THE BUSINESS CASE FOR SOLAR IRRIGATION IN KENYA

How solar pumps can improve lives and livelihoods in rural Kenya - if the market conditions are right
**BASIC FACTS**

**LOCATION:**
Kenya

**IMPLEMENTERS:**
SunCulture and Futurepump

**FUNDED BY:**
Ministry for Sustainability and Tourism, Austria; OPEC Fund for International Development

**BACKGROUND**

Kenya’s 3.5 million smallholder farmers largely rely on rainfall to irrigate their crops, as only six percent of farmland in the country is irrigated. As the population grows and the climate changes, these farmers will need to meet the growing demand for food while building their resilience to changes in rainfall patterns. Irrigation can provide this resilience while increasing farmers’ incomes, as it allows for the growing of high-value, nutritious vegetables such as tomatoes and cabbage. The expansion of irrigation capacity in Kenya has thus far been dominated by traditional pumps powered by diesel or petrol. These cause pollution and leave farmers vulnerable to fluctuations in the price of fuel.

SunCulture and Futurepump are two of a small number of private sector service and technology providers pioneering the sale of solar-powered irrigation pumps to small farmers in Kenya. Based on REEEP’s work in the sector since 2013, this brochure demonstrates that though market barriers remain, given the right financing mechanisms solar irrigation technology has the potential to improve millions of lives and enhance livelihoods in Kenya and beyond.

REEEEP’s work in the sector since 2013, this brochure demonstrates that though market barriers remain, given the right financing mechanisms solar irrigation technology has the potential to improve millions of lives and enhance livelihoods in Kenya and beyond.

**THE TECHNOLOGY**

SunCulture and Futurepump both sell solar-powered irrigation pumps. SunCulture sells these in a package with either mist or drip irrigation.

**SunCulture RainMaker**
- **Price**: USD 480, including sprinklers
- **Solar Panel Capacity**: 120W
- **Max Litres per day**: 7,000
- **Max pumping height**: 100 metres
- **Phone Charging?**: No
- **Batteries included?**: Yes
- **PAYG possible?**: Yes, through SunCulture

**Futurepump SF2**
- **Price**: USD 675 (80W) or 750 (120W), upgrades possible
- **Solar Panel Capacity**: 80 – 120 W
- **Max Litres per day**: 13,000 (80W) or 21,000 (120W)
- **Max pumping height**: 15 metres
- **Phone Charging?**: Yes
- **Batteries included?**: No
- **PAYG possible?**: Yes, through partners

---

80% of Kenya’s rural population is employed in agriculture

35.6% of Kenyans live under the poverty line

73.5% of Kenyans live in rural areas

26% of children under 5

Undernourishment affects the growth of children under 5
THE CUSTOMERS

What are the benefits of solar irrigation for farmers? This cost-benefit analysis uses Futurepump’s SF2 as a case study.

CUSTOMER STORY

Japheth experimented with different ways of irrigating his crops before finding out about solar pumping. He tried irrigating with buckets, but it took too long as the buckets were too small. He then bought a manual pump, but it was so labour intensive that he had to spend a lot of money hiring help. A petrol pump required him to invest USD 10 per day for fuel. The Futurepump SF2 solved these problems.

“"If I didn’t have the Futurepump, I think I wouldn’t be here now in the dry season because it is already too hot. But with the Futurepump now I know I will harvest something good.”"
WHAT ARE THE MAIN BARRIERS AND RISKS THE SECTOR FACES?

- The main barrier is consumer financing: most pumps on the market are relatively expensive, which puts them beyond the scope of traditional microfinance programmes. Loans from mainstream financial institutions are largely unavailable to smallholder farmers, as these find the risks and transaction costs too high, and small farmers tend to be unable to provide the required collateral. Pay As You Go is common for solar home systems; and systems can be remotely disabled if payments are not received in time. However, in the case of solar pumps this could lead to lost harvests and further reduce the capacity of a customer to pay in the future. Without this option, though, asset recovery in case of non-payment can be prohibitively expensive especially when customers are located in remote areas. SunCulture and Futurepump now provide ‘Pay-As-You-Grow’ schemes, which allow farmers to pay back only at harvest time when they have more disposable income.

- The pumps need to be powerful enough to be worth investing in but still affordable to small farmers. This can be a difficult balance to strike. Futurepump has addressed this barrier with the new SF2 pump by providing the option to upgrade by buying an extra solar panel. SunCulture offers a range of pumps to suit different segments of customers.

- Rural farmers are difficult to reach for awareness raising and sales. More importantly, a solar pump is a big investment for a Kenyan farmer, so trust building and good after-sales support are crucial. However, providing this support is expensive and logistically complicated when customers live far apart in remote areas. Both SunCulture and Futurepump’s latest models include remote monitoring sensors, so that the companies and their distributors can more effectively organise troubleshooting as well as give advice on optimal use of the pump based on usage data.

- Batteries can make the pump more reliable on cloudy days, but also tend to be both expensive and vulnerable to breakdowns. Futurepump decided not to add batteries to its pump in order to make maintenance and repairs by farmers easier, whereas SunCulture’s Rainmaker does include a battery pack.

- A study found that farmers who irrigate sell 73% of their crops on local markets. However, accessing markets further afield is difficult for small farmers. SunCulture arranges contracts with large distributors for their clients, to ensure off take of their products.

- Once a farmer owns a solar pump, water pumping is free, which means farmers have no incentive to save water. In water-scarce areas, the widespread use of solar pumps could lead to groundwater depletion. This risk can be reduced by using drip irrigation, though this is more expensive for the farmer than mist irrigation, or by finding other uses for the solar panel and thereby introducing a marginal cost.

- A major risk for the sector is posed by political unrest, which can deter investors, and unexpected policy changes, particularly changes in import duties for technology components.

WHAT ARE POSSIBLE SOLUTIONS?

Futurepump customers use their pump for 612 hours per year on average. That leaves an average of 1800 hours of sunshine per year when the pump and solar panel are not in use. Putting this excess capacity to work could increase farmer income and reduce payback times:

- Solar pumps could be sold to travelling irrigation service providers, who can use them to irrigate multiple farms.

- The solar panel, which is detachable, could be connected to a solar home system or other device when it is not required for pumping - this would also lead to reduced water wastage.
To learn about the full financial cost-benefit analysis for solar irrigation conducted by REEEP, contact info@reeep.org. To find out more about REEEP’s other work, visit www.reeep.org.

For more information about SunCulture, visit sunculture.com. To learn more about Futurepump, visit www.futurepump.com.