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An overview on desalination & sustainability: renewable energy-driven desalination and brine management

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ABSTRACT

Desalination is a water technology that is gaining increasing importance for addressing water needs, but it is costly and energy intensive and further strains the environment with brine disposal and greenhouse gas (GHG) emissions. In order to desalt seawater, either through membrane or thermal processes, a large amount of energy is required. Desalination has negative impacts in the form of depletion of fossil fuels and GHG emissions from the power production process to deliver this energy. What is more, the wastewater (brine) produced during the desalination process causes damages to the local sea environment where the brine is discharged. In order for desalination to be considered a sustainable water solution, both issues must be successfully resolved. This paper discusses the potential for coupling desalination with renewable energy (RES-D). Different renewable technologies can be combined with certain desalination techniques. The technical development stage of the RES-D combinations already applied is given. Currently applied management as well as an innovative alternative for brine management based on zero liquid discharge (ZLD) is also presented. This pilot system was developed in the framework of an European project with the acronym SOL-BRINE (LIFE09 ENV/GR/000299).

Keywords: Renewable energy; Solar energy; Wind energy; Ocean energy; Desalination; Brine treatment; Desalination; Zero liquid discharge (ZLD); SOL-BRINE

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