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Poly-generation of power and desalinated water by Small Modular Reactors

The request for drinkable and industrial-use water is steadily increasing by following the fast development and urbanization in areas such as the Middle East and by the effect of climate change. The nuclear energy has been even recently confirmed to be one of the key technologies required for the fulfillment of the Energy Transition targets.
The Small Modular Reactor concept is often coupled with the hybridization of Nuclear Power Plants with other services, such as the concurrent generation of Power with Heat, Hydrogen, or Water. This approach has the additional purpose of providing flexibility on the NPP operation in a power grid influenced by not-programmable renewable energy sources.
One of the most promising uses of SMR is the desalinization of seawater for agriculture, industrial or civil use. The desalination technology should fit with the inlet water characteristics and output water requirements (Inverse Osmosis, Multi-Stage Flash distillation) by utilizing SMR power and/or heat.
This paper presents a technical-economic analysis for the supply of water for the Abu Dhabi city. The analyzed 340 MW SMR plant, hybridized with an inverse osmosis desalination system, is able to provide 1,000,000 m3/day of drinkable water, almost 1/3 of the water daily used by the city.

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