



**WATER
BRIEFING
GLOBAL**

Oman

WATERBRIEFING

WATER AUTHORITIES & ORGANIZATIONS

PUBLIC AUTHORITY FOR ELECTRICITY AND WATER [DIAM]



<https://www.paew.gov.om>

PAEW has announced that the water network will have to be tripled by 2035 in order to supply piped water to at least 90% of the population, and in order to achieve this goal, they will participate in a plethora of water-related projects in Oman and has forecast that about \$390 million is to be spent annually on the development of these projects.

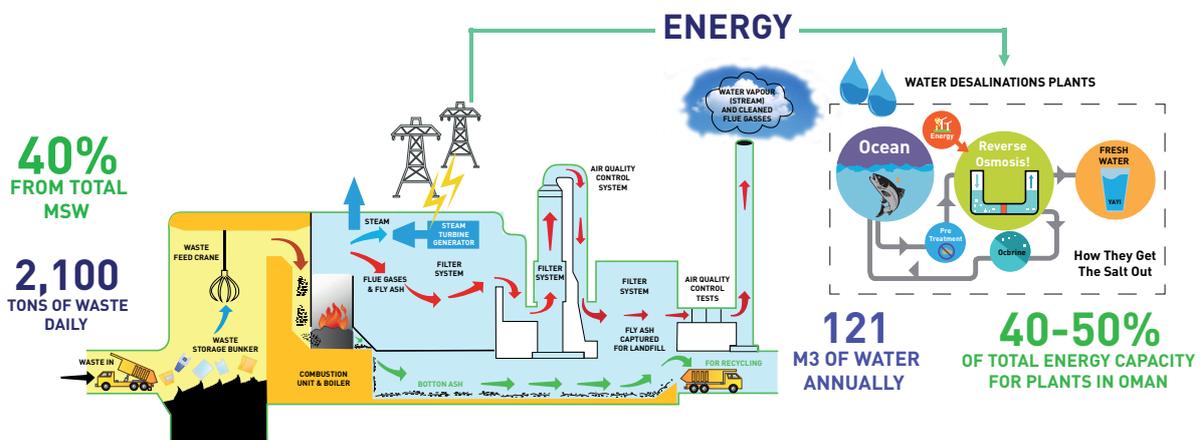
OMAN'S ENVIRONMENTAL SERVICES HOLDING COMPANY (SAOC) OR (OESHC)

Oman's Environmental Services Holding Company (SAOC) or (OESHC) is a government agency branded as BE'AH. BE'AH has developed a national strategy for industrial waste management.

In Oman environmental laws and regulations were very provisional before 2006. Generally, there was practically no action being taken regarding waste management [WM] and consequent recycling of waste prior to that time. In the 2012 budget, funding was approved to enable BE'AH to initiate the new strategy as follows:

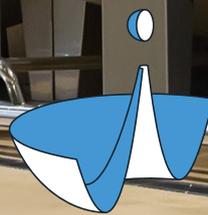
- Damage control
- Restructure of WM services
- Develop WM sector
- Support Oman's economy

A number of projects are now underway, to recover value from general & municipal waste, such as the project Waste to Energy to Water.



BE"AH developed a diversion strategy taking into mind the nature of waste produced in Oman and its sources. The diversion plan requires recycling facilities for different waste streams and a major national project whereby Municipal Solid Waste (MSW) will be incinerated to produce energy and steam both of which will feed into a desalination plant that will generate substantially large amounts of badly needed potable water.
<https://www.beah.om/About-Us/be-ah>





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UAE WATERBRIEFING

DUBAI ELECTRICITY & WATER AUTHORITY

Managing Director and CEO: His Excellency Saeed Mohammed Al Tayer

DEWA STAT :BY 2030

DEWA intends to have 100% of its desalinated water production to come from a mix of clean energy that uses both renewable energy and waste heat - this will allow Dubai to exceed global targets to use clean energy to desalinate water.

DEWA's production capacity is expected to reach 305 million gallons of desalinated water per day by 2030. This means reverse osmosis will produce 41% compared to its current share of 5%, and DEWA will be able to produce 750 million gallons of desalinated water per day by 2030, compared to the current capacity of 470 million gallons per day.

The increase in operational efficiency created by decoupling electricity generation and water desalination will lead to savings of up to AED13 billion by 2030, and reduce 43 million tons of carbon emissions by 2030.

Savings achieved in electricity and water use over 9 years, in line with its efforts to achieve the Dubai Plan 2021 include:

Between 2009 and 2017, customers saved over 1.677 TW/h of electricity and 6.66 billion gallons of water, worth over AED 1 billion.

In the residential sector, electricity use has been reduced by 19% and water by 27%. Government and semi-governmental organizations reduced electricity use by 12% and water by 21%.

The Demand Side Management Strategy in Dubai aims to reduce power and water consumption by 30% by 2030.

DEWA'S INITIATIVE:

DEWA has also launched an innovative initiative to study the possibility of injecting and storing desalinated water within subterranean water basins and being able to pump it back into the water network when needed. The project is based on the latest innovative technologies to achieve operational efficiency in the water network. Studies have shown that it is possible to store 5,100 million gallons of water that can be retrieved when needed.



DEWA currently produces potable water predominantly through the multi-stage flash (MSF) distillation process integrated with its combined cycle cogeneration plants. The MSF process is very efficient - waste heat is utilized to meet Dubai's requirements for water.

DEWA also uses Reverse Osmosis to desalinate water and has adopted a clear strategy to ensure that by 2030, 100% of desalinated water will be produced by a mix of clean energy that uses both renewable energy and waste heat.

DEWA's current total water production capacity consists of 470 MIGD out of which 445 MIGD is MSF based. The remaining 25 MIGD is based on seawater reverse osmosis (SWRO) technology.

DEWA is also involved in a current project where they plan to build 2 water reservoirs by mid- 2023. Samsung Engineering has won the contract to build the power-generating facilities worth US\$ 473 million. One reservoir will be in Al Nakhli and will have storage capacity of 120million gallons the other will be in Al Lusaily with storage of 60 million gallons.

DEWA AND EXPO 2020 DUBAI: PARTNERS FOR A CLEANER FUTURE:

EXPO 2020 DUBAI has placed sustainability at the forefront of its ambitions and has formed an exciting new partnership with DEWA to ensure it 'walks the walk' as well as 'talks the talk' during the nation's six-month celebration of ingenuity from October 2020. www.dewa.gov.ae

It is planned that 100% of the energy used at EXPO 2020 will be achieved through the partnership between DEWA, its official Sustainable Energy Partner and EXPO 2020. This includes building a smart grid that would become the first network in the world to provide the entire value chain of generation, transmission, and distribution systems to the Expo. They are investing approx. AED 4.26 billion in electricity and water.



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Kuwait

WATERBRIEFING

KUWAIT

THE FUTURE OF DESALINATION IN THE GCC

High oil prices in the early 1970s sparked the growth of desalination in the Middle East. The inflow of funds enabled the Gulf States to invest in the development of their infrastructure on a grand scale. Investments in power and water were included. At the time, the only commercially viable large-scale technology for desalination was the multistage flash distillation (MSF). Subsequently, multiple effect distillation (MED) and reverse osmosis (RO) technologies have become equally viable for large scale

MED and MSF plants typically are set up to obtain energy from adjacent thermal power stations run by fossil fuels—mainly oil but, more recently, oil and gas. A plant's energy production may be dedicated entirely to the production of potable water as a standalone facility. However, more commonly, the energy production is used to generate both electricity and water. This physical set-up, known as cogeneration, allows access to cooling water, which can be both a water source for desalination and thermal and electrical energy; and a dump for the treated brine concentrate produced by desalination.

As both the populations and the water demand of the Gulf countries burgeoned, MSF remained their preferred desalination technology, due primarily to its proven long-term record for large-scale water production. In addition, combining a power plant with a thermal desalination plant in a dual-purpose configuration is advantageous for both utilities. Moreover, only the GCC countries have the power-water sector set up with the same regulators and utilities for power and water.

MSF has also demonstrated a long economic life—approximately 25 years—much greater than anticipated at construction (15 years); and, when properly operated and maintained, its performance degradation is very low. MSF plant operations and maintenance (O&M) are very similar to the power plants to which they are coupled, so that finding personnel for O&M does not represent a major problem.

Given the high salinity and high temperature of the Gulf water, thermal desalination technologies are better suited. As a consequence, adoption of RO has been slow in the Gulf States. In the rest of the planet though, RO has accounted for most of the growth in desalination capacity.



- available to GCC countries. Oil and gas will become more expensive principally as demand from South Asia and China come to dominate world markets
- When the international agreements to minimize greenhouse gas (GHG) emissions take effect and countries are required to pay premium prices to support sequestration of greenhouse gases, the use of fossil fuels could become even more expensive

Since the need for water is inelastic and will grow with the population in the area, "greener" alternatives will have to be sought. Coupling renewable energy sources with desalination has the potential to provide a sustainable source of potable water. Moreover, bringing these two technologies together will alleviate the carbon footprint of desalination due to its heavy reliance on fossil fuel. Out of the available renewable energy technologies, 2 present the largest potential for the Gulf countries in general and Kuwait in particular and, as expected, they both exploit the solar resource:

- Photovoltaics (PV), which generate electricity to feed RO plants
- Concentrated Solar Power (CSP), which generates heat and so can be employed in conjunction with thermal desalination methods, such as MSF and MED or power a steam turbine to generate electricity so as to power RO plants

PV is a mature technology with the installed base worldwide surpassing 300 GW in 2016. In 2017, its Levelized Cost of Energy (LCOE) was in the range of 45-55 USD/MWh, lower than coal, nuclear, even new combined cycle gas turbines, capitalizing on the economies of scale achieved during the last decades, partly due to heavy subsidization in the beginning of the commercialization of the technology. PV technology has its own set of problems though, the most prominent being the intermittent nature of its output; when the sun is up, electrons flow – at night electricity production stops.

CSP, on the other hand, is in its infancy. Its potential in the MENA region is huge; nearly 400 times larger than all other forms of renewable energy (PV, wind, geothermal, hydropower and biomass) combined and about 200 times the likely electricity demand for MENA in 2050. Additionally, it comes with embedded energy storage; due to its design, it can produce energy (and thus water) 24/7, which is a huge advantage when compared to the intermittent character of other renewable sources. However, the technology has not been used in large scale commercial applications yet. As a result, its LCOE ranges from 200 to 300 USD/MWh, which is clearly not competitive. CSP desalination is expected to gain momentum in the next 10-15 years, provided that R&D efforts are supported by governments.



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