RESPONSEABLE

Key stories

SEA PRECIS

Marine renewable energy

OVERVIEW

Marine Renewable Energy (MRE) includes both offshore wind and ocean energy. Offshore wind energy uses wind turbines to harness the power of the wind and make electricity. Ocean energy can be harvested in many forms and makes use of wave, tide, temperature and salinity gradients to generate electricity. Driving MRE in the European Union is the need to meet a growing energy demand, to support sustainable jobs and growth in the 'blue economy'and to reduce carbon emissions from burning fossil fuels. Constructing and operating MRE installations requires complex tradeoffs between the need to produce 'clean' energy from sustainable sources, the management of technical, project, financial and market based risk, and public and industry concerns about potential environmental and welfare effects. The EU's Renewable Energy Directive (2009/28/EEC) requires that all Member States get 20% of their total energy consumption from renewable energy sources by 2020. For this reason MRE devices will form part of the renewable energy landscape along with sources on land such as solar, biomass and geothermal heat. The current deployment of MRE in Europe is below initial 2020 development targets.

Why is this a key story?

Climate change Burning fossil fuels to provide energy accounts for approximately three quarters of energy consumption in the EU[1]. The main driver of change for renewable energy comes from the need to reduce carbon emissions from burning fossil fuels which is linked to global scale environmental effects. These include ocean acidification, global warming and climatic changes with the potential to have widespread impacts on ecosystems and human wellbeing[2]. Increasing clean energy from marine renewables will contribute towards reducing carbon emissions.

Energy Demand Global energy demand is linked to demography and income and is predicted to continue to increase, particularly in Asia, where China and India are expected to significantly increase hydrocarbon imports by 2030 to meet demand[3]. While much of this demand is expected to be met by technological advances to recover hydrocarbons (e.g. in deep offshore environments) there is concern within the EU that energy trade flows and energy prices will be affected. Since the EU is a major hydrocarbon importer, there is a need to diversify supply in order to underpin energy security.

Blue Growth "Blue Growth" is a policy concept referring to sustainable economic development based on creating jobs and economic value from the ocean resource. The EU Blue Growth Strategy is a long term strategy to support sustainable jobs and growth in the "blue economy"[4]. Ocean energy is now one of Europe's five strategic priority sectors for blue growth.

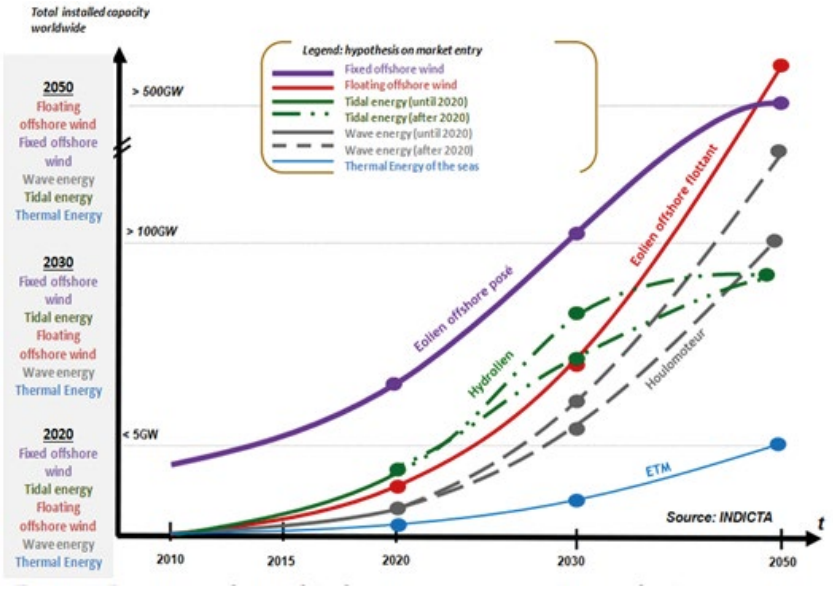
Challenges

Environment The addition of a physical structure in the marine environment can have both a positive and a negative impact. Habitat loss may lead to changes in species composition and/or change the dynamics of the existing populations[5]. Habitat gain, though the addition of a hard structure to the environment can potentially provide refuge habitat, increase food availability and enhance recruitment and productivity of some marine species[6]. When generating power the MRE device increases noise

emissions and generates an electromagnetic field, changing the sound frequency from normal background levels. Changes in ambient noise and electromagnetic fields and the increased probability of a 'strike' from the surface or subsurface moving parts of the device can displace populations and affect the behaviour (e.g. migration) of some marine species[7]. The Environmental Impact Assessment (EIA) Directive is the main European Union legislation regulating projects that are likely to have a significant impact on the environment, such as MRE devices. The challenge is to design and install MRE devices that protect or significantly minimise the impact on biodiversity.

Industry

At a global scale wind energy (terrestrial and offshore) is one of the fastest growing industrial sectors in the world, €93 billion in investment in 2014. It is estimated that the renewable industry was worth more that €48 billion that same year. The European industry is expected to create 324,000 jobs by 2028[8]. The EU is the world leader and has invested €80 million over the past 10 years and over €600 million has been invested



The forecast state of development for the different MRE devices worldwide by 2020, 2030 and 2050. They are based on the a decrease of production costs forecast for the next 20 years[10] linked to investment in research and development, learning-by-doing and economies of scale[11].

by the industry in the last seven years for ocean energy development[9].

The current deployment of MRE in Europe is still below the initial 2020 development targets. The state of development of wind energy and other MREs points to a number of difficulties. At the moment, wind and tidal energy are the only technologies being commercialized. Other technologies still face technological and financial constraints. Production costs are high. The cost-efficiency of mature devices needs to be improved. One of the main challenges for MRE is to reduce the investment risk in order to guarantee investor confidence and help the sector secure finance. The credibility of long term development is needed to attract the investments that are needed to support the industry. To increase investor confidence MRE and the supporting infrastructure, such as pipelines, need to be incorporated into Marine Spatial Plans.

Society

From a socio-political perspective renewable energy in principal is largely considered to be socially acceptable[12]. However, the most powerful barrier to the achievement of renewable energy targets in the EU is rooted the social acceptance of the actual physical installation of renewable energy schemes, a debate commonly known as the "NIMBYism" (Not in My Back Yard).

MRE schemes are often opposed by people or communities that feel that there will be negative effects on the aesthetic qualities of the seascape, that tourism and fishing industries will be impacted, that there may be health impacts from the noise emissions, and that jobs and employment will not benefit local communities[13]. The challenge here is to develop knowledge in communities about the real effects of construction and operation of MRE devices, rather than having people focus on 'perceived impacts' only.

Opportunities

The opportunity to expand "ocean literacy" in this area includes :

1. Support the knowledge exchange between the natural science community and MRE developers using new formats, particularly with regard to the development of MRE design and construction that reduces impacts on biodiversity;
2. To develop ocean literacy products that increase the confidence of investors in the Marine Spatial Planning process. For ocean energy in particular, to find synergies with more advanced sectors such as off-shore wind, oil and gas, and ship-building; and
3. To addresse the gap between perceived and actual knowledge with regard to MRE development in communities.

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This project has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation (H2020-BG-2014-1) under grant agreement No. 652643. This publication/multimedia product/presentation reflects the views of the author, and the European Union cannot be held responsible for any use which might be made of the information contained therein.
The note builds on the ideas and contributions from different partners of the project and is a living document as the project progresses.