**Technology Fact Sheet for Adaptation**

## SOLAR POWERED SEAWATER DESALINATION [i]

| 1. TECHNOLOGY: | SOLAR POWERED SEAWATER DESALINATION |
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| **A1. Introduction** | Desalination, involves removing the salt and other dissolved constituents from seawater, brackishwaters, wastewater or contaminated freshwater to make it drinkable (Elliot et al. 2011). Desalination is widely used as a freshwater source in water scarce arid and its application is expected to increase as freshwater resources are stressed by population growth, rural-urban migration and effects of climate change (Elliot et al. 2011). |
| **Technology Characteristics** | There are several ways to do it. The principal desalination methods fall into two categories namely thermal processes and membrane processes. Thermal desalination processes use heat to evaporate water, which is then condensed and collected as pure water, leaving dissolved constituents behind. The most common thermal desalination process is multistage flash (MSF) distillation, and is normally linked to power plants to utilize waste heat and therefore reduce energy requirements (Elliot et al. 2011) Membrane desalination processes utilize high pressure to force water molecules through very small pores while retaining salts and other large molecules. Reverse osmosis (RO), the most widely membrane method, uses pressure to force water molecules in the direction against the osmotic pressure (Elliot et al 2011). To overcome osmotic pressure energy is required, and the source of energy can be e.g. from solar energy. |
| **Country Specific Applicability & Potential** | Kenya has a 534 km coastline, whose world class beaches attract millions of tourists annually. The tourism and other associated industries have over the years attracted ever expanding human population. The current and future projected water stress in the region will require new sources of drinking water and desalination will be very handy as it will be able to tap on the immense marine water. Desalination will especially be applicable in the numerous hotels and numerous coastal and island communities where access to freshwater has increasingly being a challenge, a problem which is expected to increase with climate change. Many areas in the coastal region depend on groundwater as drinking and industrial water source, which is faced with the danger of salt water intrusion due to climate change induced sea level rise. The application of the desalination will be a key technology in addressing this challenge |
| **Status of Technology in Kenya** | Currently desalination has not been widely adopted in Kenya, mainly due to the perceived costs associated with acquiring the technology and possibly due low level of technology transfer. However, in Kizingitini Island, the Red Cross (ICRC) has put up a desalination plant with a capacity of 4000 litres per day, a boost to this parched island community. The community has traditionally relied on the rains for drinking water, which fall between October and December for the short rains and March and May for the long rains. However, weather patterns have been unreliable leaving the residents without drinking water for many parts of the year |

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| **Benefits to Economic/ Social and Environ-mental Development** | • Drinking water for domestic and industrial purposes in coastal region and other regions with high salt content groundwater<br>• Co-production of table salt will reduce environment impact of the production waste and be economically valuable<br>• Availability of freshwater to enhance growth of tourism and other service industries<br>• Reduce overexploitation of ground and service water with consequent environmental benefits<br>• Job Creation with regards to implementation, operation and maintenance.<br>• Reduce public and private expenditures associated with water infrastructure. |
| **Climate Change Adaptation Benefits** | Short-term drought and longer-term climatic trends of decreased precipitation can lead to decreased water availability per capita. Desalination can contribute to climate change adaptation through diversification of water supply and resilience to water quality degradation (Elliot et al. 2011). Desalination technologies also provide resilience to water quality degradation because they can usually produce very pure product water, even from highly contaminated source waters. Increasing resilience to reduced per capita freshwater availability is one of the key challenges of climate change adaptation. Nevertheless, the large energy demands of current desalination processes will contribute to greenhouse gas emissions and could set back climate-change mitigation efforts (Elliot et al 2011), which makes the use of solar powered desalinators a good technology option. |
| **Financial Requirements and Costs** | The cost factors of desalting include capital costs and operating and maintenance costs. Costs can vary considerably from one locality to another based on a number of issues in general; the amount of salt to be removed greatly affects the cost of desalting plant operation. The more salts to be removed, the more expensive the desalting process capacity of the facility also impacts costs, with larger plants generally being more economical.<br>A desalination plant serving 200 households is estimated at US$ 100,000 |

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Adaptation – Kenya. You can access the complete report from the TNA project website http://tech-action.org/**