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Sustainable Desalination - A Multipurpose Facility Developed to Alleviate Water Crises Suffered by Small Island Nations Due to Global Climate Change

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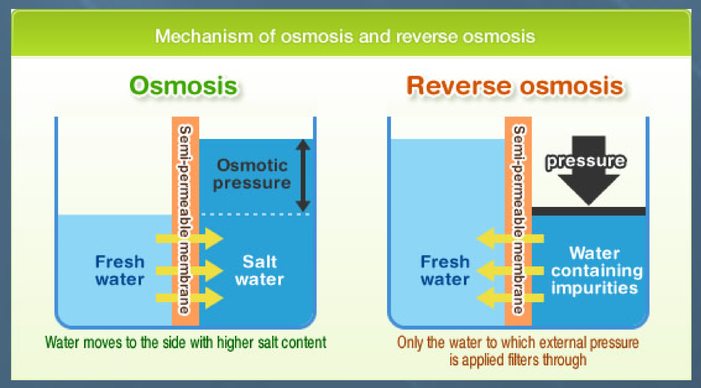
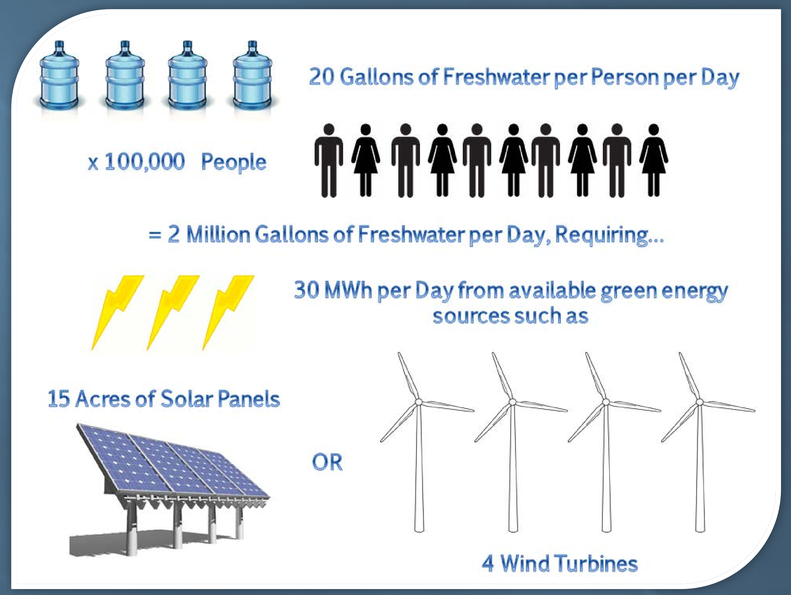
Abstract

As the effects of global warming become more prevalent, small island nations around the world are on the frontline of not only rising seas, but an even more immediate threat of drought brought on by climate change. During even the most severe drought, these small landmasses are surrounded by an endless supply of saltwater that can be converted into potable water. Desalination by reverse osmosis is notoriously expensive, energy intensive, and emits large amounts of pollution depending on the energy source utilized.

This research project inspects the feasibility and capabilities of a small scale sustainable reverse osmosis desalination plant coupled with wastewater facilities and various forms of renewable energy. While a variety of clean energy sources have been utilized and are being developed to power desalination, this project suggests an integrated approach, combining multiple sources of energy to meet the high energy demands of desalination. Depending on the geographical region in question, wind, solar, tidal, and geothermal energy can be harnessed in any combination.





Discussion

According to the United Nations (UN), each person requires an average of 20 gallons of freshwater daily.

With a target population of 100,000 people, this would total a required 2 million gallons per day (MGD) of freshwater.

The average reverse osmosis desalination plant requires 15 Megawatt Hours (MWh) per million gallons of freshwater produced.

This energy could be provided in a clean renewable manner from 4 wind turbines or 15 acres of solar panels or any combination of these green energy sources to include geothermal and tidal power.

Application

When exploring alternative sources of fresh water, it is essential that entities also consider environmental factors. Organizations, corporations, and small companies need to look beyond their own profit and small scale impacts by thinking globally and how their facility will have an effect worldwide.

This project provides an easily implemented, modular approach to desalination that requires only funding from international development organizations to help countries in need of fresh water.

The benefits of such a facility can easily be measured. A coal power plant would produce about 2 metric tons of CO_2 to produce 30 MWh. This is equivalent to the emissions from approximately 2,238 personal vehicles.

Results

Based on research and data analyses, constructing a desalination facility along with green energy producing facilities is a perfectly viable option. Depending on the location and energy sources available, a wide variety of green energy technologies could be explored and employed, even beyond what has been researched in this project. Using environmentally harmful energy sources to fuel desalination is counterproductive to helping the island nations that are in need of help.

References Available Upon Request