

WHY DOES THE ENVIRONMENT MINISTRY WANT TO REGULATE RO-BASED WATER FILTRATION SYSTEMS?

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

The story so far: The [Union Environment Ministry has issued a draft notification](#) that seeks to regulate membrane-based water filtration systems in areas where the source of water meets drinking water norms of the Bureau of Indian Standards. This primarily affects reverse osmosis (RO)-based water filtration systems and the rules, at least in letter, effectively prohibit homes from installing domestic RO systems.

RO was originally a technology devised to desalinate sea water. The idea exploits the principle of osmosis. Take a tube, twist it into a 'U'-shape and insert a semi-permeable membrane (a material with very small holes that will allow only certain molecules to filter through) at the point where the tube curves. Fill half the tube with salt water and the other with freshwater. Over time, fresh water will cross over into the salty arm until the proportion of salt and water in both arms is the same. This is due to osmotic pressure which dilutes a region with a higher concentration of solute (in this case, the salt).

Say you wanted to readjust this tube and have all the salt in one arm and pure water in the other. You would need to create some external pressure that will counter the osmotic pressure and suck all the water from the salty arm into the freshwater arm while leaving the salt behind. This is the essential principle of an RO system.

RO desalination came about in the late 1950s and primarily in large industrial settings to convert brackish sea water into potable drinking water.

However, it is possible to deploy a wide array of membranes and multiple stages of filters to filter a wide variety of solutes — arsenic, fluoride, hexavalent chromium, nitrates, bacteria — that come mixed in water. This has led to an industry of home-RO systems that are installed in a multiplicity of ways to provide potable water.

To create external pressure, RO relies on a pump and electric motors. It uses “activated carbon” components, such as charcoal and carbon black that can filter out contaminants as well as organic substances such as bacteria. It all depends on the filtering material and the number of filters that incoming tap water must pass through.

In making tap water pass through multiple stages of cleaning, RO systems end up wasting a lot of water. Anywhere between three-five times more water is wasted by them than they produce and given the challenges that cities and government face in providing potable water, environmentalist groups have convinced the National Green Tribunal to ban the use of RO systems in Delhi. It is as part of this legal dispute, which began in March 2019 that led the Environment Ministry to move to regulate RO systems.

Another concern with RO is that it filters out calcium, zinc, magnesium, which are essential salts needed by the body; drinking such water over time could be harmful. However, many manufacturers claim to overcome this challenge by “post-treatment”. The average RO system only aims to reduce Total Dissolved Solids, ensure water is odourless and has a pH from 6.5-8.5. The National Institute of Virology (NIV) claimed that most filtration methods did not eliminate Hepatitis E virus. A combination of filtration systems can eliminate most contaminants.

But opponents of RO systems say this increases costs and reduces the incentive for public-funded water distribution systems to supply clean water to the vast majority of the country who can ill-afford such systems.

Under the Jal Jeevan Mission, the Prime Minister has committed to provide tap water to the entire country by 2024. However, studies show that the existing quality of piped water is deficient in much of India. Last year, the Department of Consumer Affairs undertook a study through the Bureau of Indian Standards (BIS) on the quality of piped drinking water being supplied in the country. In Delhi, all samples drawn from various places did not comply with the BIS's requirements. Most from Mumbai were found to comply, the report claimed. In Hyderabad (Telangana), Bhubaneswar (Odisha), Ranchi (Jharkhand), Raipur (Chhattisgarh), Amravati (Maharashtra) and Shimla (Himachal Pradesh), one or more samples did not comply and none of the samples drawn from 13 State or Union Territory capitals, Chandigarh, Thiruvananthapuram, Patna, Bhopal, Guwahati, Bengaluru, Gandhinagar, Lucknow, Jammu, Jaipur, Dehradun, Chennai, Kolkata, complied with the requirements.

Countries with a high development index tend to have good quality tap water. Finland, Denmark, Switzerland, Germany, United Kingdom have access to freshwater lakes or glacier melt — extremely clean and mineral rich. This water is further filtered. Singapore and Israel rely on extensive recycling and even making sewage water fit for drinking. The limited population pressure, compared to India, as well as public resources allow these countries to ensure clean drinking water. But for much of the world, access to clean piped water from the public supply remains a challenge.

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