



## Desalination through Sustainable Water and Energy Solutions in West Asia



### Sustainable Development Goals Addressed



<b>Organization, Institution or Company</b>
Various public and private sector corporations
<b>Location of project site, Country</b>
Various locations in the West Asia region
<b>Brief narrative description of objective/project/activity/initiative</b>
Water desalination is a crucial process for the countries of the Economic and Social Commission for Western Asia (ESCWA) region which have very limited access to freshwater resources. Therefore, rapid increases in installed desalination capacity have taken place in the last two decades.
<b>Economic, environmental and climate benefits, challenges and lessons learned</b>
<p>Historically, thermal desalination has been the dominant desalination technology used, but reverse osmosis membrane-based technologies have been developing rapidly and are currently favoured for new plants. The reverse osmosis systems are considered very effective for sea water desalination but rely heavily on electricity.</p> <p>Though desalination in general is an energy-intensive process, by powering it with renewable energy, some of its drawbacks can be overcome. In addition, renewable energy desalination has the advantage of reduced GHG emissions.</p> <p>Renewable energy desalination plants are operational in Egypt, Jordan, Morocco, and the United Arab Emirates (UAE), but they are mostly of pilot size and do not amount to full utility scale production. In Dubai, an operational PV solar-powered RO desalination station, at the Mohammed bin Rashid Al Maktoum Solar Park, delivers 50 m<sup>3</sup> per day.</p> <p>Currently, Al Khafji reverse osmosis membrane desalination plant in Saudi Arabia is planned to be the world's first large-scale photo-voltaic (PV) solar-powered desalination plant. The plant is owned and operated by Advanced Water Technology (AWT) of Saudi Arabia, is a newly formed subsidiary of TAQNIA, the commercial arm of King Abdulaziz City for Science &amp; Technology (KACST). This plant is designed to deliver 60,000 m<sup>3</sup> of desalinated seawater per day in its Phase I, ensuring a regular supply of water to the surrounding province the whole year round. A possible future expansion may increase the capacity to 90,000 m<sup>3</sup>/day. The desalination facility will be powered by a 15 MW advanced solar power plant with automatically adjustable PV panels which change their position during the day to optimize the use of solar radiation. The use of solar energy allows the mitigation of a</p>

considerable volume of GHGs that would be generated if fossil-fuel generated electricity were used.

Renewable energy desalination plants represent a very promising sustainable water and energy solution for the ESCWA region where water resources are limited, by solar radiation is plentiful. Many research and development efforts are being conducted all over the world to continue improving the efficiency and reducing the cost of this integrated sea-water purification and renewable energy systems.

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**Additional information: website addresses and contacts**

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Related ESCWA Publications:

ESCWA (2017): Water-Energy Nexus Operational Toolkit: Technology Transfer Module  
<https://www.unescwa.org/publications/water-energy-nexus-technology-transfer-module>

ESCWA (2017): Water-Energy Nexus Operational Toolkit: Renewable Energy Module  
<https://www.unescwa.org/publications/water-energy-nexus-renewable-energy-module>

Advanced Water Technology Company, Saudi Arabia:

Company Profile: <https://www.awatertech.com/>

Company Projects: <https://www.awatertech.com/projects>

Promotional/educational Video Clip: <https://www.youtube.com/watch?v=RyRuQCMG1Uk>