SOLAR WATER PUMPS

Product Catalogue - 2015

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EUROPEAN MICROFINANCE PLATFORM
NETWORKING WITH THE SOUTH

e-MFP ACTION GROUP ON MICROFINANCE AND ENVIRONMENT

Description and Working Principle

Solar water pumps (SWP) use electricity generated by photovoltaic (PV) panels to pump water from bore holes, wells or reservoirs directly onto fields or into a storage tank for gravity based irrigation. With no fuel inputs and simple operation, SWP are cheaper, cleaner and more reliable than diesel pumps. They offer the potential to increase smallholder incomes through reduced operating costs and improved crop yields. Once installed, SWP are low maintenance and have a long life if maintained properly. Water supplied can be used to irrigate crops, water livestock or, in some cases, provide drinking water.

Technical Characteristics

Target group	Community-scale irrigation, smallholders, diesel pump replacement
Components	Pump, controller, solar panels, wiring, piping, water tank
System size	Depends heavily on site and pumping requirements
Fuel type needed	High levels of sunlight
Fuel replaced	Diesel
Solar array size	6 – 10 m^2/kW for silicon PV panels
System power	1.1 kW – 8 kW
Typical lift range	5 – 200 m
Typical flow rates	10 – 400 m^3/day
Lifetime	Pump: 5 – 10 years, Panel: 20 years
Operation	Unattended, during daylight hours


Source: *MicroEnergy International*

Ease of Distribution, Installation and Maintenance

Detailed site and resource assessment, including soil type, crop type, water availability, and meteorology, are required to determine water flow requirements and system sizing. In cases where new wells or bore holes are constructed, careful consideration of the local hydrology is needed. Installation of the solar panel array, wiring and piping requires extensive technical know-how to optimize the system and avoid faults. Solar panels, electronics and pumps are sensitive preassembled components, and damage during transit must be avoided.

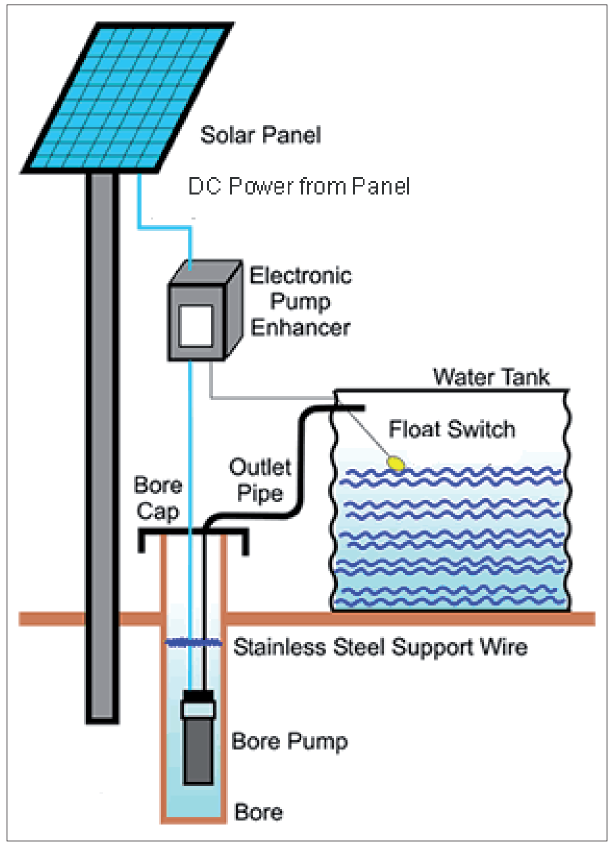
Pumps operate without supervision and require very little maintenance compared to diesel set-ups, however, routine maintenance is necessary to ensure a long lifecycle. This could include checking for faults, the cleaning of panels and pump filters, and the maintenance of the site around the SWP.

Technology Options

Efficiency improvements can be made by combining SWP with drip irrigation or using automatic electric sun tracking arrays. A variety of pump systems and sizes are available from manufacturers worldwide, ranging from surface pumps to submersible pumps. Water tanks are optional, but enable storage of water for gravity pumping on demand. It is also possible to make small systems mobile.

Price Range

System price depends on the sizing of the system, i.e. the volume and distance of pumping required. Prices range from around USD $2,400 to $10,000 for 1.1 – 4 kW pump systems. For a max pump head of 100 m and max flow rate of 3.9 m3/h, the cost of the pump-panel-controller system is approx. USD $4,500 (based on cost of Lorentz 1.8kW SWP and assumption of USD $1.2 per Watt of solar panels).



Source: *ClimateTech Wiki*

Type of Financing

At this price range, an SWP could be offered through microenterprise loans, fixed-asset loans or a financial leasing contract. In Bangladesh, for example, equipment loans are provided to a cooperative and paid for by many members. The land of the individual farmers is used as collateral, a soft loan for the SWP system is provided directly to the cooperative, and the loan is paid back through fees for water.

Economic and Social Impacts for End-users

SWP can reduce irrigation costs for farmers by 10 – 40 percent and provide a more reliable water supply than diesel pumps. Their simple operation and minimal maintenance requirements also save substantial time and effort irrigating fields and travelling to purchase diesel. Reduced exposure to pollution and lower possibility of diesel leaks onto crop fields protects the health of users.

Example: The breakeven time of a solar pump against the cost of diesel pumping is typically between 1.5 – 4 years. For instance a pump operating with 50 m lift and flow rates of 20 m3/day will breakeven after 20 months when compared to a diesel pump running for 5 hours a day with diesel costs of USD $1.30 per litre*. As diesel costs continue to increase, and solar pump systems become more affordable, this breakeven point will be reached sooner and savings will be higher.

*Based on 2008 retail price of Lorentz pump system from Lorentz Namibia Brochure

Benefits for the MFI

The MFIs will be able to broaden their loan portfolio options available to agricultural clients, while sustainably reducing environmental impacts. Savings on diesel expenses and increased crop income will facilitate successful loan repayments, and demand for this technology can attract new clients to the MFI.

Environmental Benefits

Environment: Solar water pumps avoid the emission of particulate matter (if it offsets diesel pumps), diesel leakages into cultivations and water, noise pollution, and travel to collect fuels. It could also contribute to a more efficient use of water.

Climate change mitigation: They reduce greenhouse gas (GHG) emission by replacing use of non-renewable energy, emission of CO_2 is reduced by 2.64 kg per liter of diesel; or by improving the use of the soil if agroforestry practices are implemented, or if cultivation is implemented on previously spoiled soils.

Climate change adaptation: Access to water helps increase resilience of rural households to climate shocks (such as droughts) and reduces the vulnerability of cultivation to higher temperature trends. It helps diversify income generating activities. It could help to decrease households' vulnerability on fuel price volatility.

Potential positive synergies with: Solar tunnel drier, rice husk gasifier, biodigesters (due to need of water), agroforestry, diversification strategies[1].

References

Climatetech Wiki, http://www.climatetechwiki.org/technology/jiqweb-swp

1 For further information on potential synergies check the other product catalogues for EE and RE technologies.

European Microfinance Platform

The European Microfinance Platform [e-MFP] was founded formally in 2006. e-MFP is a growing network of 120 organisations and individuals active in the area of microfinance. Its principal objective is to promote co-operation amongst European microfinance bodies working in developing countries, by facilitating communication and the exchange of information. It is a multi-stakeholder organisation representative of the European microfinance community. e-MFP members include banks, financial institutions, government agencies, NGOs, consultancy firms, researchers and universities.

e-MFP's vision is to become the microfinance focal point in Europe linking with the South through its members.

e-MFP Microfinance and Environment Action Group

e-MFP Action Groups facilitate synergies among e-MFP members and encourage them to implement activities together, thus contributing to the advancement of the microfinance sector.

The aim of the e-MFP Microfinance and Environment Action Group is to bring together microfinance practitioners to discuss and exchange experiences in dealing with environmental issues and to create new practical tools to advance environmental microfinance. The Action Group is also intended to act as a think tank that disseminates its results among e-MFP members and the microfinance sector at large with a view to increasing the awareness of and commitment to act on these issues. It is meant both as an internal knowledge-sharing and external awareness-raising platform that serves as a reference in the microfinance sector.

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