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Editorial: Perspectives for Marine Energy in the Mediterranean Area

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Editorial on the Research Topic

Perspectives for Marine Energy in the Mediterranean Area

A recent report by the World Economic Forum (WEF, 2020) showed that the five most likely risks to the global economy are of environmental origin; the same holds for four out of five threats that have the potential of giving the worst effects. Among them, climate change and its consequences are at the top. If we want to take these indications seriously, the necessary energy transition has to be fast and unrelenting. To this purpose can we afford to exclude around 70% of our Planet from the possibilities to deploy renewable energy? This refers to the amount of the Earth covered by oceans and seas and we now need to be ready to include "Blue Energies" in energy planning: tides, currents, offshore wind, waves (onshore and offshore), saline and thermal gradients, and even marine algal biomass.

Europe is the front runner in this effort and the Green Deal may provide further momentum. Of late, the North Sea, Northern Atlantic, and the British Channel are the most favorable spots in Europe, but, as highlighted by Pisacane et al., the technological readiness of the different solutions allows for the expansion to the Mediterranean Sea. Although waves, winds, currents and tides are generally less intense than in northern Europe, the conditions are promising, especially for wind and wave energy, the latter for its continuity and high predictability.

Feasibility, legal frameworks and technological and environmental challenges have been studied in the 12 papers of this Research Topic. Goffetti et al., have focused on the main strengths, weaknesses, opportunities and threats for marine renewable energy technologies, considering several dimensions: technological, environmental, social, economic, and legal.

Nikolaidis et al., provide an analysis of the potentials in the whole Mediterranean area from which it emerges that wind energy is the most mature technology and the main technological efforts are directed in facing the problem of the depth of the Mediterranean Sea which requires the implementation of floating devices. In particular, Abanades shows the technological and economic feasibility of a gravity-based solution for the foundation of Wind Turbine Generators in the Cadiz area (Spain). Azzellino et al., suggest that floating wind turbines can allow also the co-installation of technological solutions for the capture of wave energy thus increasing greatly the energy generation potential of a certain area.

The potentials of wave energy are evaluated by Mattiazzo, with a paper that lists several solutions already at the pilot stage and being implemented in the Mediterranean area claiming that at least some of these technological solutions are already competitive. These can be further improved when the number of devices is increased. Waves can be exploited both offshore and onshore with devices that can be integrated into ports. Examples of onshore realizations are Overtopping Breakwater for Energy Conversion devices that can be improved in their design by means of the method illustrated by Kralli et al., that optimizes the size of the OBREC reservoir in order to consider the combined

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effects of shoaling, refraction, diffraction, reflection, and breaking of waves. The same system is analyzed by Patrizi et al., that, by means of a Life Cycle Assessment, show the effects of the whole life cycle of the components on greenhouse gases emissions. An important outcome of the analysis is that if we considered the whole plant built on purpose, it would have a very high impact; instead, if we consider just the amount of energy and materials that have to be added to a port, that has to be built anyhow, for energy production, the impacts would be negligible.

Coiro et al., point out that offshore wave solutions require site-specific calibration of the technology. Furthermore, large differences between average and peak response may arise requiring the optimization of the control strategy. Also, the exploitation of currents can be problematic in the Mediterranean area: the possible suitable locations are few and the implementation risky due to the depth of the areas.

A decisive step for the implementation of Blue Energies in the Mediterranean area is identified by Soukissian et al.'s cluster(s) development. Clusters are the key to the development of the Blue Energy sector by means of innovation, agreements on legislation, and financial stimuli. Clusters are also the place where stakeholders that can provide solutions and policymakers looking for the best technologies for their areas can meet and establish the basis for the production of renewable energy.

Another aspect that has to be taken into account, as pointed out by Andreadou et al., is the possible conflict of Blue Energies with tourism. The Mediterranean area is a tourist attraction having a unique character for its climate, culture, and landscapes. And tourism is also one of the main factors for the economy of the area. The beauty of technological solutions has to be pursued in order to make them a further reason for the attraction of tourism and to avoid conflict. Fotiadou and Papagiannopoulos-Miaoulis suggest that the realization of Blue Energy can help policymakers to see the Mediterranean Sea as a "space": Maritime Spatial Planning can be the key to harmonize all the activities that are carried out on the Sea, limiting in this way the competition for space and creating synergies between Blue Energy and other uses.

The number of views of the papers in this Research Topic (more than 30,000 up to date) shows that there is a need for these kinds of studies. Blue Energies have to become part of our future. No big plants with high impacts but many plants diffused all over the Mediterranean area. Technologically speaking we can say that we are ready for this. But some aspects have to be fixed, especially at the legislative level: for example just one plant for wind energy has been authorized in the Mediterranean area. It is in Italy, in front of the industrial site of Taranto and it took more than 10 years to get this authorization.

The possible conflicts with other uses and negative reactions from citizens can be avoided if a different approach is taken, as suggested by the Interreg MED projects MAESTRALE, PELAGOS, INNOBLUEGROWTH, and BLUE DEAL: evaluation of sustainability, involvement of citizens in the presentation and discussion of possible technological solutions, careful planning, making these solutions more appealing and integrated into the landscape. Beauty and Science allied for a sustainable future (Tiezzi, 2004).

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication. SB drafted the paper that was improved by the three co-authors before submission.

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