frontiers | Frontiers in Energy Research

TYPE Editorial
PUBLISHED 09 January 2023
DOI 10.3389/fenrg.2022.1122265

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Sustainable Energy Systems and Policies, a section of the journal Frontiers in Energy Research

RECEIVED 12 December 2022
ACCEPTED 22 December 2022
PUBLISHED 09 January 2023

CITATION
Struglia MV, Pulselli RM, Damasiotis M, Mikulčić H and Bastianoni S (2023), Editorial: Perspectives for marine energy in the Mediterranean area Volume II. *Front. Energy Res.* 10:1122265. doi: 10.3389/fenrg.2022.1122265

Editorial: Perspectives for marine energy in the Mediterranean area Volume II

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KEYWORDS

blue energy, marine energy, Mediterranean area, sustainable development, energy transition

Editorial on the Research Topic
Perspectives for marine energy in the Mediterranean area Volume II

The need to decisively and urgently address the transition to renewable sources of energy, and the awareness that offshore energy production is not only a possibility but a concrete EU strategy has stimulated us to take a new look at the situation of offshore energy in the Mediterranean, after 3 years since the publication of the first Research Topic on the *Perspectives for Marine Energy in the Mediterranean Area*.

If in the previous Research Topic the focus had been mainly on the level of development of the technologies available for the Mediterranean Sea, in this one we focus more on the way forward for an effective introduction of these technologies in a particularly fragile and complex context such as the Mediterranean Area. Marine Renewable Energies (MREs) are still under-deployed in the Mediterranean area for many reasons, including legislative constraints, social acceptance and a lower energy availability than in the Atlantic Ocean and Northern European seas.

In this volume, we have collected eight research articles and one perspective article centered on these very Research Topic. These papers mostly stem from the activities and synthesize the results of the BLUE DEAL project, that was conceived and implemented by 12 Mediterranean partners to tackle these Research Topic and set the route for blue energy (BE) deployment in the Mediterranean area.

Two research papers deal with the application of ocean numerical models in the BE sector (Carillo et al.; Napolitano et al.). Availability of detailed short-term forecasts of the ocean main characteristics (circulation and waves) is essential for the extraction of renewable energy. Activities aimed at harvesting energy from these sources require a detailed knowledge of the marine environment, both in terms of circulation and sea state, on a variety of time scales. Multi-decadal simulations are necessary to assess the resources and their variability, and consequently to choose the best technological solutions. On the other hand, the optimization and management of the devices being deployed requires the availability of detailed and reliable short-term forecasts. The maintenance of an operative wave forecast system has produced a 7-year dataset at high spatial and temporal resolution that has been analyzed together with site theoretical productivity for three state-of-the art WECs, showing interesting potential for future deployment in several target regions.

The energy transition is a complex process that mainly involves citizens, local communities and stakeholders and must reconcile the introduction of new technologies with the already existing economic activities, managing the possible conflicts among different productive sectors and complying with environmental legislation and the integrated maritime policy.

The implementation of integrated solutions to exploit MREs requires inclusive planning practices considering different aspects regarding climate and environmental impacts, landscape compatibility, interference with other marine activities, and social acceptance that can be tackled only with an interdisciplinary approach. Although each environment represents a *unicum*, it has been shown that a replicable BE planning framework can be developed and applied to very different test cases (Pulselli et al.).

As decarbonisation is the main driver towards the energy transition, energy planning must also include the environmental performance of offshore devices. In this volume we cover this aspect with two research papers: Life Cycle Assessment methodology was used to account for their potential environmental impact, in terms of carbon footprint (t CO_2eq) for both offshore wind (Pulselli et al.) turbines and WECs (Bruno et al.).

Besides these technical aspects (e.g., resource characterization, spatial planning, LCA) human factors are equally important to achieve an energy transition that includes offshore renewables. An appropriate participatory process including all actors (e.g., policymakers, firms, citizens, and researchers) is necessary for a correct path toward decarbonisation. The results of a survey that targeted about 3,000 persons in 12 Mediterranean sites are exposed and revealed that although BE is still relatively unknown to the general public (only 42% of respondents were aware of these technologies), there was a general willingness (70%) to host one or more such installations in their areas (Betti et al.). Not surprisingly, major concerns come from the environmental and visual impact of the new installations, and a new approach and a new paradigm should be considered as it is suggested in the perspective paper included in this Research Topic. Assuming that "protecting" means preserving without banning technological evolution, seascape protection and ecological transition are not alternatives because both converge toward sustainability (Paolinelli et al.).

The picture emerging from this Research Topic of papers is that a contribution to the decarbonisation of the power generation sector can be expected to come from offshore renewables and that offshore wind power will be the main driver of these transition in the next future, especially for the Mediterranean islands (Stančin et al.). While most of the attention is concentrated on new technologies for the production of electricity, we must keep in mind that important efforts must be expected also in other sectors, like energy efficiency and decarbonisation of buildings, and in coastal cities the sea still offers important opportunities to adopt new and effective mitigation measures, such as seawater based heat pump systems (Schibuola et al.).

Author contributions

MS drafted the paper that was improved by co-authors before submission.

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Acknowledgments

The Research Topic originated thanks to a project funded in the framework of the program Interreg Med (2014-2023): BLUE DEAL (Grant No. 5MED18_1.1_M23_072), project co-financed by the European Regional Development Fund.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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