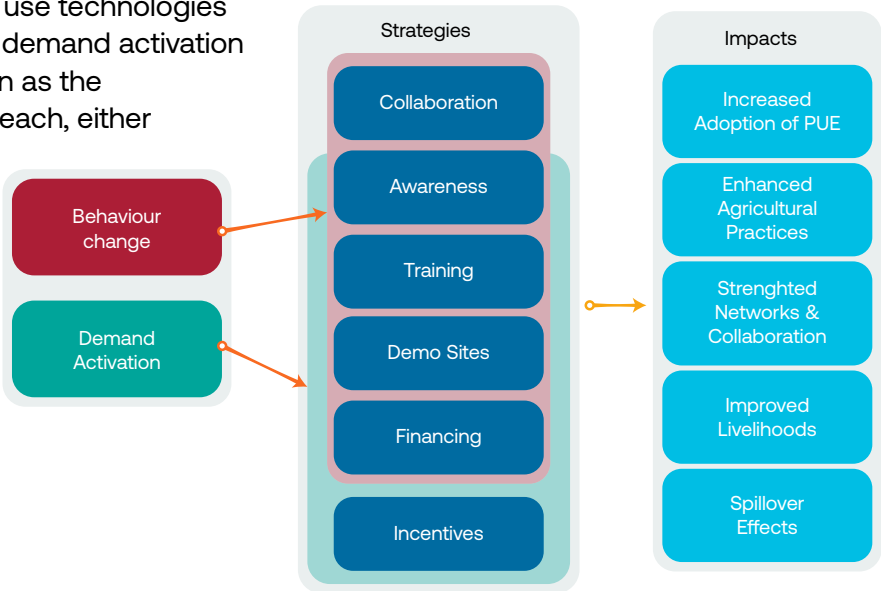


Figure 2: Strategies and Impacts of Behaviour Change and Demand Activation Activities in SEFFA

Case Studies in Behaviour Change and Demand Activation

Summary of Mini Case Studies

Case study	Behaviour Change Strategies	Impact
A. Solar Water Pumps for Tomato Farming	Training and Capacity Building; Incentivisation	Reduced Irrigation Costs; Improved Livelihoods
B. Solar-Powered Milking Machines	Skills Training; Demo Sites	Socio-economic Development of Individuals and Communities; Skills Development
C. Solar Cooling for Dairy	Financing Options; Match-Making Events; Demo Sites	Technology Adoption; Improved Incomes for Dairy Farmers and Cooperatives
D. Solar Water Pumps for Avocado Farming	Demo Sites; Financing Options; Capacity Building; Awareness Raising; Collaborations	Increased Adoption of Technologies; Reduced Irrigation Costs; Improved Livelihoods

Solar Water Pumps for Tomato Farming

Group adoption of SWPs was facilitated for small-scale tomato farmers in Nakaseke district, central Uganda. Farmers suffered high irrigation costs and unreliable access to water during the dry season and they were helped to switch from gasoline pumps to SWPs.

The behaviour change and demand activation components from this project:

- Providing grant financing to a private sector company to implement the project from the innovation fund.
- Providing the farmers with comprehensive training in tomato farming practices and post-harvest handling.
- The formation of farmers' groups incentivised the shift to SWPs by allowing a sharing model for the pumps.
- Analysing the costs of SWPs vs gasoline power to show reduced irrigation costs for farmers who used SWPs.

Impacts

As a result, 3 farmers groups, each with 10 farmers, were formed and each group was given an SWP to trial: the farmers managed to operate and maintain the pumps while sharing the use of the pumps.



Solar-Powered Milking Machines

Local company, Ntakyé Holdings Limited implemented a project in Uganda which introduced solar-powered milking machines to enhance efficiency and improve the well-being of dairy cattle.

The behaviour change and demand activation components from this project:

- Providing grant financing to Ntakyé Ltd to implement the project from the innovation fund.
- Implementing six demonstration sites across Central and Western Uganda showcasing the potential of this innovation.
- Providing training in animal husbandry, nutrition, and health management to farmers. The project also encouraged farmers to focus on breeding and improving feeding practices, promoting sustainable and profitable farming.

Impacts

- The solar-powered milking machines resulted in increased milking efficiency, leading to higher milk output and streamlined operations for farms.
- Farmers gained comprehensive skills in animal husbandry and had access to on-site veterinary care.





Solar Cooling for Dairy

In South-Western Uganda, a project aimed to help dairy cooperatives and small enterprises switch from non-renewable energy-based cold storage to solar hybrid energy technology.

Financing options were offered in the form of energy-as-a-service models and solar loan products from financial intermediaries. The behaviour change and demand activation strategies from this project included conducting pre-project assessments of business capacity and barriers to creating markets and scaling up the use of solar cooling.

Solar Water Pumps for Avocado Farming

In East Meskan, Ethiopia, Ato Tefera Mekonnen and his family are embracing SWP technology to enhance their avocado farming practices, via a SEFFA initiative in collaboration with Awash Bank. Ato Tefera and his group contributed ETB 160,000 (30% of the total cost) towards an SWP investment, with Awash Bank providing a two-year loan covering the remaining 70%.

By submitting necessary legal documents to Awash Bank, including land tenure and personal IDs, Ato Tefera experienced a smooth loan approval process. The imminent disbursement of ETB 242,243 signifies a pivotal advancement in enhancing avocado cultivation practices in the Umer Kebele region.

The behaviour change and demand activation components from this project:

- Financial partnership with Awash resulted in solar loan products being available to the farmers.
- Ato Tefera and his family actively participated in awareness sessions organised by SEFFA at the Green Legacy Small Irrigation Users Group pilot demo site farm in Meskan.
- Training sessions included practical insights into efficient water management and the benefits of renewable energy solutions, reinforcing their commitment to sustainable agriculture.



Impacts

- Implementation of solar cooling technologies which reduced the dependence on non-renewable energy sources
- Improved quality and shelf life of dairy products, which had positive outcomes for income of the dairy cooperative and dairy SMEs, thereby benefiting individuals, communities, and the country's dairy sector.
- The project also contributed to the reduction of greenhouse gas emissions and enhanced sustainability.



Behaviour Change Communication (BCC) & Demand Activation in SEFFA

Contextual factors

- Specific SHF challenges such as financial limitations, poor understanding of suppliers, and weak market linkages.
- Tailored interventions to suit the local realities, such as land size, crop type, water head, and market demand.

Capacity Building

- Delivered trainings, creating awareness, and promoting knowledge exchange to understand how best to use, operate, and maintain the technologies.

Partnership Building

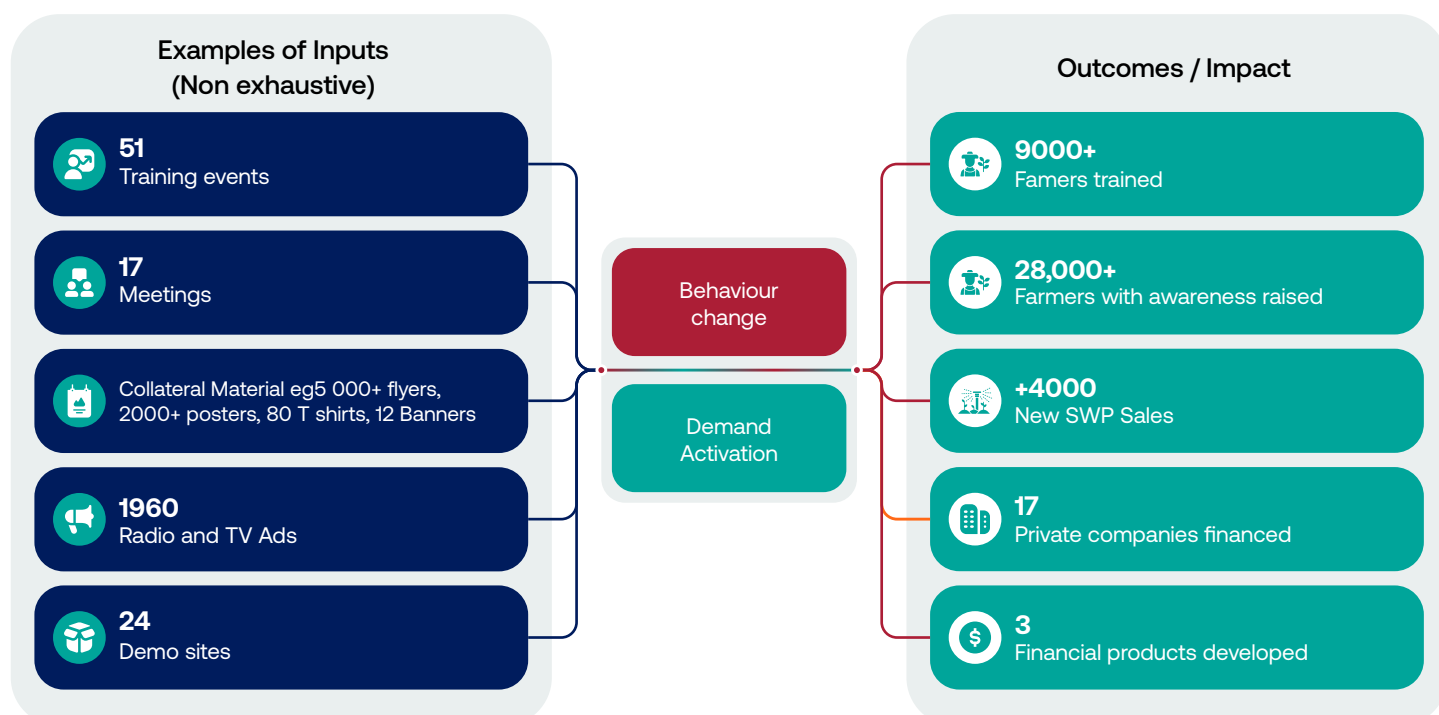
- Local and national partners are critical to drive behaviour change and demand activation, and create an ecosystem of support.
- Formal agreements were used with government bodies and commercial banks.

Change Approaches

- Awareness of the benefits of these technologies, addressing misconceptions and barriers to adoption, and showcasing successful pilots.
- Understand the cultural, social, and political acceptability of the technologies.

Outcomes on Decreasing Barriers to PUE Adoption

Behaviour change communication and demand activation activities were carried out by both implementing organisation in all 3 countries. The figure below shows the high level input and their impacts on the adoption of PUE among the SHFs targeted.



Training

- BCC engagements should be all-encompassing including technology providers, agronomy advisors, financial institutions, the local government, reference other relevant technologies
- (e.g. biogas) and include post-harvest handling.
- A needs assessment can inform the design of BCC interventions beyond technology awareness and address other aspects like affordability, water sources, etc.
- Tailored capacity-building programmes that address the broader context of smallholder agriculture and entrepreneurship as well as technical aspects were important to the impact of SEFFA. Financial literacy and business management skills can be achieved through partnerships with local educational institutions and industry experts.
- Based on the SEFFA experience, such programmes should encompass financial literacy and business management skills and can be achieved through partnerships with local educational institutions and industry experts.
- Local language training and the translation of the training content to local languages enhanced effective communication and delivery of the training^[1].



Project Design

Collaborations

- Strong collaborations with financial institutions, government agencies, and private sector partners are required to facilitate access to affordable financing and develop flexible repayment models.
- Encouraging partnerships with financial intermediaries, such as banks and microfinance institutions, can help create tailored financing mechanisms that address the specific needs and financial capabilities of SHFs and agri-entrepreneurs.
- Government engagement is crucial to incentivise and support the adoption of sustainable energy technologies by offering subsidies, tax incentives, and policy frameworks that promote and prioritise these technologies within the agricultural sector.
- Nascent technologies require more project implementation time as PUE suppliers may need to alter the solutions to the needs of SHFs. This requires patience from the development agency until the required capacity is sufficiently built to adapt the product/service to market needs and demands.
- Active community engagements are more effective in reaching farmers and allow for demos and hands-on interaction with the technologies. When accompanied by reference materials such as fliers, manuals, etc, a multiplier effect can be seen.
- Consider gender and inclusivity in planning BCC events, for example GIZ Uganda provided space for childcare activities and their conference center was disability inclusive.

Several layers of barriers to the adoption of PUE technologies.

Technologies



Financial Barrier



Logistical Barrier



Farmer Internal Barrier



Farmers



^[1] For example: GIZ Uganda translated the materials into 3 local languages in the target areas

Key Takeaways



Overcoming Technology Specific Barriers



SWP

- Behavioural change in irrigation takes time, it starts with technology adoption, then other aspects such as improved agronomy practices, a water reservoir and smart water harvesting technologies, etc follow gradually.
- SWPs are suitable for low-pressure irrigation and sustained use largely dependent on the availability and sustainability of water sources. Much more work is needed to change farmers' irrigation habits as most farmers use flood irrigation, which is not ideal. Project designs should also include measures that enhance water access and conservation practices.
- To replace the use of diesel and petrol-powered pumps, awareness campaigns should address barriers resulting from the mismatch between the SWP technology capacity and expectations from some farmers. The SWPs produce much lower water volumes per hour, compared to the fuel generators used for flood irrigation.
- Individual on-site conditions influence the adoption of SWP such as topology, farmers' income and purchasing power, distance to water source, priority crop value chain, and agricultural practices. Therefore, collaborative partnerships with actors in the energy, water, and agriculture sectors are needed to support interventions on water harvesting, market access and linkages, agronomy and business advisory.



Cooling

- Market linkages are critical for sustainability - the aggregator model was preferred to the fee-for-a-service model for both cooling and drying.



Drying

- Solar dryers should be versatile and flexible to be used with several types of crops.
- Strategic partnership with off-takers of produce is vital to drive technology adoption.



Horticulture



Overcoming Value Chain Specific Barriers



- Viewing the project through the lens of the energy-agriculture nexus is critical; Campaigns should involve an integrated approach to support farmers in both energy access and agriculture practices.

The farmers must be able to sell their farm produce at the right prices to generate income, ensuring they can repay their loans/product credit, recoup their investment, and improve their livelihoods. Therefore, campaigns involving agronomy support, access to markets, and partnerships with value chain actors will enhance PUE adoption.

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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