

## Emerging Entrepreneurs

# Producing water out of thin air

N Ramakrishnan | Updated on June 24, 2019 | Published on June 24, 2019



VayuJal has developed atmospheric generators that make potable water

Ramesh Kumar Soni's aim was to get into an IIT. He was in Kota, Rajasthan, his home State, preparing for the IIT entrance, but couldn't make it. While preparing for the JEE, Ramesh heard that nanotechnology was an evolving area, one where the next big wave was going to happen. This brought him to SRM University in Chennai for a B.Tech in nanotechnology. As luck would have it, Ramesh joined as a project associate in the chemistry department at IIT-Madras, partly fulfilling his ambition of getting into an IIT, where, apart from being the founder of VayuJal, he is also pursuing an inter-disciplinary Master's.

It was his interest and qualification in nanotechnology that got him interested in developing atmospheric water generators, to tap the moisture in the air to produce re-mineralised, potable water. He started working on this in 2015 and looked at various materials and surfaces that can be used in the water generator unit. He even participated in a global competition on making atmospheric water generators (AWG), marking the stepping stone for the venture.

“We got this company formed. We got financial support from Engineers India Ltd (a Government of India enterprise),” says Ramesh. VayuJal has produced four AWGs so far – three of 100 litres a day capacity and one 400-litre-a-day unit, all of which are being tested out in various locations in and around IIT-M. VayuJal has started working on a 2,000-litres-a-day water generator with solar back-up.

Given the water starved situation in Chennai, or for that matter in most parts of the country, this can be an ideal solution, feels Ramesh. There are even requests for smaller units, of say 30 litres a day capacity, that can be used in individual apartments.

## How it works

How does the AWG work? It is, explains Ramesh, something similar to an air-conditioner, where there are different surfaces involved and where there is condensation of water. This condensed water is filtered, treated, re-mineralised and made fit for drinking or cooking. The structures used for cooling the air, says Ramesh, draw inspiration from cactii. Just as the cactii have small thorn-like structures, the cooling surface in the AWG too has some structures that is used to cooled the air. When air passes through it, the relative humidity content goes high and water starts to come out of it. The effort is to speed up the condensation process so that more water is produced. The rate at which water is produced depends on the ambient temperature, humidity level, volume of air passing over the coil and the unit's capacity to cool the coil.

The AWGs are power-intensive and that is why VayuJal is working on reducing the power consumption or using solar panels on the larger units to produce more water so that AWGs become attractive for a larger market. The AWG works well in areas where the relative humidity is high, especially coastal places such as Chennai.

Ramesh says VayuJal is working on making a unit that will work well in desert conditions as in his native Rajasthan. The problem there is that the units will consume more power than those in coastal areas.

VayuJal designs the components and structures and gets them made by vendors, after which it assembles them itself. The components include compressors, air filters, water filtration, heat exchanger coils, evaporators, condensers and a few fans.

Where does the nanotechnology part come in? In the evaporator, says Ramesh. The part where condensation happens. “We are trying to increase the heat transfer and the condensation efficiency. If both go higher, we will have lesser power consumption per litre of water produced,” he adds.

According to Ramesh, a litre of drinking water produced by VayuJal’s AWGs cost ₹1.8-2, considering electricity tariff at ₹6 a unit. These numbers, he adds, depend on the cost of electricity, ambient temperature and relative humidity. “We are working to reduce operational cost to ₹1.5 a litre and minimise the impact of ambient humidity on the machine’s water generation capacity so that they can run even in arid States such as Rajasthan,” says Ramesh.

## Commercial plan

VayuJal, he says, is ready for commercial production, even as it works on improving the technology.

“Jaisalmer (in Rajasthan) is our ideal test site. If you succeed in Jaisalmer with lesser power consumption, if a common man can buy it there, that day we would say VayuJal is a success. Right now, we are on

that journey,” says Ramesh.

The 100-litre-a-day unit costs ₹1.5-1.6 lakh, while a 400-litre unit costs ₹5.5 lakh. Ramesh is keen to bring down the price of both, for which the company is revisiting its bill of materials to see if it can do with fewer components and bring in IoT to improve efficiencies. He would rather bootstrap for some more time before going in for outside equity funding.

<p><b>The company: Vayujal Technologies Pvt Ltd, Chennai</b></p> <p><b>What it does:</b> Founded In September 2017 by T Pradeep, Professor, Department of Chemistry, IIT-Madras, Ramesh Kumar Soni and Ankit Nagar, Vayujal has been incubated at IIT-M Research Park. It is building atmospheric water generators, which produce potable water from the moisture in the air. It has produced four such units—three of 100 litres a day capacity and one of 400 litres a day capacity. All the four units have been installed on a pilot basis and are producing water. The 400-litre-a-day unit has been installed at the Taramani Guest House in IIT-Madras and the water produced by it is used for cooking and drinking</p>	<p><b>The moving force</b></p> <p><b>Ramesh Kumar Soni, Director &amp; CEO, 27 years old</b></p> <ul style="list-style-type: none"> <li>▶ Ramesh has a B.Tech In Nanotechnology from SRM University and joined as a project associate in the Chemistry department at IIT-Madras. He is now pursuing an inter-disciplinary Master's at IIT-Madras</li> <li>▶ <b>Hobbies and Interests:</b> Apart from watching movies, Ramesh says he runs a Facebook page that aims to provide a scientific explanation for some of our religious beliefs and ancient customs</li> </ul> <p><b>Ankit Nagar, co-founder and Director, 25 years old</b></p> <ul style="list-style-type: none"> <li>▶ A B.Tech and M.Tech in material sciences engineering from IIT-Kanpur, Ankit is now pursuing a Ph.D at IIT-Madras</li> <li>▶ <b>Hobbies and Interests:</b> Ankit likes to sing, particularly Indian classical music. He also likes to read</li> </ul>
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