



- **Solco “turn key” solar water pumping and purification system.**

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# SOLAR REVERSE OSMOSIS IN THE MALDIVES



# PROJECT AIMS

- Establish a sustainable solar powered desalination system with minimal environmental impact on the remote northern atoll island of Kulhudhuffushi.
- Generate income and employment within a small community from sale of water.
- Provide an affordable alternative water supply to the imported bottled water and contaminated ground water
- Prove economic sustainability of capital finance repayment through product sales



Arial view of Kulhudhuffushi

# KULHUDHUFFUSHI SITUATION

- Kulhudduffushi is a remote Island of 7600 people.
- Bottled water is expensive, ground water (island lens) is salty and contaminated with sewage. Salinity has worsened since the major Tsunami of 26<sup>th</sup> December 2004
- Measured decrease in rainfall is also contributing to increased ground water salinity
- Raw sewerage is permitted to enter the fresh water island lens.
- Inhabitants have rain water tanks but only last 4 months, those who can afford bottled water do purchase while the majority drink ground water, often leading to disease.
- Solco gained approval to run a three month trial with access to the ground water at a level unfit for human consumption. Then purify by solar powered reverse osmosis.

## KULHUDHUFFUSHI WATER QUALITY (Coffey MPW Report June 1999)

Source No.	Locality or House Name	Date Sampled	Source Type	Total Coliforms	E.Coli	E.C.( $\mu$ S)	Chloride (mg/L)
Ku1	Guesthouse	11/05/99	Well	30	NT	939	126

Samples incubated at 35 degrees for 28 hours. Results in CFU / 100 mL TNTC = Colonies too numerous to count or general blue-green fluorescence in cultured sample; NT = not test



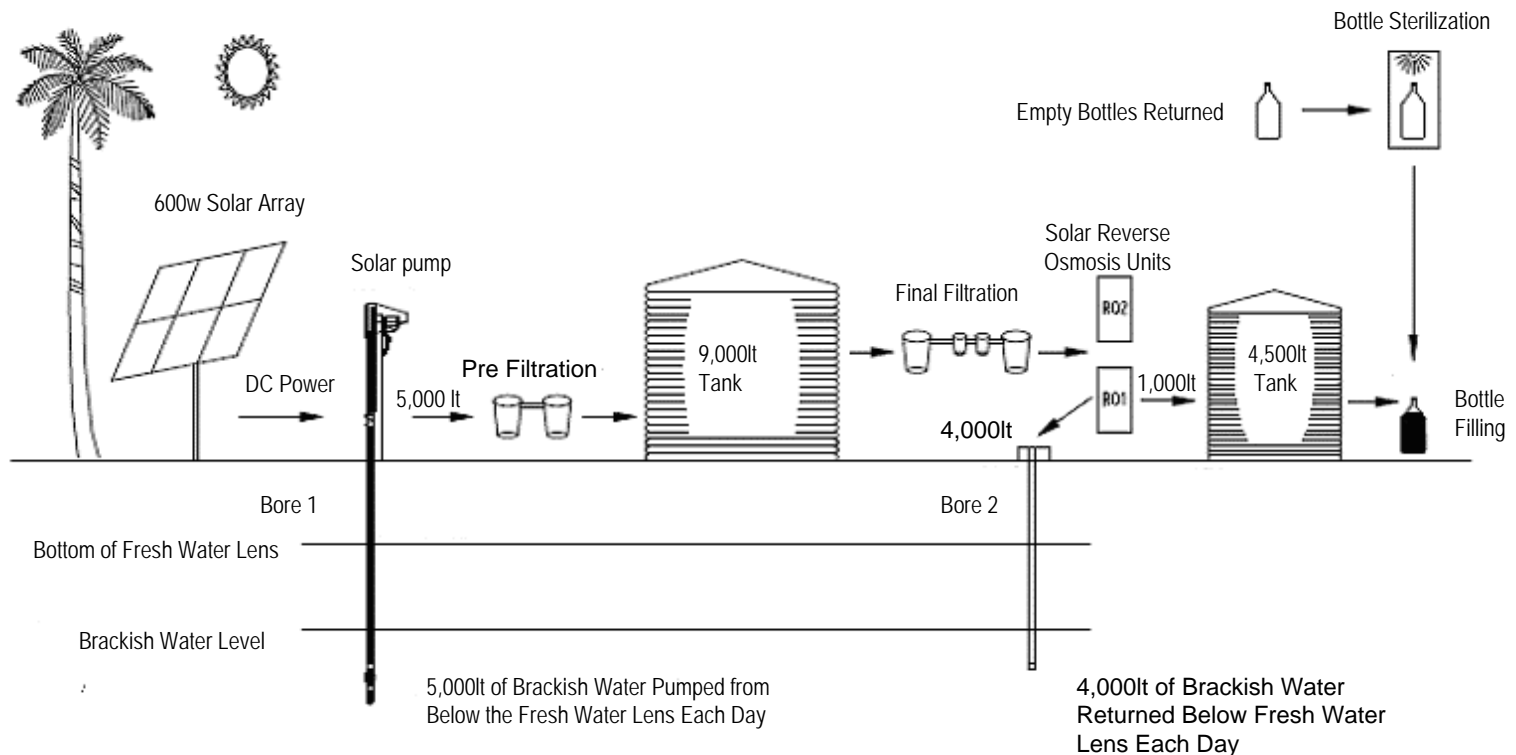
# KULHUDHUFFUSHI SOLUTION

- Community consultation process
- Integration of several Solco technologies.
- Containerised (20ft container) portable reverse osmosis plant
- 2 x 10m deep bore holes
- 22,000lt water storage
- Community education package
- 350 x 20lt water bottles
- Delivery system including motorbike and trailer.
- Daily feedwater and product water quality testing



Drilling the 2 x 10m bore holes

# KULHUDHUFFUSHI PROCESS



# KULHUDHUFFUSHI MAJOR COMPONENTS



**Bore/Well Pump**

- 3 x 100 watt tracked “Solarflow” reverse osmosis units (each capable of producing 500lt of pure drinking water each day at a 16% recovery ratio)
- 2 x tanks – 9,000lt and 4,800lt
- 1 x 200 watt tracked Sun Mill Solar Water Pump – bore hole model
- 350 x 19lt water bottles and dispensers
- 1 x bottle sterilisation system
- 1 x bottle filling station
- 1 x 20 foot customised sea container

“Sunmill” solar pump



Basic “Solarflow” RO system

# MALDIVES SYSTEM DETAILS

## SUN MILL SOLAR WATER PUMP

- 200 watt Sun Mill
- Positive displacement piston pump
- Tracked solar array increases flow by up to 30%
- Capacity is 18,000lt per day at 10m TDH
- 100% corrosion resistant components

## SOLARFLOW REVERSE OSMOSIS UNIT x 3

- 1,500lt per day of product water
- Up to 5000ppm Total Dissolved Solids
- 16% recovery ratio
- Washable stainless steel pre-filtration
- Membrane replacement between 2-5 years



Purification equipment inside the container



# KEY COMPONENT - SUN MILL

- Simple to maintain onsite without specialised tools or skills
- Able to pump heads of up to 60 metres TDH
- Capable of delivering 40,000 litres a day
- Non-corroding components are unaffected by poor water quality



200w "Sunmill" solar pump

# KEY COMPONENT - SOLARFLOW

- Unique, designed for solar reverse osmosis system, with energy recovery technology
- Capable to treating polluted and brackish water up to 5000ppm TDS
- 100w of solar will produces up to 500 litres of high quality drinking water / day.
- Easily installed, maintained and serviced by trained locals
- Modular design available in many configurations.



A 500lt/day village water supply

# KULHUDHUFFUSHI RESULTS

- Average water quality improvement from approx. 2500ppm TDS to 100ppm TDS
- Demand out weight supply
- Water sold in community for half the bottled water price. 20 Rufiyaa (Rf) / 19lt.
- Water sold to near by 6 star resort for 30 Rufeaa / 19lt (subsidising community water)
- Fulltime employment for 2 locals
- Small footprint, minimum environmental impact and quiet operation.
- Project cash flow positive within one month
- Trial successful and terminated after 3 months
- Element in the community not in favour of continued operation due to negative impact on sales of imported bottled water.



**Maldivian children enjoying Solco's pure drinking water**

# KULHUDHUFFUSHI FINANCIALS

- Approximate cost of this installation was \$130,000 USD
- Project funded 50% buy Solco, Australia and 50% by soft loan from Triodos Bank Renewable Energy Development Fund, The Netherlands
- Product water sold for an average of 30 Rf per 19lt. (\$1=12.9 Rf) \$2.50 USD
- Average daily production of 1,500lt
- Daily water sales assuming high demand \$187.50 USD
- Daily labour costs \$10.00 USD
- Principal and interest on Triodos loan \$35 USD / day
- Average daily maintenance costs \$11 USD
- Site rental costs \$1.70 / day
- Daily operational costs \$15.00 (Phone, motorbike bike, cleaning solutions etc.)
- Cash flow positive by approximately \$110.00 per day.
- Estimated capital payback period of this project is approximately 3.5 years.



Customers queuing for a bottle of clean water





## THE OPPORTUNITY

- Solco can supply equipment only or design and install a customised “turn key” solar water pumping and purification system any where in the world.

For more information please contact:

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**Merci pour votre attention**