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SAFE WATER FOR RURAL AREAS IN SOUTHERN AFRICA

In the 16 sub-Saharan African countries falling under the umbrella of the Southern Africa Development Community (SADC), more than 100 million people have no access to safe water. Most heavily affected are people in rural areas or informal settlements without connection to piped water, and unreliable or no energy supply by the grid. Water used for drinking and sanitary purposes is often significantly polluted by germs as well as organic and/or inorganic pollutants. One key cause for this lack of access to clean water is a lack of infrastructure. Rural water treatment plants are often in poor condition due to insufficient operation and maintenance. In addition, existing water purification solutions often cannot cope with the variety of contaminants introduced into the water by increasing human activities. In the EU-funded Horizon 2020 project Self-Sustaining Cleaning Technology for Safe Water Supply and Management in Rural African Areas, with the acronym SafeWaterAfrica, a European-African consortium under the coordination of the Fraunhofer IST has developed a "Made in Africa" solution seeking to fill this gap

Europe and Africa – equal partners

European and African partners have been closely cooperating in the SafeWaterAfrica project as equal partners on all levels, including technical development, training and business development, in order to develop and convey the water purification system as a "Made in Africa" solution. A "Made in Africa" perception will be of key importance in gaining acceptance of the SafeWaterAfrica technology in the African local rural communities and will promote local ownership.

SafeWaterAfrica – the technology

Core component of the SafeWaterAfrica water purification system is an electrochemical oxidation process using metal electrodes coated with a conductive boron-doped diamond layer which is only a few micrometers in thickness. With the help of these electrodes, contaminants such as pesticides, pharmaceuticals and germs are efficiently removed from polluted waters. With low voltage applied, the electrodes produce strong oxidants such as hydroxyl radicals (OH•) and ozone (O_3) which are able to deactivate viruses and to break down organic substances into safe substances.

The modular purification system has a pre-treatment including a newly developed and highly efficient electrocoagulation and electrodialysis. The pre-treatment removes suspended particles and heavy metals in order to achieve optimum efficiency of the electrochemical oxidation.

Two container based demonstrator plants in Waterval, South Africa and Ressano Garcia, Mozambique, are in operation since months, the water sources being Klip river and Inkomati river, respectively. The demonstrators are capable of purifying water in accordance with World Health Organization (WHO) and South African SANS 241 standards. Autonomous operation by local staff has been successfully demonstrated so far with the South African unit. It is equipped with solar panels

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and batteries for off-grid operation and has already been tested in the 24-hour operation mode. 7 – 8 hours of solar radiation are sufficient to produce at least 10 000 liters per day of safe water, which is sufficient for supplying 300 people.

Socio-economic and economic impact

The SafeWaterAfrica technology will contribute to the improvement of the potable water supply situation, thus addressing United Nations Sustainable Development Goals (SDG) 6 and 3. In the rural communities, this will mean - particularly for women and children – a relief in time-consuming water collection and, as a result, more opportunities for education and productive pursuits (SDG 5). Good health will also affect school absence times for pupils with the corresponding positive effects on education. On the economic side, new qualified job opportunities in rural areas will be created by local system fabrication, installation, operation and maintenance (SDG 8).

Outlook

Work will continue to create and increase awareness for the SafeWaterAfrica system among all relevant public and private stakeholders. In addition, business models were developed to roll-out the technology in the Southern Africa Development Community.

1 *Demonstrator in South Africa: overall view including the solar panels supplying the electrical power needed.*

2 *Water purification unit in Ressano Garcia, Mozambique.*

3 *Controlling the operation of the electrochemical oxidation unit by a local operator.*

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