



Sunvention Sunpulse Water Solar Thermal Water Pump

Summary

Sunvention have developed an integrated solar thermal water pump, possibly the first cost-effective solution to village-scale pumping in sunbelt countries.

Problem

Much of the world's rural poor lack access to water, and part of this is a lack of cost-effective pumping.

The World Bank set a “maximum water cost target” of 6 US cents/m³ as benchmark for pumping systems in order to be economically employed in sunbelt countries. Gasoline powered pumps figure in the relevant World Bank Study at 8.58 US cents/m³, while photovoltaic systems are estimated at US 8.4 cents/m³.ⁱ

Solution

Sunvention have developed an integrated solar thermal pump. It uses a collector, steered in two axis, and coupled directly to a slow-speed atmospheric pressure Stirling engine, which can be coupled directly to a pump – or other requirement for mechanical power.

The system is designed for manufacture in developing countries, using locally available, non-toxic, recyclable, materials and appropriate techniques.

Head meters (feet)	Volume per day Litres (Gallons)
Field Irrigation	400,000 l (100,000 g)
10m (33 ft)	80,000 l (21,000 g)
50m (165 ft)	17,000 l (4,500 g)

The pump, starts working at sunrise, and with 8 hours of sun, can pump significant volumes.

Buffering systems can extend usage to 24-hours.

It is estimated the pump could be produced for about US\$1,250 and sold of US\$2,500.

Market

TÜV labsⁱⁱ recently assessed the system at a cost of US 2.4c/m³ making it the first village scale pump that we are aware of that meets the World Bank target.

As such TÜV estimated a potential market if it reached 10% of the rural villages in India alone with just one pump per year, would generate US\$ 32m/year gross profit.

Additional markets include any off-grid pumping application in sunny regions. Air pumping for fish-farms; off-grid mechanical requirements (milling, grinding, compressing etc)

Status

The Sunpulse water pre-production prototype is complete and discussions are under way with possible manufacturing partners.



Technology details

At the front of the pump is a solar collector; this reflects sunlight towards the middle where it heats up the front of a Stirling Engine.

Sunvention's unique design of Stirling engine uses air at atmospheric pressure as the working fluid, and pulses at a slow 30-60 times per minute.

The pump can be attached to a rotary pump, to Sunvention's own bellows pump, or as shown, connected to a hydraulic cylinder.

The other end of the hydraulic hose is connected to a hydraulic cylinder attached in this case to an India Mark II Water Pump.

ⁱ Based on a 30m borehole in a region with 2000 sun-hours per year.

ⁱⁱ TÜV is the european equivalent of UL labs in the US



SunPulse Water connected to India Mark II Water Pump

