

Mount Sunzu Coffee Limited

Combining PV-Power and Irrigation System in Professional Agriculture

Building a 90 kWp photovoltaic system to power Mount Sunzu's Irrigation System

27. November 2025

REPIC Jahresveranstaltung, Eventforum Bern



Mount Sunzu Coffee Limited

Who we are



Luca Costa
Commercial Director
Master of Science in
Agricultural Sciences,
ETH Zurich (2016)

- Responsible for farm establishment and commercialization of coffee
- Deep insights into food processing industry in the high quality segment in the CH & EU market
- Worked with Läderach at the interface between country of origin and Switzerland
- Experience in setting up and managing farms (rubber, cocoa, agroforestry) on 1'000 ha in Africa



Fridolin Stocker
Agronomic Director
Master of Science in
Agricultural Sciences,
ETH Zurich (2017)

- Responsible for operations and quality
- Worked for one of the world's largest agribusinesses in researching yield optimisation and sustainable cultivation in coffee
- Was responsible for agronomy on farms cultivating 4'700 ha of coffee




Yanik Costa
Administrative Director
CFA (2017); Master of
Arts in BWL,
University of Zurich
(2015)

- Responsible for financials and compliance
- Director at Investec; responsible for M&A transactions and succession planning, previously with PwC's Corporate Finance team
- Experience in transactions, business valuations, financial modelling, business planning and business optimisation



Mount Sunzu Coffee Limited

Building a sustainable and profitable coffee farm in Zambia



**Incorporated
2019 by Yanik &
Luca Costa and
Fridolin Stocker**



**150 ha Coffee
under Sustainable
Cultivation**



**Ethical Business
Practices &
Values**



**Second Biggest
Coffee Farm
in Zambia**



**First Yields
in 2024**



**Creation of 900
Jobs with 3'780
Beneficiaries**



**Backed by long-
term oriented
Swiss investors**



**Production of
300 tons
Specialty Coffee**



**605 ha Forests
and Wetlands
Protected**



**Future-Oriented
Growing
Technologies**



**Zambia's Only
Seed Distributor
& Nursery**



**Waste Reduction
and Recycling
in Processing**

Situation and Challenge

Unreliable Grid Infrastructure pushes Zambian Farms to rely on Diesel for Energy Generation

The Challenge

Commercial agricultural operations across Zambia face a critical energy dilemma. Grid electricity remains unstable and unavailable in rural areas, forcing farm operators to rely on costly diesel generators for irrigation pumping.

A standard 115-hectare centre-pivot system consumes approximately 112 MWh annually. Under assumption of 50% energy generation via diesel fuel, operators face¹⁾:

- Annual emissions exceeding 30 tonnes of CO₂
- Fuel expenditure surpassing \$20'000 yearly
- Logistical burdens during critical growing periods
- Irrigation disruption during power outages

Missing Middle: niche between smallholder pumps and mega solar farms

Systems suitable for Mount Sunzu's needs are not readily available on the market

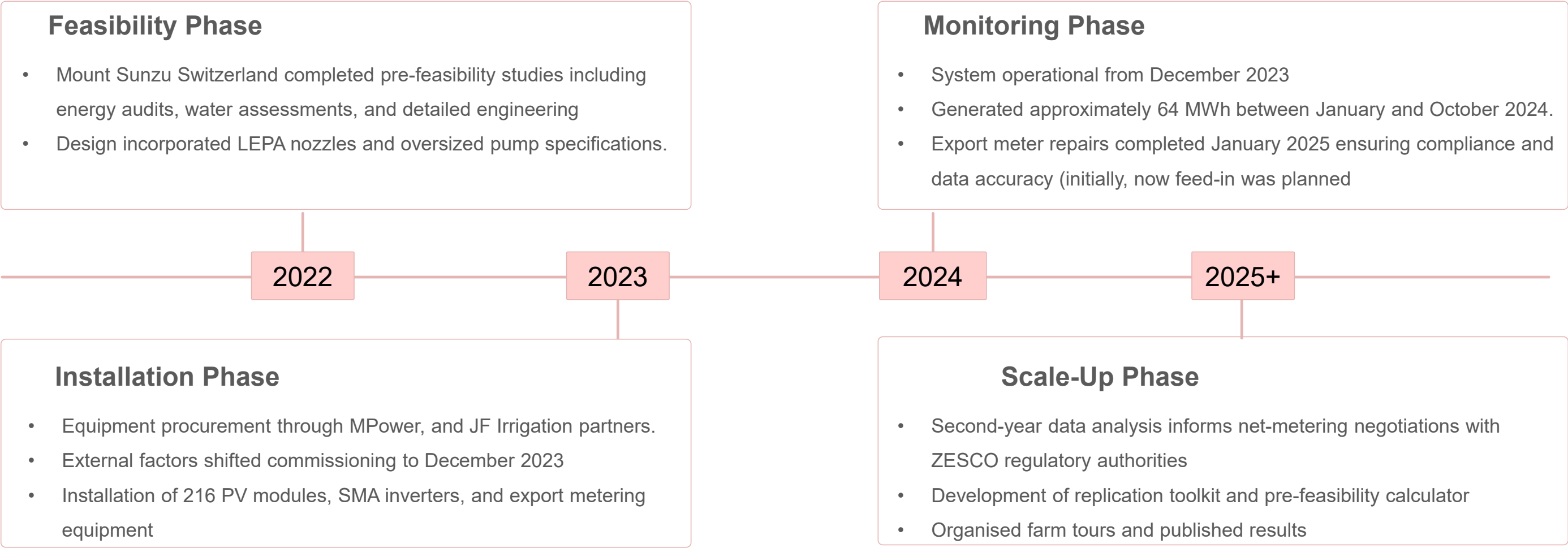
- **Smallholder scale:**
 - majority of solar irrigation in Africa targets smallholders with pumps sized in the 1–5 kW range, serving often less than 5 ha of land
- **Large utility scale:**
 - On the other end, Zambia already has solar farms of tens of MW feeding the grid; e.g., the ~60 MW Itimpi Solar Power Station
- **Mid-sized system:**
 - The Mount Sunzu system (~90 kWp PV; serving a ~75 kW motor pivot) sits in between
 - far larger than a mini pump for a smallholder, but far smaller than an IPP²⁾ solar farm.
 - This mid-size makes it especially suitable to commercial farms and the “missing middle” of irrigation electrification.

1) Please note: Mount Sunzu is connected to the electricity grid and therefore limited dependence on fossil fuels

2) Independent Power Producer

Timeline

Phased Implementation Progresses from 2022 Feasibility Study to 2025 Showcase



Achievement: Custom project supported by Repic

Solar PV Now Supplies 65% of Mount Sunzu's Energy Demand

Major Solar Share

Photovoltaic arrays supply approximately 65% of the farm's total electricity demand, predominantly for irrigation pumping. This drastically reduces grid dependency.

Higher Efficiency

Designing irrigation system to match PV-System using LEPA-nozzles (Low energy precision application) improved water-use efficiency by approximately 30% compared to baseline.

Extended Coverage

The system enables continuous six-month dry-season irrigation, stabilising yields and revenue predictability.

Social Impact

The project created 25+ permanent local positions, exceeding the initial target of 15 jobs. Approximately 200 beneficiaries now enjoy year-round employment.

This demonstrated North-South partnership model between Swiss donors and local installers has resulted in positive feedback from other commercial farms (with approx. 7'400 ha under cultivation) showing that this solution has a potential to be replicated.



Achievements and next steps

Verified Performance Data Confirms 64 MWh Generation and 100% System Uptime

Achievements

64

MWh Generated

January–October 2024 output

65%

Energy Coverage

Of total irrigation pump demand

100%

System Uptime

Since December 2023 commissioning

57

Tonnes CO₂ Avoided

Annual greenhouse gas reduction

Next Steps



Replication

Replicate proven solutions with additional farms



Energy Storage

Adjust design to include battery
Trade-off between higher costs and higher efficiency



Shift towards green energy

Developed solution comes at right time as shift towards green energy is becoming more prominent in Zambia

Appendix

Pictures

Construction



Pictures

Final Installation



System Architecture

Ground-Mounted 89 kWp Array Feeds Three-Phase Pump Via Grid-Backup Architecture

The solution comprises 216 photovoltaic panels (410 Wp each) delivering 89 kWp total capacity through a ground-mounted array. SMA inverters convert DC power to 400V three-phase supply for the centre-pivot pump system, with the national grid providing backup during low-radiation periods.

01

Robust Foundation

Concrete mounting footings ensuring long-term structural integrity in challenging terrain conditions.

03

Grid Protection

Export-limiting meter and surge protection equipment safeguard against grid instability whilst preventing illegal reverse power flow.

Financing and Partnerships

The CHF 452'00 capital requirement blends REPIC donor grants (CHF 150'000) with local equity and commercial loans. Strategic partnerships with irrigation vendors and agricultural financiers can reduce upfront barriers for replication projects.

02

Optimised Irrigation

The 75 kW pivot pump operates during peak solar hours using oversized piping and LEPA nozzles to maximise field coverage during daytime availability.

04

Advanced Control

Precision scheduling systems align pump operation with solar generation patterns, maximising renewable energy utilisation.

Challenges

High Capital Costs and Grid Variability Require Careful Risk Management

Capital and Financing

Total project cost of CHF 452'000 (including CHF 150'000 REPIC grant) presents significant barriers. Replication requires blended finance combining donor support, commercial loans, and bank credit facilities to achieve adoption.

Technical Challenges

Grid voltage fluctuations necessitated inverter sizing at 66 kW peak versus 55 kW pump rating. Design margins for weak-grid scenarios prove critical. Initial export meter commissioning errors delayed data collection until resolution in Q1 2025.

Operational Requirements

Battery-free architecture requires operators. Comprehensive staff training ensures simple maintenance capabilities and basic troubleshooting competency.

Market Adoption

Conservative farming communities exhibit scepticism towards novel technologies. Proof-of-concept visibility, detailed cost-benefit documentation, and demonstrated reliability overcome adoption resistance amongst potential investors.