**Technology Fact Sheet for Adaptation**

# Solar Distillation [i]

## Solar Distillation

**Sector** – Water

- **Technology characteristics**

1. **Introduction**

Intrusion of sea water into fresh water will be a problem due to sea level rise. Under such a situation, this technology can be used to produce fresh water. In this method safe drinking water is produced through distillation of fresh water contaminated with sea water/ brackish water by using solar energy. As the water evaporates, water vapour rises and condenses on a glass surface for collection. Life time of the still is about 20 years[(1)].This technology would give 44% of drinking water requirement in areas vulnerable to sea level rise. Solar distillation technology can also be used to remove fluoride from fluoride containing water.

2. **Technology characteristics/Highlights**

- Low cost
- Simple

3. **Institutional/ organisational requirements**

- Awareness programs and initial training required should be given by experts.

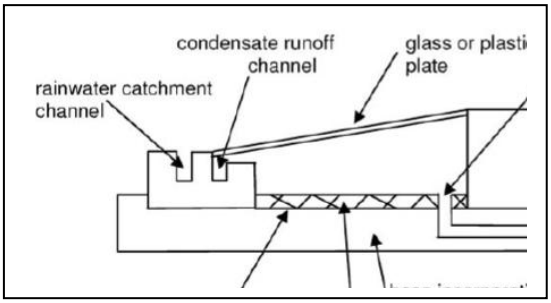
- **Operations and maintenance**

4. **Endorsement by experts**

i. **Operations[(2)]**

- Solar still is a passive solar distillation process and the only energy source needed is solar energy.
- A flat and level area with direct access to water and sun is necessary.
- A conventional solar distiller is a box with a glass roof (glaze) set at an angle from the horizontal to ensure optimal exposure to sun light. This angle is roughly equal to the latitude of the location.
- Untreated water is routed into a holding basin inside the distiller.
- Radiation from sunlight penetrates the glass and heats the inside of the distiller, causing the water in the basin to evaporate.
- The absorption of higher frequency radiation heats the water. The glaze traps infrared re-radiation cause a greenhouse effect resulting in higher temperatures.

- The evaporation process separates contaminants from the water and results in a thin condensate on the underside of the glass cover.
- The condensed, distilled water then runs off the glass into a trough, and is transferred to a water storage container for domestic use.
- Two diagrams of the system are given below[3].



ii. **Maintenance**

- May need to add required amounts of minerals.
- Contaminants and particulates remain in the basin must be washed away periodically

**b. Adequacy for current climate**

**Negative consequences of the adaption option in the current climate**:

- Production rate is about 6 L per sunny day per square meter.
- Efficiency of a single basin solar still is 60%[2](Solar still efficiency is the amount of energy utilized in vaporizing water in the still over the amount of incident solar energy on the still)

**c. Size of beneficiaries groups:**

Coastal population and the population using water containing with fluoride ions)

**5. Costs**

**a. Cost to implement adaptation options**

- SolAqua – Rain maker is commercially available in certain other countries
- The price is $ 489[2] + shipping charges
- Instead of purchasing the SolAqua system, similar solar still systems can be made locally and it will be cheaper

**Additional costs to implement adaptation option, compared to "business as usual"**

- Additional cost is required for greater water production (e.g. for a community)
- If it is necessary to pump water and operate the above plant; The power necessary to pump water could be obtained by fitting solar panals to the plant.

6. **Development impacts , indirect benefits**

a. **Economic benefits**

- **Employment** – Medium (construction of solar distillation units etc)
- **Investment -** Medium **(**Production of solar distillation units)

b. **Social benefits**:

- **Income –**
  - Medium
  - Additional income from the by-product salt formed during desalination of sea water
  - Decrease expenditure for purchasing water from other sources
- **Education**
  - Awareness programs and initial training required should be given by experts for the target groups.
  - Technical advice should be given whenever necessary by experts.
  - This will be an additional education in solar technology for students, possibly taking the knowledge with them in their daily lives, and to the future
- **Health** –
  - High impact; Decrease in waterborne diseases
  - Long term health benefits due to drinking of good quality water

5.3 **Environmental benefits**

- Impacts on ground and surface water quality - none
- Release of GHG –No; Energy consumption- solar energy

6. **Local context**

6.1 **(i) Opportunities**

- Solar energy is freely available in Sri Lanka
- Due to climate change, if fresh water gets contaminated due to intrusion of salt water, this technology will be useful.

**(ii) Barriers**

- Release of waste containing salt can affect the environment.

- Production is low; e.g. Production per day by the above plant is about 10L (Tropical country)(1)

### 6.2 Status

Over the past century, hundreds of solar still plants and thousands of individual stills have been built around the world

### 6.3 Acceptability to local stake holders

Due to low cost and low technology this will be acceptable to stake holders. This technology will be especially useful for the vulnerable areas to sea level rise and also for the dry zone having high fluoride contents in water.

## 7 References


(1) www.solucionespracticas.org.pe/fichastecnicas/pdf/solar_distillation.pdf

(2) www.solaqua.com/solstilbas.html

(3) wikipedia:solar distillation

(4) http://issuu.com/hanac66/docs/solar_distillation


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