

Research report

SunCulture: Improving accessibility of productive-use solar products

Insights from SunCulture and Bboxx-EDF Togo

Prepared by SunCulture | December 2023



Shell Foundation | 



Document Control

Document title	SunCulture: Improving accessibility of productive-use solar products
Reference no.	WOR-2393J
Prepared by	SunCulture
Checked by	ES, ZK
Date	December 2023

This report is the copyright of Shell Foundation and has been prepared in collaboration with Triple Line and SunCulture. The contents of this report may not be reproduced in whole or in part, nor passed to any other organisation or person without the specific prior written permission of Shell Foundation.

The authors used reasonable skill and care in checking the accuracy and completeness of information in the report. However, the views and information shared in this report are of the authors not those of Shell Foundation or FCDO.

Acknowledgements

This report would not have been possible without the financial and business support from the UK's Foreign and Commonwealth and Development Office and Shell Foundation.

Cover: *SunCulture*

Contents

1	Introduction	2
2	Issues facing African smallholder farmers	2
3	About SunCulture	3
4	Shell Foundation's support to SunCulture	3
5	Partnering for scale: Bboxx-EDF Togo	4
6	Conclusions	6

List of abbreviations

CASEE	Catalysing Agriculture by Scaling Energy Ecosystems
CSA	Climate-Smart Agriculture
CSB2	ClimateSmart Battery2
FCDO	Foreign Commonwealth and Development Office
IT	Information Technology
KPI	Key Performance Indicator
MoU	Memorandum of Understanding
PAPV	Programme d'appui aux Personnes Vulnérables
PPP	Public-private Partnership
SF	Shell Foundation
SHS	Smallholder Farming Systems
SME	Small-medium Enterprise

1 Introduction

This report was produced by Triple Line and SunCulture, based on data and insights provided by SunCulture. The research was commissioned by SunCulture and the Shell Foundation (SF), with funding from the Foreign Commonwealth and Development Office (FCDO) under the Catalysing Agriculture by Scaling Energy Ecosystems (CASEE) programme. The objective was to analyse how the formation of partnerships between SF partners, in this case SunCulture and Bboxx-EDF Togo, could scale the impact of SunCulture's operations in addressing the various issues affecting smallholder farmers.

1. What does a small-medium enterprise (SME) look like multiple years beyond catalytic funding from SF and how has the output from SF grant funding laid the groundwork for SunCulture's continued success?
2. Alongside the government, two SF portfolio companies (SunCulture and Bboxx-EDF Togo) partnered to deliver a successful and impactful program in Togo. What can we learn about the value-add of cross-pollination between companies in SF's portfolio? With the help of future grant/government funding, how can this programme be expanded and replicated in other markets?

The research finds that SF's support to SunCulture has been invaluable to SunCulture's growth and improved end-user impact. In addition, SunCulture's partnership with Bboxx-EDF Togo has been successful in improving the livelihoods of smallholder farmer customers and provides lessons for future partnership formation between SF grantees. Further research is needed to fully assess the long-term impact of the partnership.

2 Issues facing African smallholder farmers

There are an estimated 700 million¹ people living on smallholder farms in Africa, and the farmers cultivating them contribute up to 70%² of the food supply on the continent. Despite this, the continent still faces challenges in achieving self-sufficiency in food production due to low productivity³ and changes in climate which threaten the yields of essential crops such as maize and potatoes, and therefore, smallholder farmer incomes and livelihoods.^{4,5} Without a stable livelihood, farmers cannot afford to invest in inputs and tools that could raise their productivity (e.g., high quality seeds, fertiliser, post-harvest processing, cold storage), and they remain shut out of consumer and financial markets.

Smallholder productivity is a notoriously difficult problem to solve, but solar irrigation is a feasible solution that simultaneously supports energy access, food security, poverty alleviation, climate adaptation and mitigation, as well as responsible water resource management. Despite its benefits, solar irrigation has not been adopted more widely with one of the biggest barriers being affordability. Smallholder farmers have uncertain cash flows and most do not have access to formal banking services. While Climate-Smart Agriculture (CSA) interventions in Africa are necessary to build resilience for smallholder farmers, they are often not sufficient as they are too expensive to operationalise for the

¹ Calculation done based on data from O'Neill, A. 2023. *Sub-Saharan Africa: Total population from 2011 to 2021*. Accessible at: <https://www.statista.com/statistics/805605/total-population-sub-saharan-africa/#:~:text=This%20statistic%20shows%20the%20total,to%20approximately%201.18%20billion%20inhabitants> and Goedde, L., Ooko-Ombaka, A., Pais, G. 2019. *Winning in Africa's agricultural market*, Accessible at: <https://www.mckinsey.com/industries/agriculture/our-insights/winning-in-africas-agricultural-market>

² IFAD. *The Field Report*. Accessible at: <https://www.ifad.org/thefieldreport/>

³ Maina, M. M. 2023. *Solar-Powered Irrigation Systems: Challenges & Opportunities in Kenya*. Accessible at: <https://www.clasp.ngo/research/all/solar-powered-irrigation-systems-challenges-opportunities-in-kenya/>

⁴ It is projected that the average global crop yields for maize may see a decrease of 24% by the late century (NASA. 2022. *Impact of Climate Change on Global Agricultural Yields*. Accessible at: <https://svs.gsfc.nasa.gov/4974#:~:text=Climate%20change%20will%20affect%20agricultural.crop%20yields%20by%20about%2017%25>)

⁵ In sub-Saharan Africa, the average maize yield is 50% of the average yield in all developing countries and 20% of the average yield in developed countries (Dr. Oyewole. 2022. *Boosting Smallholder Farmers' Productivity To Feed Africa Against The Looming Food Crisis*. Accessible at: [https://idev.afdb.org/sites/default/files/documents/files/Evaluation%20Week%202022%20-%20BOOSTING%20SMALLHOLDER%20FARMERS_Dr%20Babafemi_Agriculture%20session%20\(1\).pdf](https://idev.afdb.org/sites/default/files/documents/files/Evaluation%20Week%202022%20-%20BOOSTING%20SMALLHOLDER%20FARMERS_Dr%20Babafemi_Agriculture%20session%20(1).pdf))

⁶ The utilisation of 2 kg per hectare (ha) in sub-Saharan Africa is significantly lower compared to the world average of 146 kg/ha and approximately 400 kg/ha in China (Balana, B. 2023. *Small-Scale Irrigation – Income and Economic Growth Opportunities*. Accessible at: https://ilssi.tamu.edu/files/2023/03/ILSSI_Symposium_Bedru.pdf).

mass market.⁷ Productive-use assets supplied through a PAYGrow financing system (see below), such as those provided by SunCulture, can help address the challenges of access.

3 About SunCulture

SunCulture is headquartered in Kenya and is dedicated to addressing the biggest daily challenges faced by smallholder farming households by providing solutions that meet both their agricultural and household energy needs. Currently operating in East, West, and Southern Africa, SunCulture has successfully supported over 45,000 farmers with reports from customers demonstrating increased crop yields, higher incomes and an enhanced quality of life. SunCulture stands out for its innovative use of proprietary off-grid solar technology, which effectively tackles various obstacles experienced by smallholder farmers, including reliable access to water, irrigation, lighting, and mobile phone charging. These benefits are delivered through a single, easy-to-use platform.

To further enhance the accessibility of its products and overcome one of the primary barriers hindering smallholder farmers from adopting solar irrigation solutions, SunCulture offers a unique financing option called the Pay-As-You-Grow "PAYGrow" instalment plan, where customers pay a small initial deposit followed by monthly instalments over the course of 24 to 30 months. This initiative aims to make the company's products more affordable and addresses the historical lack of formal financing opportunities for smallholder farmers. Leveraging the income-generating potential of the system, SunCulture is at the forefront of providing financing for productive-use solar products to this underserved sector. Furthermore, the company has developed customised credit models and processes to strengthen and expand these financial capabilities.

4 Shell Foundation's support to SunCulture

Shell Foundation has played a critical and catalytic role in SunCulture's development and success. The Foundation's financial and technical support has been comprehensive, encompassing various facets of the business. One notable contribution is the assistance provided in the development of SunCulture's "Pay-As-You-Grow" financing product. This support proved instrumental in propelling SunCulture's growth, from selling fewer than 500 units annually up until 2017, to outfitting more than 40,000 smallholder farmers across 8 countries to date. As a result of their expansion into other countries, SunCulture has grown to over 190 full-time employees, and has more than 8 distribution partners.

Shell Foundation has also supported the company's rebranding project, enabling the company to strengthen its brand identity and effectively communicate its value proposition to stakeholders. Additionally, SF's involvement has extended to the enhancement of SunCulture's organisational systems, processes, and policies. At the impact level, SunCulture's work has led to 87% of customers reporting increased earnings compared with before having access to the system, 90% reporting an increased or very much increased production level, 83% reporting improved productivity and 89% of customers reporting an improved quality of life.⁸

By facilitating these improvements, SF has contributed to the company's overall operational efficiency and effectiveness. This has all contributed to SunCulture's continuous success.

The below graphic (**Figure 1**) includes a summary of Shell Foundation grants provided to SunCulture over the duration of their partnership from 2016 to 2023.

⁷ Climate-smart agriculture is an integrated approach to managing landscapes such as cropland, livestock, forests and fisheries that addresses the interlinked challenges of food security and climate change (World Bank, 2021. *Climate-smart Agriculture*, Accessible at: [https://www.worldbank.org/en/topic/climate-smart-agriculture#:~:text=Climate%2Dsmart%20agriculture%20\(CSA\),food%20security%20and%20climate%20change.&text=A%20growing%20global%20population%20and,up%20the%20demand%20for%20food](https://www.worldbank.org/en/topic/climate-smart-agriculture#:~:text=Climate%2Dsmart%20agriculture%20(CSA),food%20security%20and%20climate%20change.&text=A%20growing%20global%20population%20and,up%20the%20demand%20for%20food)).

⁸ The reported figures are based on 2022 third-party survey results.

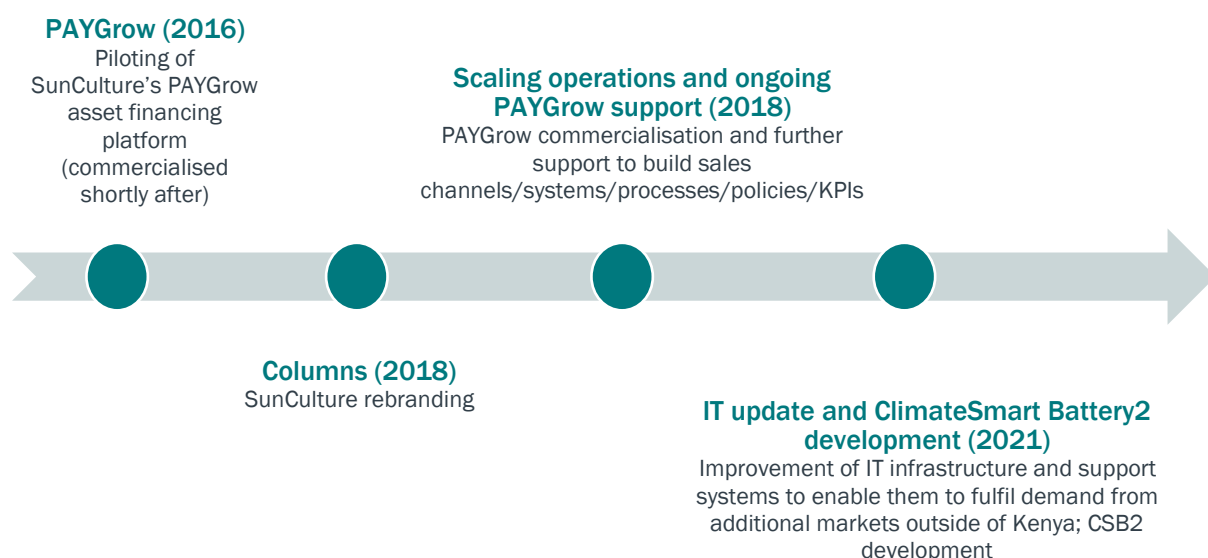


Figure 1: Timeline of SF support to SunCulture

5 Partnering for scale: Bboxx-EDF Togo

SunCulture has established a strategic distribution partnership with Bboxx-EDF Togo, another organisation supported by Shell Foundation, leveraging their expertise in providing affordable solar energy solutions to off-grid communities. In this partnership, SunCulture acted as the technology supplier and training provider, while Bboxx-EDF Togo acted as the distributor, leveraging its Pulse® super platform to connect farmers with life-changing solutions. This has resulted in mutually-beneficial outcomes that enhance both organisations' business performance and amplify their social impact.

Impact of the partnership with Bboxx-EDF Togo

In 2019, SunCulture and Bboxx-EDF Togo, established a pilot scheme to provide 30 productive-use assets to smallholder farmers in Togo. This pilot sought to understand Togolese smallholder farmers' needs and showcase the value of SunCulture's proprietary productive-use solar technology to the Togolese Ministry of Agriculture as a means of increasing local food production and improving food security. The pilot and proof of concept were then used to scale up the project and increase the number of beneficiaries through a public-private partnership (PPP) Memorandum of Understanding (MOU) that was signed by Bboxx-EDF Togo, SunCulture, and the Government of Togo.

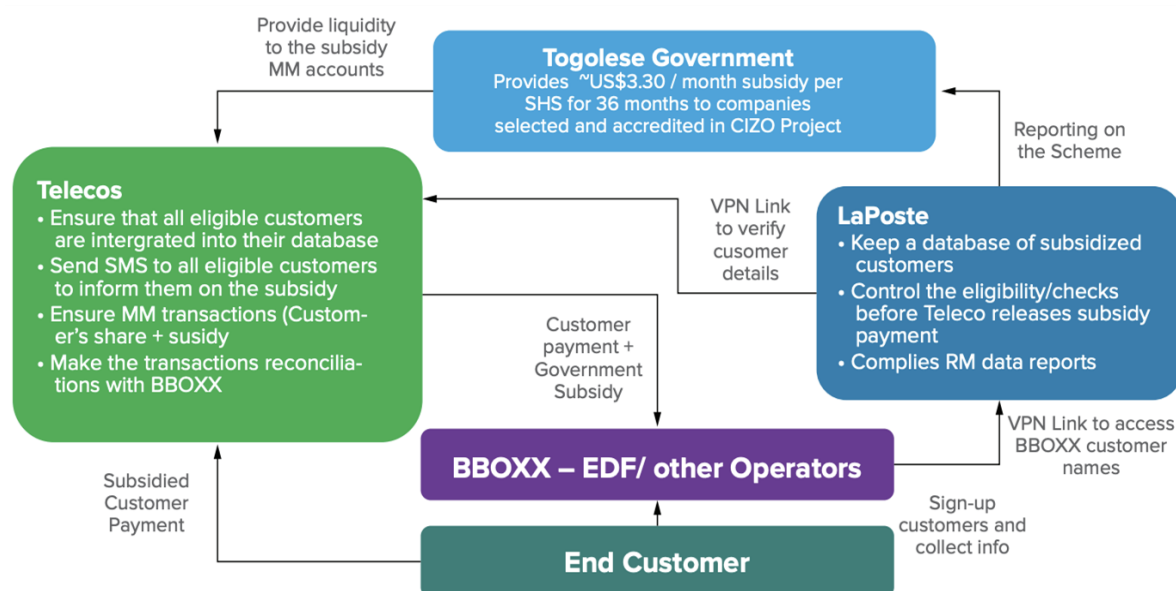
The goal was to expand the programme to provide 5,000 units to smallholders with a 50% subsidy supported by the Togolese government through a PAPV programme (Programme d'appui aux Personnes Vulnérables = Support Programme for Vulnerable People) lead by the Ministry of Agriculture using the existing CIZO platform as highlighted in [Figure 2](#) below. The partnership has so far resulted in the installation of 3,581 solar irrigation systems for smallholder farmers across Togo.⁹¹⁰

SunCulture could build on Bboxx-EDF Togo's operational expertise and capacity to quickly deploy thousands of solar irrigation systems as requested by the government.

⁹ The total financed cost for the smaller irrigation system costs 670,000 FCFA (~1,100 USD) which delivers up to 1.2M³ water per hour and 900,000 FCFA (~1,500 USD) FCFA for the larger system which delivers up to 2.8M³ water per hour. The product mix of the project is 68% provision of larger systems and 32% smaller systems.

¹⁰ The Togolese government has extended the CIZO platform used for smallholder farming systems (SHS) subsidies to incorporate solar irrigation assets.

Customers receive a 50% subsidy, which is used towards the deposit of the solar water pump and monthly payments are made by customers following payment of the deposit. A customer is registered on the CIZO platform and every time a customer makes a payment to the distributor, the same amount (50% of total cost) is then disbursed by the government to the company via mobile money. This subsidy scheme has improved affordability of the products for lower-income customers. In addition, through their partnership, Bboxx-EDF Togo, and SunCulture managed to unlock an additional \$2.7m USD in results-based financing to scale their respective operations.



Source: Bboxx-EDF

Figure 2: The mechanics of the CIZO platform

However, a larger impact data survey needs to be executed post-phase one of the project (5,000 units) in order to track the emerging impact on smallholder farmers and the project's wider contribution to the country's food security and climate resilience.

Key topics and learnings from the partnership:

- **Training and knowledge transfer in combination with software integration of PAYG technology is key.** Knowledge transfer from the solar irrigation company to the SHS company is key with on the ground training during the project setup and ongoing training throughout the project scaleup. Additionally, software integration of PAYG lock / unlock technology is a necessity to be able to manage financing at scale.
- **Product fitness & design to match specific local customers' needs.** Although replacing traditional ways of pumping underground water (by hand, with fuel pumps, etc.) with a solar powered unit is the core functionality of a solar irrigation kit, user needs differ significantly in each market (e.g., Kenya vs. Togo) due to differences in farm geometry and localisation. Therefore the customer's ability to fully exploit his or her new irrigation system also lies with the qualitative localised "offer" designed around the pumping system matching customer specific needs. For example, offer a portable system option for markets where cultivated lands are typically far from the farmhouse, include a water tank by default in the offer when farmers are accustomed to gravity irrigation practices, etc.
- **Government led subsidies and farmer & private-led sales.** Though the government should promote the subsidy and the technology, its support should accompany a farmer- and private-led sales and distribution process to ensure farmer buy-in and commitment.

- **Awareness and knowledge is the second biggest barrier to access for solar irrigation systems,** after affordability, in countries with low income and agricultural activity (Togo has lower income and agricultural activity than Kenya). Dedicated funding and teams to set up demonstrations, engage farming communities, co-ops, and government entities is key for scaling. Government agriculture extension officers can be of great support if they are engaged from the start.
- **Selling and distribution of productive-use solar irrigation systems is complex.** The process requires higher technical expertise of the sales and support teams, as the product has a longer sales cycle than typical solar home systems, and door-to-door sales are less efficient. There is also a risk of overselling in this market, meaning sales agents may sell to farmers for whom the product is not appropriate, resulting in an eventual refund. Therefore, having a dedicated sales and technical team focusing solely on the solar irrigation system is key.
- **A dedicated team member should be responsible for the administrative aspect of the CIZO platform and a suitable platform should be used for the management of payments of the PayGo system and of data.** This ensures that the distributor can focus solely on scaling their sales and operations and on providing quality products and services, and not be distracted by subsidy administration.

6 Conclusions

SF's support, both financial and technical, has been critical in the success of SunCulture over the period from 2016 to today. SunCulture has been successful in expanding operations across countries and increasing the size of their workforce, enabling the company to reach more customers. Customers reported satisfaction with their productive-use assets, and reported an improvement in livelihood and income.

Partnering with Bboxx-EDF Togo for the pilot scheme led to the successful roll-out of nearly 4,000 productive-use assets to smallholder farmers in Togo. The learnings gleaned from SunCulture's partnership with Bboxx-EDF Togo have informed the framework with which SunCulture engages new or potential partnerships, especially as it relates to awareness, knowledge sharing, and partner communication. For partnerships specific to subsidies/results-based financing, SunCulture will ensure an integrated platform is in place to allow each partner to focus on their own expertise and value-add, while ensuring a seamless and successful customer journey for beneficiaries.

To fully assess the impact of the SunCulture & Bboxx-EDF Togo partnership, further research is needed, in particular, data should be collected on income levels and crop yields of end-users before and after the introduction of the productive-use assets. This could be done in the form of a survey of Togolese customers who participated in the irrigation subsidy programme. In addition, **further research can be conducted into how the irrigation subsidy programme can be rolled out in different countries.** Based on initial sales data, which indicates that the programme has been effective in providing access to solar irrigation for farmers in Togo, there may be an opportunity to use the success of the Togolese programme as a formula for other large scale PPPs in order to be successful in obtaining results-based financing for productive use of renewable energy.