

REvived Water: Innovative electro dialysis solutions for clean drinking water in Off-Grid areas

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The balance between drinking water demand and water availability has reached a critical level in many regions of the world. Especially in dry regions of developing countries people suffer from increasingly salty water sources. Regions with water shortages often are situated far from any electricity grid.

“REvived water”, a research and innovation project funded under the EU’s Horizon 2020 programme in the field of ‘low-energy solutions for drinking water’, brings together ten partners from six European countries that will contribute to overcoming the drinking water challenge by establishing electro dialysis (ED) as the new standard for desalination.

One of the ED based solutions developed by the REvived water project are small-scale desalination units powered by Off-Grid solar systems for the use in developing countries to get clean drinking water out of brackish water sources. The new system has the advantages of lower energy consumption, low maintenance and independence from any kind of infrastructure which is ideal for remote areas.

Several aspects were investigated during the development of the first pilot such as the pre-treatment, ED unit, post-treatment and waste management. The first prototype was constructed and tested in a laboratory in April 2018. Investigations of the pilot run and the field test in Somaliland led to the development of two further generations of the system. They include the following modules:

A) Pre-Treatment Unit: Microfiltration and Activated Carbon

The filtration technology and activated carbon was chosen out of seven pre-treatment options due to its robustness, simplicity, and economic viability.

B) Capacitive Electro dialysis (CED) desalination unit

A desalination unit with capacitive electrodes, new generation of ion exchange membranes and innovative stack design was developed.

- C) Post-Treatment: Chlorination by electrochemical activation
A chlorine treatment of the out-coming water and for the system's cleaning purposes was chosen as the most viable option.
- D) Concentrate Disposal: Evaporation pond for brine
The salt concentrate water as waste product of the system is being collected in an evaporation pond.
- E) Solar Power Supply
The PV system for power supply was sized with the further developed EasySizing REvived software.
- F) Control and user interface
The system can be monitored and controlled via GSM from all parts of the world.



Figure 1: Schematic overview of the system

For the first field test a salted well in the desert of Somaliland was selected. The PV powered pilot plant was installed in May 2018 in the village Beyo Gulan to collect data from the operation under the Somali sun. Seven additional pilot systems of generation 2 and 3 are installed in 2019 in various African countries and in India.

The presentation will give an insight into the technology used, the performance of the pilot systems in the field and the experiences collected during the field tests.



Figure 2 and 3: Field tests with REvived systems in Somaliland and Djibouti

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