Genetic Algorithm for Sustainable and Cost Optimized Saltwater Desalination

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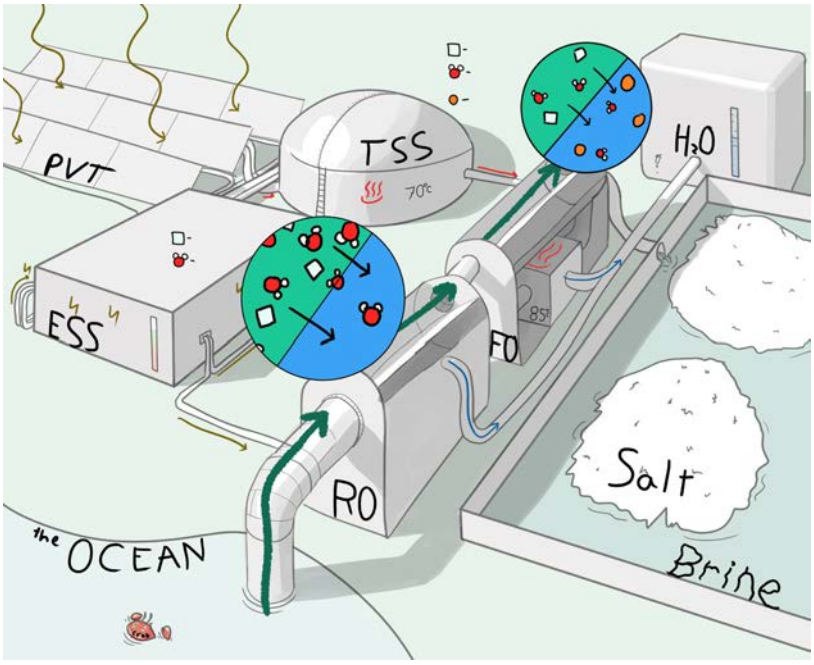
Limited Access To Freshwater Globally

Four billion people in the world experience water scarcity. This problem will intensify in the next decade due to the global population increasing and ongoing climate change.

Environmentally Harmful Current Solutions

The desalination industry is an **energy intensive process** which usually produces greenhouse gas emissions. Moreover, brine waste poses a **threat to marine life** as it contains dangerously high concentration of salts.

Mitigate Climate Change By Using Renewable Energy Sources To Produce Freshwater



PVT: Photovoltaic Thermal (Solar Panels), TSS: Thermal Storage System (Heat Tank), ESS: Electrical Storage System (Battery), RO: Reverse Osmosis, FO: Forward Osmosis

Using energy collected from the solar panels, our system will store the electrical and thermal energy in the battery and heat exchanger systems before transferring it to the pumps. These storage spaces enable our plant to function in a **steady-state to remain optimal year-round**.

The design and operation of the solar desalination plant is **sustainably focused** to reduce the environmental footprint. Additionally, the brine is used to **produce salt** to reduce environmental impacts on the **marine life**.

Costs: Building Capital, Solar Panels, Batteries, Pumps, Tanks, Maintenance
Revenues: Freshwater, Electricity, Salt

Genetic Algorithms to Design Desalination Solar Plant

<u>System Inputs:</u>
Water Flow
Location

With these inputs, our **Genetic Algorithm** will consider all these systems, costs, and revenues to produce the optimal solution. It iterates through different plant configurations to decrease cost and increase performance.

<u>System Outputs:</u>
Solar Panels
Batteries
Membranes
Sized Tank (m^3)