MÖRK WATER

SOLAR POWERED DESALINATION TECHNOLOGY

A Holistic Approach Making the Island Communities Resilient Against Climate Change Challenges

PACIFIC WATER AND WASTE WATER CONFERENCE, VANUATU, PORT VILA, 5-9 AUGUST 2019

CONTENT

WHO WE ARE

- Approach & Technology

3 PROJECTS

- Solomon Islands
- Vanuatu
- East Cape Village PNG & Portable Unit

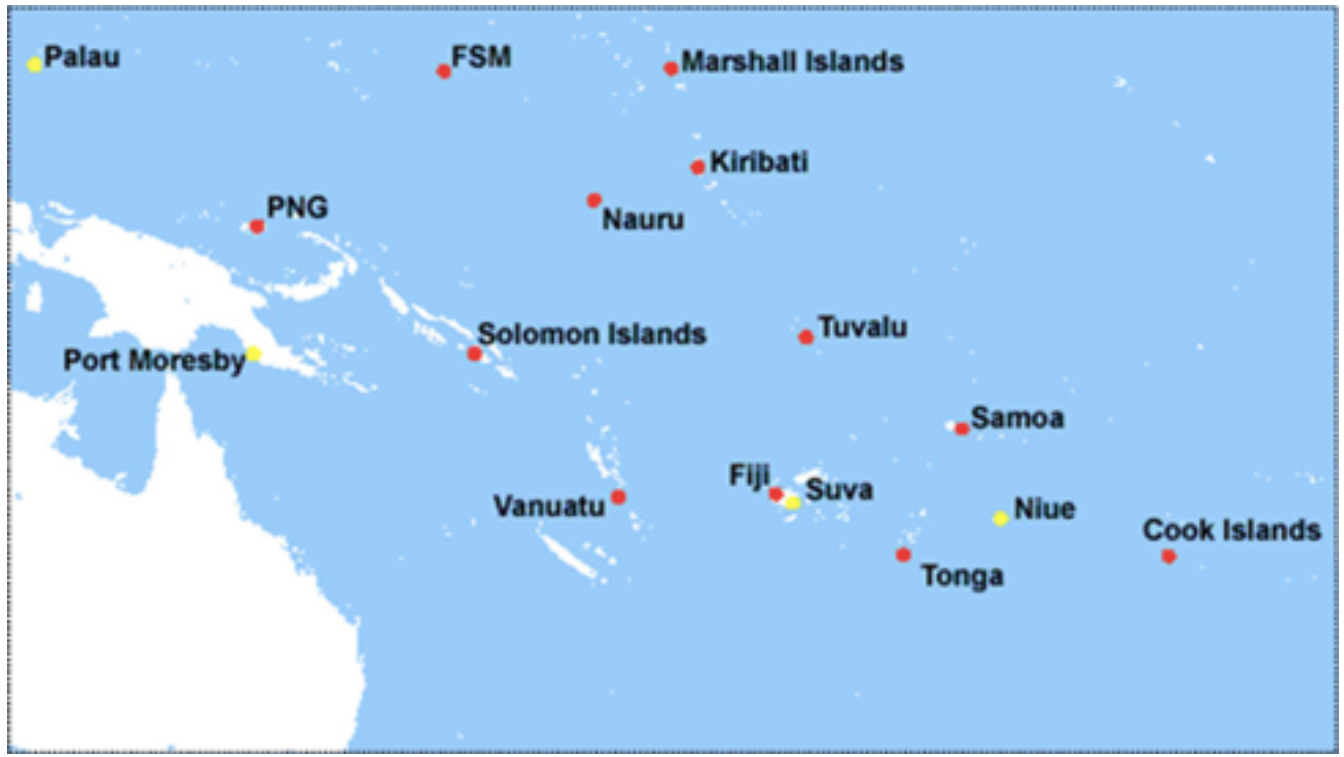
SUCCESS STORIES

- Zanzibar (Kokota & Uzi Island)

Launching our portable desalination unit. We are based in Perth, Western Australia

PACIFIC ISLANDS

CLEAN & SAFE WATER SUPPLY WHERE IT'S NEEDED



CHALLENGES due to Climate Change:

- Intrusion of saltwater into wells and groundwater
- Contaminated ground water and river water
- Coral atolls: no source of sweet groundwater
- Growing population = increased demand for water
- Lack of safe water supply during the dry season
- Lack of safe water during cyclones
- Access to the islands is expensive

HOLISTIC & SUSTAINABLE APPROACH

Goal:

- Do our part to reaching SDG 6
- Affordable and sustainable technology
- Provide communities, health care centres, aid posts and schools with reliable **drinking water supply**

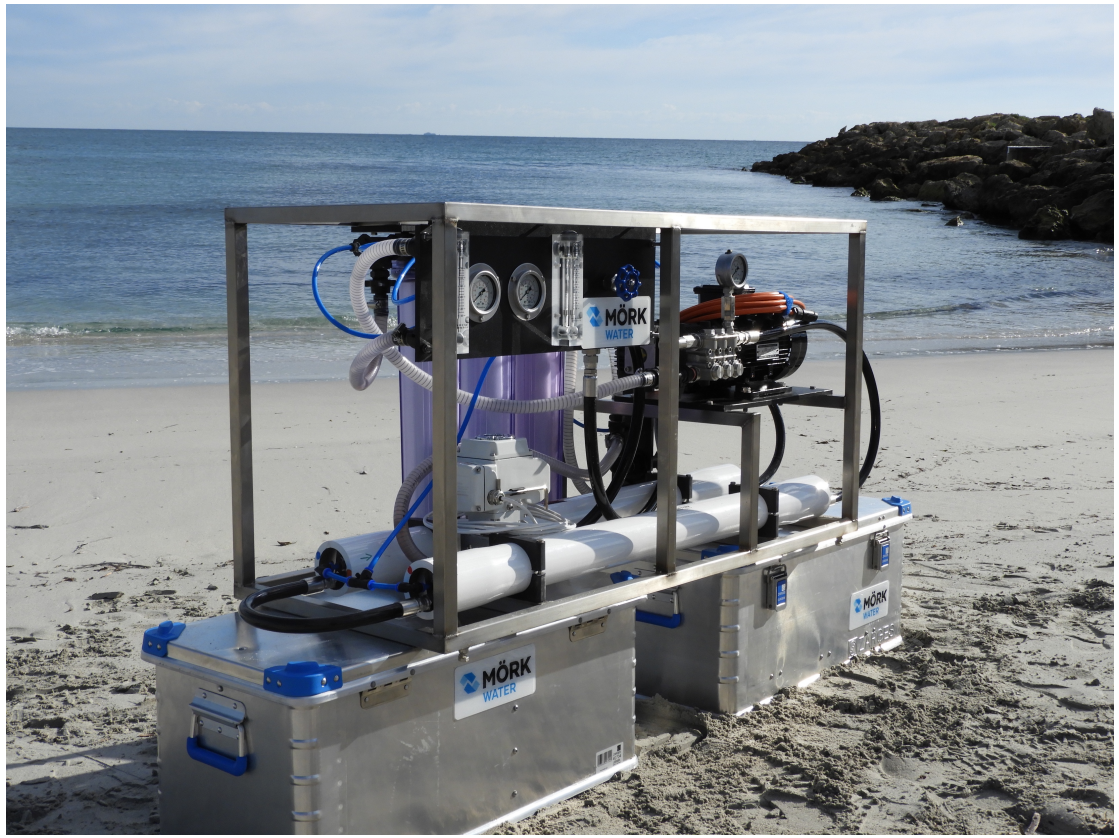
WHO-Standard

TECHNOLOGY & BENEFITS

Desalination of sea and brackish water by reverse osmosis and nanofiltration:

- **Proven membrane technology**
- Removal of dissolved salts & water borne contaminants; operating **chemical free**

- Solar-powered with battery operation and direct driven, without batteries to power the pressure driven membrane filtration process
- Simplified Technology:
  - **Robust design -> manual operation**
  - Utilises equipment & **materials suitable for tropical environment -> easy to carry in small boats**
- System sizing **adapted to local requirements**



„Village Plant“ – 100l/hour

TEACHING & TRAINING

Training on 2 levels:

1. **Equipping** local operators
2. **Training** of service technicians

High emphasis on **women empowerment**:

- Training of nurses
- Midwifes in Health Care Centres
- School teachers
- Villagers

TEACHING IN SOLOMON ISLANDS

Participants from various fields: ⟹ One-week workshop

- **NGOs**
- **Government**
- **Students** from Solomon-Island-University (USP) &
- School of Natural Resources & Applied Sciences (S.I.N.U.)
- **Nurses, Midwifes & Villagers**
- **German Development Agency (GIZ)**

WATER TREATMENT PLANT

Drinking Water from Sea Water for Remote Areas.
100% Renewable energy. Chemical free operation. No batteries needed.

MÖRK WATER
www.moerkwater.com.au

YWAM Solomon Islands
University of the Nations

Workshop

SOLAR POWERED DESALINATION TECHNOLOGY

16 - 20 October 2017

Main Referents:
Martin Brezger
Director/ Senior Engineer, MOERK WATER Solutions Asia-Pacific
Daniel Wagler, *Engineer, MOERK WATER*

Mark Lerch
Training Coordinator University of the Nations Solomon Islands

Program:
Every Day we will have three hours lectures in the mornings, followed by a practical, hands on block after the provided lunch.

Themes:
- Choosing the appropriate technology for water purification
- Overview of a solar powered desalination plant, with the following questions in mind:
  - Where and when is a solar powered desalination plant needed?
  - What is required for running the plant?
  - What are the main components?
- Water intake and composition of sea water
- Solar power generation and users
- Water filtration and purification
- Water storage and distribution

Practical:
- Water testing
- Assembling of the plant including solar power system
- Manually drilled wells

TEACHING IN SOLOMON ISLANDS

- Theoretical & hands-on sessions in native language
- Integration of local community -> gender-based approach

Hand-out of certificates after one-week training

INSTALLATION

SAMARAE MATERNITY CLINIC & HEALTH CARE CENTRE SOLOMON ISLANDS

- **RO-System: 100 l/h drinking water**
- Depends on sunshine hours & demand
- No batteries, direct driven, solar-powered – system operation manually
- Collaboration with YWAM Honiara (community technology)
- Installation by local new trained service technicians in their native language

SERVICE AND MAINTENANCE SOLOMON ISLANDS

Local service technician trains **daily operators (midwife & technicians from nearby island)**

Nurse and midwife from health care centre & maternal clinic

PROJECTS

SAMARAE MATERNITY CLINIC & HEALTH CARE CENTRE SOLOMON ISLANDS

IMPACT & HEALTH BENEFITS

- Mums can stay longer in hospital after giving birth. Before they had to paddle home immedialty after giving birth. Midwife is happy to care longer for Mothers and their Babies now having enough water.
  - Life saving: no deaths due to lack of clean water
- Fishermen & community stop at clinic to pick up water
- High quality of health care service for community

PROJECTS

URIPIV, VANUATU

RO-System: 2300-3000 l/day for 800 Islanders, schools and health care centres & surrounding Islanders in times of drought

- **Strong cooperation – coordinated**

  by Roger Sutter, NGO V2L

  - Local community
  - Private & public sector

→ **Strong resilience to combat Climate Change**

PROJECTS

URIPIV, VANUATU

TRAINING & EQUIPPING

Donors:

- Vanuatu Government
  - El Nino Fund
- Privat donors: Germany, Australia & US
- US Peace Corps, V2Life

- CO2-free water production -> green source of safe drinking water
- Off-grid - **Produce water where you need it.**

PROJECTS

URIPIV, VANUATU

RO Training & Qualification – 2 levels:

Level 1 – Operators

- Training for local people to operate the system
- On the job training on:
  - Water treatment basics
  - Security & safety
  - Operating the unit without any chemicals
  - Troubleshooting

Level 2 – Service Technicians

- Operation procedure
- Knowledge of RO & filter systems
- Chemical cleaning
- Troubleshooting

PROJECTS

IMPACT & OUTCOMES

"First time in history of our island we have a source of water which is reliable… when the rainwater tanks are empty, groundwater is not the best to drink. What ever happens, we have a source of freshwater to drink" Hon Minister of Foreign Affairs, Int Cooperation and External Trade, Ralph Regenvanu (MP) Vanuatu

- Desalinated water is shared with neighbouring Islanders during drought season.
- Health Care Centre, Schools and community is provided with clean drinking water as well as the community.
- Locally owned and managed unit

PROJECTS

EAST CAPE VILLAGE – PNG

- 1500 l/h solar-powered **nanofiltration system**
- Depends on sunshine hours & demand
- **Provides villagers**, surrounding **schools**, nearby **health care center**, **local market** where 3,000 people cross everyday coming from outer islands to take the truck traveling to town.

→ **more than 2000 local people have access**

Honorable Minister Charles Abel MP and LLG President Opening Ceremony

PROJECTS

EAST CAPE VILLAGE – PNG

MÖRK WATER

CERTIFICATE OF ACHIEVEMENT

THIS CERTIFIES THAT

Mr. Leo Josiah

has successfully completed the required training course approved
by Moerk Water Solutions Asia-Pacific Pty Ltd
and is therefore certified for the Moerk Water plant East Cape Village for two years as

OPERATING PERSONNEL

Given this 20th December, 2018

Daniel Wagler, Engineer, Moerk Water

Trainer Moerk Water

www.moerkwater.com.au

Certificate for the Daily Operators handed out by Moerk Water Engineer and Trainer Daniel

PROJECTS

EAST CAPE VILLAGE – PNG

SIMPLIFIED ROBUST TECHNOLOGY

- Solar powered -> no external power supply needed
- Fit for purpose -> WHO Standard
- Withstands tropical weather conditions

PROJECTS

EAST CAPE VILLAGE – PNG

IMPACT & OUTCOMES

- **Water treatment plant is locally managed**
- **Schools stay open now all year round and do not have to close because of a lack of drinking water**

PROJECTS

Alotau Administration – PNG – Portable Unit

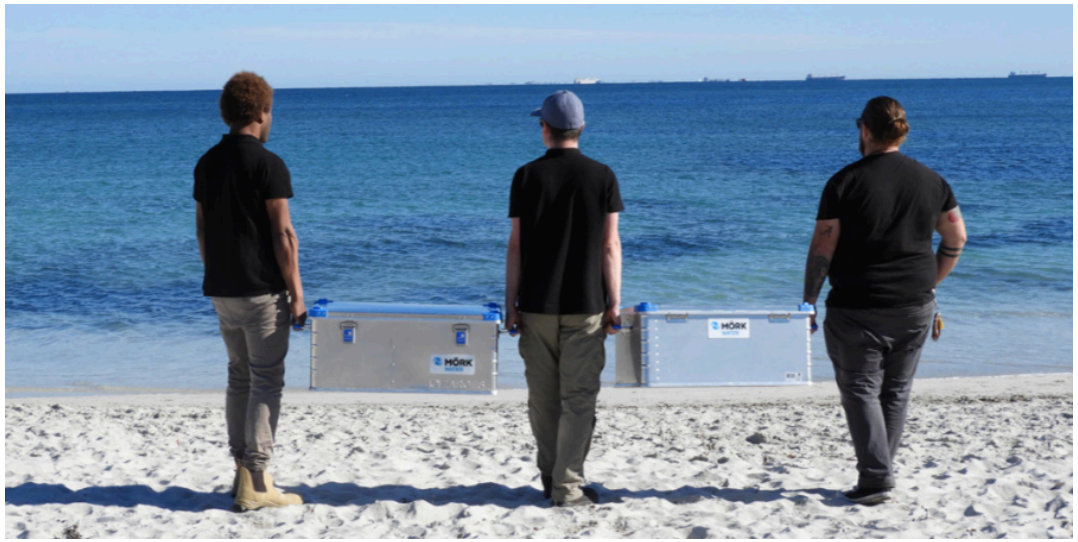
TESTIMONIES

"Watched demonstration of pure salt water into fresh water we drank. Took about 5 minutes to start producing. Portable in two 30kg aluminium boxes."

Hon Minister of Finances and Rural Development Charles Abel MP, Alotau

PROJECTS

Alotau Administration – PNG – Portable Unit



- **Backup for disaster and small communities**
- 30l/h of WHO-Standard drinking water
- Solar-powered, off-grid
- Light weight: 2 boxes, each max. 30kg
- **Set up in 10 minutes**
- Transportable via air freight & boats

Please come to our training at the beach today
1.15 pm

PROJECTS

SUCCESS STORY – ZANZIBAR

4 small desalination plants have been installed in Zanzibar

- Kokota in 2011
- Uzi Island 2015

PROJECTS

SUCCESS STORY – ZANZIBAR

Kokota Island

- 500 Villagers
- Plant runs reliably since 2012
- Increase of Health
- Healthy children, now full attendence at school
- Two extra classes have been added to the school
- Empowerment of local community – creating local entrepreneurship

PROJECTS

SUCCESS STORY – ZANZIBAR

Uzi Island – 3 plants spread out on the island:

- **Since installation of desalition plant -> no cholera**
- **No water borne diseases and stomach problems**
- **1700 people have clean water**
- **More time for work, increased income of fishermen**
- **Higher education level**
- **Training local operators for local ownership**
- **Dry season: Unit runs 14h/d**

LONG-TERM MAINTENANCE

Monthly **maintenance** and cleaning by e.g. Pamoja	Labour and transport for 12 visits in a year **USD 210/plant/year**
How often the **spare and wear parts** are to be replaced differs Membranes last 7-10 years ➢ Ongoing process: Training!	Spare and wear parts in total/year/200L/h plant: **USD 440/ plant/ year**

Note: Cost estimates given based on projects in Zanzibar in August 2018 Costs will vary considerably depending on location

BUSINESS MODEL – OPERATING COSTS

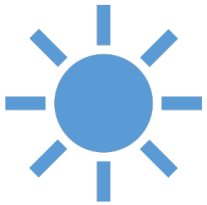
Costs per year	
Local service	USD 210
Spare and wear parts	USD 440
	USD 650

Income from selling water		
Cost of production: USD 650 ÷ 918,000 litre per year = USD 0,0007 Litre		
Income through sales: 100 Tanz. Schilling/20l = USD 0,0022/litre = USD 0,044/ 20l bucket		

Note: Cost estimates given based on projects in Zanzibar in August 2018.

Capital costs 100% funded by various donation partners.

ADVANTAGES OF SOLAR DESALINATION



- Solar desalination:
  - fit for purpose
  - **Robust**, affordable and **simplified technology** with low environmental footprint
- delivered through strong community engagement and training to establish long-term community ownership

→ **strong sustainability** & **health benefits all year round**

CONTACT

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COME VISIT US AT OUR EXHIBITION
BOOTH 38

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THE AUSTRALIAN WATER PARTNERSHIP

IWA the international water association