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Experiences gained from the WaveSAX energy device tests at the Civitavecchia harbour (Italy)

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In recent years, ocean energy has been the subject of various political initiatives, both at European and national level. In the European Union, following the launch of the Ocean Energy Communication in 2014 and the subsequent establishment of the Ocean Energy Forum, the industry was been asked to convene together to identify joint actions to bring the technology to the market.
Most recently, the inclusion of oceanic energy in the new Strategic Energy Technology Plan (SET Plan) of the European Union (2015) has highlighted the current European leadership in the sector and the need to improve the performance of ocean energy technologies through innovation. In line with the SET Plan, the European Commission, Member States and stakeholders have defined a "Declaration of Intent for Ocean Energy" setting out cost-reduction targets for ocean energy technologies aimed at making a significant contribution to the future European energy system (2016).
The size of the business for commercialising ocean energy is enormous. In Europe alone, the ocean energy industry plans to deploy 100 GW of production capacity by 2050, meeting 10% of the electricity demand. This is enough to meet the daily electricity needs of 76 million households. Deploying 100 GW of energy will also mean creating a new industrial sector in Europe, with over 400,000 skilled jobs across the supply chain (OEE, 2018).
Despite in Italy the wave energy resource is generally lower than in the open seas and oceans, there is a growing interest in the technological development of the sector, facing important challenges and opportunities, such as the realization of low-cost devices, the specialization of the devices to the characteristics of the resource in the Mediterranean sites and the use of coastal infrastructure for the installation.
In this frame, RSE and UNITUS have started the development of a wave energy conversion device, named WaveSAX, based on the "oscillating water column" principle with an innovative configuration in which the (Wells) turbine is installed in the liquid phase. Among the most promising devices developed in recent years, WaveSAX has the advantage of being easily installed in coastal maritime structures thus producing a negligible environmental impact.
In addition, the impact of man-made noise on the marine environment has received increased attention from both scientists and policy makers. In this context, the potential impact related to the underwater sound emissions as results of the WaveSAX operation has been assessed, evaluating its role as noise source in different scenarios according to its various activity status.
The aim of the present work is to outline the experiences gained from testing the WaveSAX device installed at the breakwater of the Civitavecchia Port, during last Autumn. In particular, the paper describes the wave energy potential analysis - both by in situ measurements and numerical models, the underwater sound emission measurements, the results of LCA (Life Cycle Assessment) studies and the preliminary evaluation of material performance, addressed to minimize anthropogenic effects on marine ecosystems.