Making salt water drinkable

Wageningen was already able to desalinate seawater to produce pure drinking water. Now researchers have taken the technology further to generate electricity too. They are currently looking for trial projects. The Middle East is interested.

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Wageningen researchers have been able to turn seawater into drinking water for some time by heating the water and sending the vapour through a membrane with tiny holes that the salts cannot permeate. This principle, which is called Memstill, was tested in a number of trial projects from 2012. A hotel on the island of Malta got its drinking water from the sea for six months using the process. Closer to home, rose growers used it to purify their irrigation water as a test. The water could be reused as the membrane kept back the salts and contaminants. The salts were sometimes reused as fertilizer.

'The membrane technology has also been successfully tried out for removing water from brine tanks used for salting cheese so that the water can be reused instead of discarded,' says researcher Norbert Kuipers of Wageningen Food & Biobased Research. There are numerous other applications. 'It can be used to turn orange juice into concentrate after it has been pressed, which can save a lot on space and energy in transport. Memstill is also suitable for condensing milk to create milk powder in an energy efficient way.'

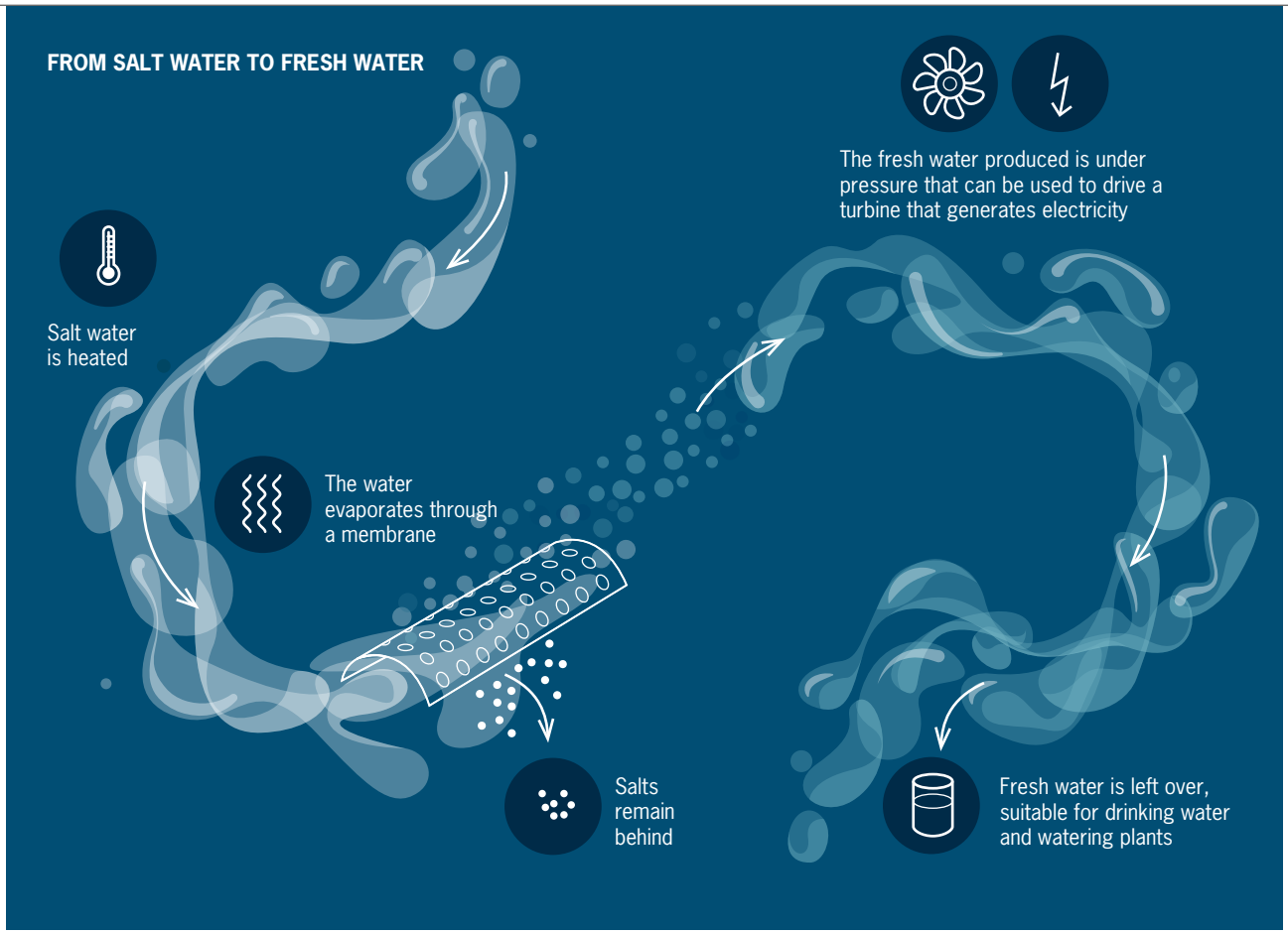
TNO came up with the technology. Norbert Kuipers was working for TNO then. At the start of this year, his department of 40 people moved to Wageningen and the membrane technology research ended up with Wageningen Food & Biobased Research.

'Memstill is not yet being applied commercially as the technique is still more expensive than conventional techniques, which use reverse osmosis,' explains Kuipers. That involves forcing water through membranes.

SUSTAINABLE WATER USAGE IN GREENHOUSES

This autumn, some 23 organizations from 10 different EU countries — including Wageningen University & Research — presented the Fertigation Bible, a reference work summarizing 125 ways of using use of water in greenhouses sustainably. 'Fertigation' is a portmanteau of fertilization and irrigation. 'Market gardeners are using increasingly sophisticated systems for applying their irrigation water with dissolved fertilizer components and additives to the soil or substrate,' explains Willy van Tongeren of Wageningen Food & Biobased Research. 'Now, for the first time, they have an exhaustive list of techniques, with descriptions of all the pros and cons that have been observed, that they can use to see if there are innovative, sustainable techniques suitable for their production system.' Both Memstill and Mempower are included in the guide.

Info: www.fertinnowa.com



'The standard technology is more developed but it does use more energy.' To shift the business case in favour of Wageningen's membrane technology, a new dimension is now being added in the laboratory to the approach. 'If you let the purified water flow through the system a little more slowly than the water entering the system, rather than draining it off immediately, the water pressure builds up. If we then pass that water through a turbine, we can generate electricity,' says Kuipers. Research shows that the electricity generated is enough to keep the process itself running, perhaps with some surplus power too.

GLOBAL WATER AWARD

Last year, this invention — known as Mempower — received the MBR Global Water Award in Dubai. MBR refers to His Highness Sheikh Mohammed bin Rashid Al Maktoum, prime minister of the United Arab Emirates and an advocate of sustainable water and energy initiatives. The attention this membrane technology has attracted in the Middle East is no coincidence, explains Kuipers. 'Not only are a lot of countries and islands there short of clean drinking water, they also have an abundance of solar heat. And that heat is the driving force behind the Mempower principle, which works by heating the water.'

'The membranes have to withstand the water pressure'

Large solar power stations and solar farms are being built in many countries in the region, often on the edge of the desert. 'We can use this source of energy cheaply in our process by taking heat from there, forexample by send the water in pipes along the solar cells. An additional advantage is that this would cool the solar cells; they produce more electricity if the temperature is slightly lower.'

Another appealing aspect is that the salts from the seawater can be recovered and used in table salt, bath salts or (for the potassium and magnesium salts) fertilizer. But Kuipers and his fellow researchers are not there yet. They can currently get 26 square metres of membrane in a tube measuring 50 centimetres in diameter and 1 metre in length by rolling it up cleverly. 'That could perhaps be improved. It's also clear that the membranes need to be able to withstand the increased water pressure in the system. We hope to be a lot further intwo years' time,' says Kuipers. Tests on a real-life scale should help bring about these improvements. Kuipers does not want to say which companies are interested but his travel schedule suggests there will be tests in the Middle East. ■

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