Geothermal waters heat integration for the desalination of sea water

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ABSTRACT
The main objective of this work is to utilize the existing geothermal potential of the Greek island of Nisyros located in the southeastern part of the Aegean Sea for desalination of seawater. The technology most applicable for the exploitation of geothermal purposes is the multiple effect distillation process (MED). The exploitation of the geothermal hot water sources located in the island combined with an effective desalination technology can eliminate energy consumption from hydrocarbons, minimize the environmental impact and reduce dramatically the cost of fresh water. The determination of the overall environmental impact of the desalination plan by means of a Life Cycle Analysis, and the evaluation of the measure’s economical feasibility by means of Cost-Benefit Analysis and Life Cycle Cost methods will be shown. Exergy Analysis of the process will determine its thermodynamic efficiency. This work is to determine and demonstrate the feasibility of a geothermal-driven power-desalination plant to provide high quality of water in sufficient quantity at affordable costs, while protecting the fragile island environment.

Keywords: Water desalination; Renewable energy; Geothermal energy; Potable water

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