



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*

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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.



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

Undernourishment affects the growth of



26% of children under 5

THE TECHNOLOGY

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

Below: Futurepump's SF2
Credit: Futurepump



	SunCulture RainMaker	Futurepump SF2
Price	USD 480, including sprinklers	USD 675 (80W) or 750 (120W), upgrades possible
Solar Panel Capacity	120W	80 – 120 W
Max Litres per day	7,000	13,000 (80W) or 21,000 (120W)
Max pumping height	100 metres	15 metres
Phone Charging?	No	Yes
Batteries included?	Yes	No
PAYG possible?	Yes, through SunCulture	Yes, through partners

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.”

PETROL PUMP VS. SF2 PUMP

	Petrol Pump	Futurepump SF2
Cost	USD 250	USD 675 (80W) Upgraded 120W version available for USD 750 – but extra panel can also be added later
Technology lifetime	3 years	10 years
Equipment cost per 10 years	USD 1126 (replacement pumps, including forecasted inflation)	USD 675
Running cost per year	USD 92 (fuel)	0
Maintenance cost per year	Repairs usually not undertaken	USD 33 per year after the five-year warranty – total over lifespan of the pump: USD 203 (including forecasted inflation)
Operating costs- labour hours per year	Needs to be supervised while pumping (113 hrs per year)	Can be left to pump on its own
Other benefits		Can be used for mobile phone charging when not in use for pumping, saving farmers USD 21 per year. Farmers do not have to invest time in sourcing fuel, and are protected from fuel price fluctuations. No local air, soil or groundwater pollution Less noisy When farmers buy the pump through a rent-to-own or pay-as-you-go scheme, they build a track record of loan repayments, making the first step towards financial inclusion. Small and light: easy to move around and store securely at night.
Total cost of running a pump for 10 years	USD 2046	If paid upfront: USD 668
GHG emissions per year	196 kg CO ₂	0

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.



Above: SunCulture's drip irrigation kit in action.
Credit: SunCulture

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.

Below: Futurepump Distribution Manager Kimya Kimathi installs a solar panel.
Credit: Futurepump



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Federal Ministry
Republic of Austria
Sustainability and Tourism



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CONTACT

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.
