Water Desalination Using Renewable Energy

INSIGHTS FOR POLICYMAKERS

Global demand for water continues to increase whilst freshwater sources are becoming more scarce due to increasing demand for natural resources and the impacts of climate change, particularly in semi-arid and costal/island areas. Desalination of seawater and brackish water can be used to augment the increasing demand for fresh water supplies. However, desalination is a very energy intensive process, often using energy supply from fossil fuel sources which are vulnerable to volatile global market prices as well as logistical supply problems in remote and island communities and are therefore not sustainable.

Until now, the majority of desalination plants have been located in regions with high availability and low costs of energy. Current information on desalination shows that only 1% of total desalinated water is based on energy from renewable sources. Renewables are becoming increasingly mainstream and technology prices continue to decline, thus making renewable energy a viable option. With increasing demand for desalinated water in energy-importing countries such as India, China and small islands, there is a large market potential for renewable energy-powered desalination systems worldwide.

There are two broad categories of desalination technologies. Thermal desalination uses heat to vaporise fresh water, while membrane desalination (reverse osmosis) uses high pressure from electrically-powered pumps to separate fresh water from seawater or brackish water using a membrane. Policy makers need to consider these diff erent technology choices for desalination and base their decisions on locally available renewable energy sources. For example, solar energy – in particular heat from concentrated solar power (CSP) for thermal desalination and electricity from solar photovoltaic and CSP for membrane desalination – is a key solution in arid regions (e.g. the MENA region) with extensive solar energy potentials, whilst wind energy is of interest for membrane desalination projects in coastal and islands communities.

While desalination is still costly, declining renewable energy technology deployment costs are expected to bring this cost down in the coming years. This is of particular interest to remote regions and islands with small populations and poor infrastructure for freshwater and electricity transmission and distribution.

Mapping water needs and renewable energy sources is a strategic tool for planning new desalination systems. Renewable energy-powered desalination could be a key enabler for continued growth, especially in those countries that rely on desalinated water for sustaining local communities and productive uses such as irrigation. As such, renewable energy generation should be seen as a valuable economic investment that reduces external, social, environmental and operational costs. Policy makers may therefore wish to take the evolving market opportunities and long term impacts of technology options into consideration when planning their capacity, infrastructure and sustainable water supply needs.

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