

Autonomous desalination for improving resilience and sustainability of water management in North Cyprus

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ABSTRACT

The study explored the potential of creating an alternative water resource through autonomous desalination of seawater and/or brackish water based on available renewable energy sources. The evaluation was carried out for different levels of water demand in remote rural areas and tourism activities where water scarcity and lack of electricity infrastructure coincides with availability of renewable energy sources. Abundance of solar power (up to 2,100 W/m²) in North Cyprus makes autonomous desalination based on photovoltaic (PV) power an attractive and sustainable alternative resource for water supply: 1 MW PV powered reverse osmosis desalination plant in North Cyprus is estimated to produce 1.15 million m³/year and 0.32 million m³/year of freshwater from brackish water and seawater, respectively. This suggests that PV-run autonomous desalination process implemented at different sites with varying capacities could supply the total municipal water demand using a total PV panel area of only 0.25 km² for brackish water and 0.70 km² for seawater. Hence an integrated water management plan should consider PV-run desalination systems along with the current applications in order to improve the resilience and sustainability of its water resources potential.

Keywords: Autonomous desalination; Renewable energy; Water management; Solar energy; Photovoltaics (PV); North Cyprus

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