

Solar Irrigation Systems Fund - SIS Fund

Investment Thesis: The SIS Fund addresses the **gap in agricultural productivity and energy access** in Sub-Saharan Africa by **financing solar irrigation systems (SIS)** for smallholder farmers. The fund covers local developers' upfront costs **in exchange for its receivables** and generates additional revenue from **Renewable Energy Certificates**. The **blended finance model** allows to combine a climate mitigation and adaptation strategy with strong financial returns.

The Challenge

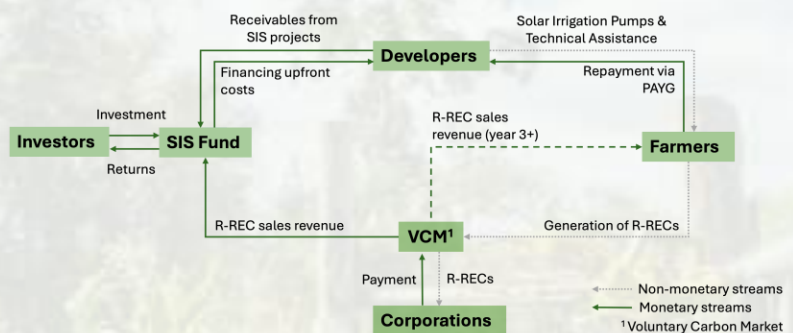
Over **600 million people in Sub-Saharan Africa (SSA)** lack **access to electricity**, with rural areas being particularly underserved. The **off-grid solar (OGS)** sector has emerged as a critical solution: recognizing that the vast majority of SSA's rural households is engaged in agricultural activities, it has increasingly shifted from focusing on immediate household needs to more productive uses. Most smallholder farmers do not have access to modernized tools, leading to an undermechanized sector with yields at a global low. Coupled with increasing climate shocks and demographic pressures, this results in **26% of the region's population still facing food insecurity**, a number only projected to grow. **Productive use leveraging solar energy (PULSE)** therefore represents the next frontier in the OGS sector.

Although most PULSE appliances are still in early stages of development, **solar irrigation systems (SIS) are the readiest to scale**. Solar water pumps have the potential to increase food security and agricultural productivity up to fivefold, while also strengthening climate resilience and generating renewable energy. However, **high upfront costs** and a lack of tailored financing mechanisms continue to hinder widespread adoption. To achieve scale, the sector requires **coordinated efforts among various value chain participants**, including investors, product providers, and distributors interacting directly with farmers. Addressing these barriers, we present a comprehensive solution designed to **bridge the financing gap** in this critical industry segment.

Innovative Solution

The SIS Fund is structured using a **blended finance** approach, combining concessional loans, mezzanine debt, and equity to mobilize different providers of capital. The fund will **partner with developers to cover their upfront costs**, which include the hardware, installation, and training costs for the SIS. In other words, **the fund purchases the developers' receivables at a discount**, which consist of future monthly instalments over a period of three years made by farmers using the SIS. At the end of this period, the SIS become their property (equipment lifetime is up to 25 years). The continuous renewable energy production allows for the **generation of Renewable Energy Certificates (RECs)** serving as an additional revenue stream for the fund, thereafter the farmers benefit from this additional income. Depending on the configuration, SIS may be equipped with **LED lights and/or USB charging ports**, which can facilitate the access to electricity in the communities.

Operating Model



- Collaboration with local organizations and SIS developers (e.g., Solektra or Futurepump) to identify SIS project farmers, purchase of receivables from the developers.
- The farmers' monthly instalments are collected via Pay-as-you-go (PAYG) solutions and aggregated by developers, before going to the SIS Fund.
- RECs, for example generated via the blockchain based R-REC standard, are sold on the VCM to corporations.
- Corporations purchase RECs for voluntary emission accounting, the importance of social/economic co-benefits is increasing

Potential Partners

SOLEKTRA

Futurepump

R-RECS

Key Details

Key Financial Information

Fund Size	11 million
Investment type	Climate project finance
Management Fees	2%
Maturity	9 years
Target IRR	8.7%
Eligible projects	Solar irrigation systems
Irrigation target per year	22'680 acres

Investors

Development Banks ➤ 30% of the SIS fund  	Senior debt with lower return expectations upon achieving certain impact milestones Expected returns: 3.1%
Impact Investors ➤ 40% of the SIS fund  	Mezzanine debt which allows to balance impact and financial returns Expected returns: 8.1%
Family Offices ➤ 30% of the SIS fund  	Equity investment with market rate return expectations Expected returns: 18.2 %

Target Market

The **market for SIS in SSA** will grow over the next years into a **billion-dollar market**, mainly since the relative cost per unit of performance is expected to go down, and rural incomes will continue to rise. Specifically, the market for solar powered irrigation systems in SSA has a **serviceable market volume of USD 913 million in 2025** and a CAGR of 13%, projected to reach USD 1.63 billion by 2030. The SIS Fund will follow a **three stages expansion plan**:

Phase 1: PILOT



- Fund Size: \$11M
- Goal: **Validate repayment rates in 2-3 countries** in East Africa
- Use capital stack described on the left

Phase 2: SCALE



- Fund Size: \$50M+
- Goal: **Expansion across SSA**
- Use similar capital stack structure; increased private participation desired

Phase 3: MATURITY



- Goal: Transition to **local financial institutions**
- Structure: debt funds by local commercial banks and inclusion of Pan-African pension funds

Solar Irrigation System Project Description



Each SIS, comprising a solar panel and a pump, costs on **average USD 580** and can **irrigate 1 to 2 acres**. Depending on the model, they may be equipped with LED lights and/or USB charging ports



For reference, the average income of farmers from sales of their produce¹ is USD ~50 per month in Tanzania. When installed, the SIS **increase the crop yield** of the communities by **up to 500%**.



The sourcing of projects, coordination with the developers, and the installation of the SIS result in additional costs of **USD 50 per pump**.



The fee is at the lower end of **the market standard** for SIS, made possible through our blended finance approach in combination with the selling of REC's.



For farmers to be eligible for a project, a **downpayment of USD 80 per SIS** (15% of the hardware cost) must be made. The monthly fee per SIS is **USD 36 per month** for a duration of five years.



After **three years**, the ownership of the SIS goes to the farmers, which can use it for **up to 20 more years**. They will also obtain all **revenue from the sale of the REC's**.

¹ amount of cash income of sold produce, does not include in-kind income or the farmer's own consumption of crops

Cash Flow Projections and Fund Performance

Costs

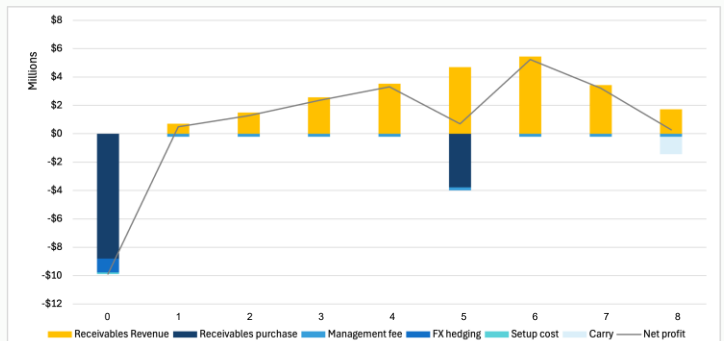
- The funds are invested over a timeline of 9 years, allowing for the installation of 15.000 SIS.
- The receivables are paid for in two stages, 70% in year 0, the remaining 30% end of year 5.
- As receivables are denominated in local currency, 70% of their value is hedged at a cost of 6%.
- The management fee is 2%, carried interest is 15% at a hurdle rate of 7.5% [IRR].

Revenues

- The SIS Fund receives most of the income from monthly PAYG revenue (receivables) which contributes to 90% of the overall fund income.
- A default rate of 18-20% for the farmers is assumed.
- REC's are the second income of the fund, contributing 10% of the overall fund income.

Net income

- The SIS Fund generates positive net income from year 1, with the management fee, second stage receivables, and carry remaining the only expenses.



Fund performance

- With a total investment of USD 11 million, the fund generates revenues of USD 19 million and has an IRR of 8.7%
- The blended finance structure of the SIS Fund allows to meet the expectations of the different investors
 - Development banks: 3.1%
 - Impact investors: 8.2%
 - Family offices and high net worth individuals: 15%

Impact Assessment

SDG	Our Contribution	Impact Targets	Risks and Mitigation Strategy
SDG 7: Affordable and Clean Energy	Generate clean energy for irrigation and secondary uses	Over 90,000 MWh generated for over 120,000 livelihoods	Fund an RCT to study broader spillover effects such as disincentives to expand central grid electricity to rural areas
SDG 13: Climate Action	Replace diesel-based pumps and increase climate resilience	Nearly 25 MtCO2e avoided per year	Water availability and land rights: promote water saving devices, work with farmers with clear water access and land rights
SDG 2: Zero Hunger	Increase agricultural productivity	Over 40,000 additional people fed per year	Address other constraints in agricultural VCs through comprehensive capacity building going beyond maintenance of SIS
SDG 8: Decent Work and Economic Growth	Boost rural incomes through increased yields & cost savings; create jobs across agri. VC	Increase in annual farmer incomes of over 700\$ or double the baseline	Exclusion of low-income farmers: refine PAYG possibilities
SDG 5: Gender Equality	Promote jobs & training for women	Over 3,600 women or >60% of farmers targeted	Work with specialized NGO to address intra-household bargaining tensions and unsecured land rights for women

Risk Assessment

Risk	Mitigation Strategy
Credit / default risk	Farmers may not be able to repay their receivables due to volatile income. Using a PAYG scheme based on a harvest-adjusted repayment period of three years addresses this issue, with external control via SIM to deactivate and repossess SIS devices as a last resort.
Currency risk	The local currency might depreciate, resulting in a loss when converting to USD. As a response, the SIS Fund hedges 70% of the receivables with cross-currency swaps from TCX.
Cash outflow risk	Local FIs might lack sufficient USD reserves to handle large-scale conversions. Applying TCX hedging, as well as considering this aspect in the country due diligence and diversifying across multiple countries is key.
Price volatility & quality of REC's	Securing long-term offtake agreements with corporations to stabilize the REC price. Collaboration with external verifiers (e.g., CarbonClear), in addition to the blockchain approach, to increase the quality guarantee

References FSDT, MercyCorps, & Nahani. (2017). FinScope Tanzania 2017: Dedicated Farmers (Insights That Drive Innovation). Lighting Global, The World Bank, & International Finance Corporation. (2019). The Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa. Ministerie van Landbouw, Natuur en Voedselkwaliteit. (2020, November 11). Increasing the use of solar powered pumps for Irrigation in Tanzania. Tanzania | Agroberichten Buitenland. Peterschmidt, N. (2024, March). I-RECs, P-RECs, D-RECs, R-RECs—Revenue opportunities for mini-grid companies [No. 17] [Broadcast]. Retrieved February 22, 2025. Raji, T., Alee, A., & Williams, N. J. (2024). Productive use of electricity in agriculture in sub-Saharan Africa: A systematic review. Progress in Energy, 6(4), 042003. <https://doi.org/10.1088/2516-1083/ad6c9e> Tanzania Investment Centre. (2022, November). Renewable Energy Irrigation. Retrieved February 21, 2025, from <https://tdg.fic.go.tz/opportunities/renewable-energy-irrigation/>