

**WSTA 15th Gulf Water Conference**  
**Water in the GCC, The Role of Technology in Effective Water Management**  
**28–30 April 2024, Doha, Qatar**

## **Solar-driven desalination in Saudi Arabia for a sustainable future**

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### **A B S T R A C T**

All primary (fossil) energy sources available on planet Earth emanate from the Sun, namely its photosphere (at 5700 K) where useful solar irradiance is acquired either directly or indirectly on a receiver surface. The maximum potential of a solar receiver is gauged by either direct normal (DNI) or global (HGI) irradiance. The literature has widely reported three types of solar harvesters for the production of green electricity, namely (i) the stationary PV, (ii) the concentrated PV or CPV, and (iii) the CSP combined with thermal energy storage systems powering the power plants. Thus, depending on the PV materials and receiver designs, the solar systems could operate over a wide range of solar irradiance, ranging from 1 Sun to concentrations up to 1000 suns or more. Consequently, it is important to differentiate the inherent performance of these solar energy harvesters in terms of collectible energy efficiency. In the study of totally green desalination, all types of solar harvesters for electricity production will be utilized for powering the membrane-based seawater desalination plants. The water production efficacy from assorted PV and seawater reverse-osmosis plants will be compared and presented along with their estimated unit water production cost.

*Keywords:* Green desalination methods; Standard solar energy (SSE); Solar energy

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