

**Nature-based Solution Coalition  
Proposed Contribution  
of the Permanent Mission of the Principality of Monaco**

**Develop, promote and scale-up Ocean Thermal Energy Conversion (OTEC).**

- Context and rationale:

Ocean Thermal Energy Conversion (OTEC) is a game-changing technology that leverages the temperature difference in the ocean between cold deep waters and warm surface waters to generate unlimited energy without the use of fossil fuels. It boasts a competitive advantage over alternative sources of electricity production regarding accessibility, predictability, affordability, and emissions. OTEC plants can operate continuously providing a base load supply for an electrical power generation system.

This technology can also be used to desalinate ocean water and give access to a critical resource (fresh water).

OTEC is still considered an emerging technology and could complement renewable energy solutions in National energy mix.

IRENA Ocean Thermal Energy Conversion: Technology Brief (2014) stated:

“OTEC has the highest potential when comparing all ocean energy technologies, and as many as 98 nations and territories have been identified that have viable OTEC resources in their exclusive economic zones. Recent studies suggest that total worldwide power generation capacity could be supplied by OTEC.

OTEC has the largest potential of the different ocean energy technologies (Lewis, et al., 2011). Extracting this energy would have no impact on the ocean’s thermal structure.” The total estimated available resource for OTEC could be up to 30 terawatt (TW) and deployments up to 7 TW would have little effect on the oceanic temperature fields (Rajagopalan and Nihous, 2013).

The economic potential for OTEC is not only determined by the quality of the OTEC resources, but also depends on the needs of the different countries. Many Island States are dependent on diesel imports for electricity generation, which has an important impact on their economies and results in electricity generation prices higher than USD 0.30/kWh. For these countries, OTEC makes for an attractive alternative especially if it can be combined with fresh-water production. At the same time, many Island States that are isolated and have limited logistical access to the rest of the world could face increased costs due to the shipping of components and the construction, resulting in construction delays and having an impact on environment.

- Overview of the contribution:

The Principality of Monaco was one of the first countries in the world to develop this type of technology. Monaco installed its first OTEC heat pump in 1963 and now has over 80.

The Principality plans to develop, in the years to come, two OTEC loops to extend the use of this type of energy. These pumps will connect to a water system that will run in pipes supplying several buildings, sometimes farther from the shoreline. This optimizes the efficiency of this technology,

reduces costs and allow to supply clean energy to more buildings. The system will be a particularly beneficial alternative for buildings currently heated with oil. It will reduce their greenhouse gas emissions of around 80%. For buildings heated with natural gas, the reduction will be of 25%. This will contribute for about 14% of our overall objective to reached carbon neutrality by 2050.

The Optima-PAC project completed in Monaco in 2015 successfully assessed harmful effect technology on the marine environment allowing therefore to be further optimized.

The Principality of Monaco could share its expertise in that field, including scientific knowledge to avoid impacts on the environment, to promote and scale-up the use of this type of energy.