« Climate Change and Natural Disasters

« أداء الحج الأخضر

Environmental Impacts of Seawater Desalination

By Emily Folk | July 13, 2019 | Energy, Environment, Pollution, Water

Desalination is a process that removes salt and minerals from seawater and turns it into a potable resource. It is extremely helpful in areas experiencing rising water demands due to water scarcity, droughts, growing populations and increased water consumption. With the ocean covering most of the Earth's surface, seawater provides a sustainable, long-term solution to a problem that won't soon dissipate.

By 2015, 18,000 desalination plants had cropped up worldwide, producing 22,870 million gallons of fresh water per day. Experts believe desalination, coupled with future advancements in technology, could be the key to establishing drought-proof communities worldwide.

A clean source of water is still a major concern in many places around the world. However, the process of desalination comes with its own environmental risks. Desalination's role in the future of sustainability will depend on how these risks are addressed and adapted.

The Production of Brine

During the desalination process, half of the collected water will end up as fresh water. The remaining half will be a highly concentrated brine containing a mixture of toxic chemicals. Research shows that desalination plants produce 141.5 million cubic meters of brine each day, compared to 95 million cubic meters of fresh water. Disposal of this brine can be costly and, if tossed back into the ocean, can be deadly to marine life.

But this minor setback could lead to new economic opportunity. Briny discharge is often a source of precious minerals and elements like salt and uranium. Uranium can be resold to reduce overall operating costs and salt can be made commercially available as a de-icing agent. Experts believe this financial benefit could be enough incentive for plants to turn to extraction.

Authors

Select Author

Topics

Select Category

Newest Articles

Garbage Woes in Cairo
The Holy Quran: A New Ecological Paradigm
Important Things You Should Know About Mattress Disposal
Credit Cards For Bad Credit – Why Everybody Needs to Get One
نصائح لتقليل النفايات الغذائية
The Menace of Landfills in Kuwait
5 Sustainable and Eco-Friendly Coffee Drinking Habits To Have In Your Life
New Fines for Littering in Bahrain
Talking Green in Jordan
رسالة التربية البيئية
آثار تغير المناخ البشري المنشأ على النظم البيئية المختلفة
Top 7 Benefits of Environmental Education
How Going Green Can Promote Better Sleep for Your Family
Drilling Waste Management and Cement Industry
8 Top Tips to Support Women Leaders
Role of Internet of Things (IoT) in Sustainable Development
الفساد البيئي في نهج السلوك البشري والتنمية المستدامة
Environmental NGOs as a Trigger for Social Good – a Jordanian Perspective

EcoMENA on Facebook

EcoMENA 9.9K likes

Like Page

Powering Sustainable Development in MENA

Site Traffic

3,100,615 visitors until now

Search EcoMENA

Search OK

Most Popular

Environmental Impacts of Industrialization
فوائد اعاده التدوير
15 Inspirational Quotes On The Environment
Egypt's Water Crisis – Recipe for Disaster
What is Vermicomposting
Detrimental Effects of Littering
10 Eco-Friendly Project Ideas for School Students

Upcoming Event

Subscribe to EcoMENA

Join 12,689 other subscribers

Email Address

Subscribe

EcoMENA on Twitter

EcoMENA إكو مينا
@eco_MENA

Coal power becoming 'uninsurable' as firms refuse cover
theguardian.com/environment/20…

The amount of brine generated can also be reduced through more efficient desalination processes. A modern kind of membrane technology called reverse osmosis is cheaper, requires less energy and produces less brine. Sustainable desalination practices will depend on plants switching over from outdated methods, such as thermal desalination, which sucks in seawater, heats it up to a vapor and then pushes the remaining brine back out to sea.

The Impact to Marine Life

Another concern in the desalination industry is impingement and entrainment. During the intake process, when water from the ocean is sucked in, marine life like fish and crabs can get sucked in and die against the intake screen, called impingement. During the treatment process, smaller organisms like fish eggs and plankton can also get sucked in and killed, referred to as entrainment.

One way to reduce this threat is to switch from a surface to a subsurface intake process. This means extracting water from beneath the ocean floor instead of on top, where sand can act as a natural filter to protect marine life. This natural filter also reduces the need for chemicals and energy consumption during the treatment process, which can significantly cut costs.

A subsurface intake process isn't the only solution available to protect marine life. Experts have also found ways to adapt screen openings to incorporate a finer mesh with less space for organisms to enter the intake. Another option is the lower the through-screen velocity. Impingement occurs when the through-screen velocity is so high that crabs and fish are unable to move away when caught. The EPA (Environmental Protection Agency) has determined a velocity lower than or equal to 0.5 feet per second can effectively address marine impacts.

The Consumption of Energy

Energy use is a concern in any industry, and desalination is no different. Worldwide, desalination plants consume more than 200 million kilowatt-hours of energy per day. Energy costs make up about 55% of a desalination plant's operating costs, making them especially vulnerable to price increases. In comparison, a traditional drinking water treatment plant consumes less than 1 kilowatt-hour per cubic meter. Eighty-five percent of Americans support increasing federal investment to rebuild water infrastructure, indicating how we get our water is of high importance to today's consumers.

Desalination plants who adopt the reverse osmosis process — which also produces the least amount of brine — see a major decrease in energy usage, down to three to 10 kilowatt-hours per cubic meter. But researchers are still looking for cheaper and more eco-friendly ways to treat seawater. One method being tested is forward osmosis, which uses a solution of salt and gases to create a pressure difference. Experts say this can lengthen the lifespan of reverse osmosis membranes and reduce the need for disinfectants during treatment.

Solar is also being considered as a solution to high energy consumption. Experts are using the sustainable form of energy as a way to improve the thermal desalination process. The desired outcome is a more efficient water treatment method that requires less startup and integration capital.

Bottom Line

Desalination may have some drawbacks. The production of brine and the consumption of waste are at the forefronts of experts' minds as they determine an efficient way to solve one of the world's most pressing problems — access to clean drinking water. Luckily, new solutions, like the use of updated filtration and intake systems and solar energy, are being developed and integrated to reduce the impact of the desalination process.

Related