Hot mist strips salt from the sea

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by Curtis Ellis

A PROCESS that turns seawater into fresh water at around a third of the cost of conventional desalination is promising a new way of providing clean drinking water, claims one US company.

Called rapid spray evaporation (RSE), it is being developed by AquaSonics International, based in Atlanta, Georgia. The company has produced portable units capable of converting up to 11,000 litres of water a day and is now scaling up the technology for much larger desalination plants.

"Our process attains near 100 per cent efficiency for recovery of feed water," says Henry Lloyd, AquaSonics' chief. This means the process produces virtually no brine, compared with as much as 40 per cent with processes such as reverse osmosis.

Many poor countries struggle to obtain affordable clean water for their burgeoning populations. From Bolivia to South Africa, water has triggered political unrest as poor people are forced to spend an ever-larger slice of their income on this essential commodity.

"There are lots of inland and shoreline communities that are facing the problem of salinity in their water," says Mansur Ali, UNICEF's senior adviser for water, environment and sanitation. This offers a good opportunity to replace the current reverse osmosis method."

Traditional desalination plants simply heat water under a partial vacuum, collecting the vapour that boils off, and condense it, or by a process called reverse osmosis which involves forcing salt water through a fine filter. RSE ejects the salt water through a nozzle into a stream of heated air, forming a mist of droplets which vaporise almost instantly. The minute flakes of solid salt left behind fall to the bottom of the evaporation chamber where they can be collected.

The process was originally conceived by Lloyd Motz and David Secunda at Columbia University, New York, in the 1970s. AquaSonics picked up the idea, patented the process and has spent the past four years developing it into a workable design. The trick lay in developing nozzles that would allow the process to work with hydraulic pressure, says Lloyd, and in designing the separation chamber. However Lloyd refuses to reveal how they solved these problems, saying that it is proprietary information.

Nevertheless, tests on the system carried out by William Turner of Westwater Resources in Albuquerque, New Mexico, confirmed

that it can process water containing up to 16 per cent salt, roughly five times the salinity of seawater and three times that which reverse osmosis desalination can handle.

This makes it ideal for use as an add-on to conventional desalination plants. Taking the concentrated brine and waste heat from a reverse osmosis plant, RSE can achieve near-100 per cent salt-to-fresh conversion and greatly reduce operational costs, says Lloyd. In this configuration, the operating costs for RSE are about one-third of the cost of conventional desalination methods alone, producing 1000 litres of fresh water for between 16 and 27 cents.

RSE can also be used to treat waste water, and Lloyd suggests using it to remove arsenic contamination, which is an acute problem for people living in Bangladesh. (*New Scientist*, 16 November 2002, p 4).