Energy Security and Net Zero Select Committee Inquiry
A flexible grid for the future
Marine Energy Council response

Introduction

The Marine Energy Council (MEC) welcomes the opportunity to respond to the Energy Security and Net Zero Committee's inquiry into a flexible grid for the future.

The MEC is the voice of the UK's tidal stream and wave energy industries. Established in 2018, the MEC's membership spans technology and project developers, associations, manufacturers, and small and medium sized enterprises working in the supply chain. Our vision is for the marine energy sector to support a secure, cost-effective, and fair transition to net zero, enabling investment, exporting great British innovation, and levelling up with employment opportunities across the UK.

The UK's energy system is changing with wind and solar forming the spine of the generation mix. This brings a challenge around intermittency, and how security of supply will be ensured when the wind isn't blowing, and the sun isn't shining. A range of different solutions and technologies will need to be deployed to manage this in a secure and cost-effective manner. As storage options represent vectors and not generators in themselves, a diverse generation portfolio will be fundamental.

- **Tidal stream energy** is entirely predictable and can provide 11%[1] of the UK's electricity demand. Tidal stream turbines capture the kinetic energy of the currents that flow around coastal areas, unlike tidal lagoons or barrages which require large barriers to be built. This firm power energy resource can directly displace dependence on imports and can be deployed rapidly, with the construction time of a consented tidal stream farm being less than three years.
- **Wave energy** could provide up to 20%[2] of the UK's electricity demand. When wave energy converters are collocated with offshore wind reduce the levelised cost of energy for both projects by 12%.[3] This harmonious relationship with offshore wind means that wave energy will support a more cost-effective and efficient energy system. [4]

Predictable and consistent renewable generation, in a system that becomes increasingly reliant on intermittent sources, will be critical in delivering the UK Government's decarbonisation targets. Flexibility is key. However, rapidly scaling up and delivering a diverse generation portfolio should be a priority.

[1] Coles et al (2021) *A review of the UK and British Channel Islands practical tidal stream energy resource*. Available online.
[2] Jin et al (2021) *Wave energy in the UK: Status review and future perspectives.* Available online.
[3] Offshore Wind Consultants Ltd (2023) '*Wave and Floating Wind Energy*. Available online.
[4] In this response 'marine energy' is used to refer to tidal stream and wave energy.

MEC response

1. **Does the current national and DNO grid deliver the capacity needed for the future and, if not, what are the solutions?**

and

2. **Has the organisation of the National Grid proved a barrier to the installation of renewable energy sources, and if so what could be done to remedy this?**

and

3. **Should there be more innovation and devolution in the development of the Grid?**

Network capacity acts as a significant barrier to marine renewable energy (MRE) deployment. This is both in terms as a physical barrier to connecting to the grid, but also in interacting with mechanisms designed to support renewable energy deployment.

For a project to bid into the Contracts for Difference (CfD) mechanism its capacity needs to be 'eligible', meaning it has a lease agreement, marine licence and grid offer in place. A constrained grid is less able to offer grid connection and therefore acts as a barrier to realising the UK's 30GW+ of MRE capacity.

Once a grid connection offer is in place, it can take over 5 years to connect a marine energy project to the grid. This is a costly process for companies deploying innovative technologies where costs are already tight.

When a connection is available it can be 'non-firm', which means that the available grid capacity will vary depending on the load on the network, meaning MRE may be prevented from exporting the power it is generated to the grid. This delay, cost and uncertainty presents severe barriers to investment, and discourages innovative technology deployment.

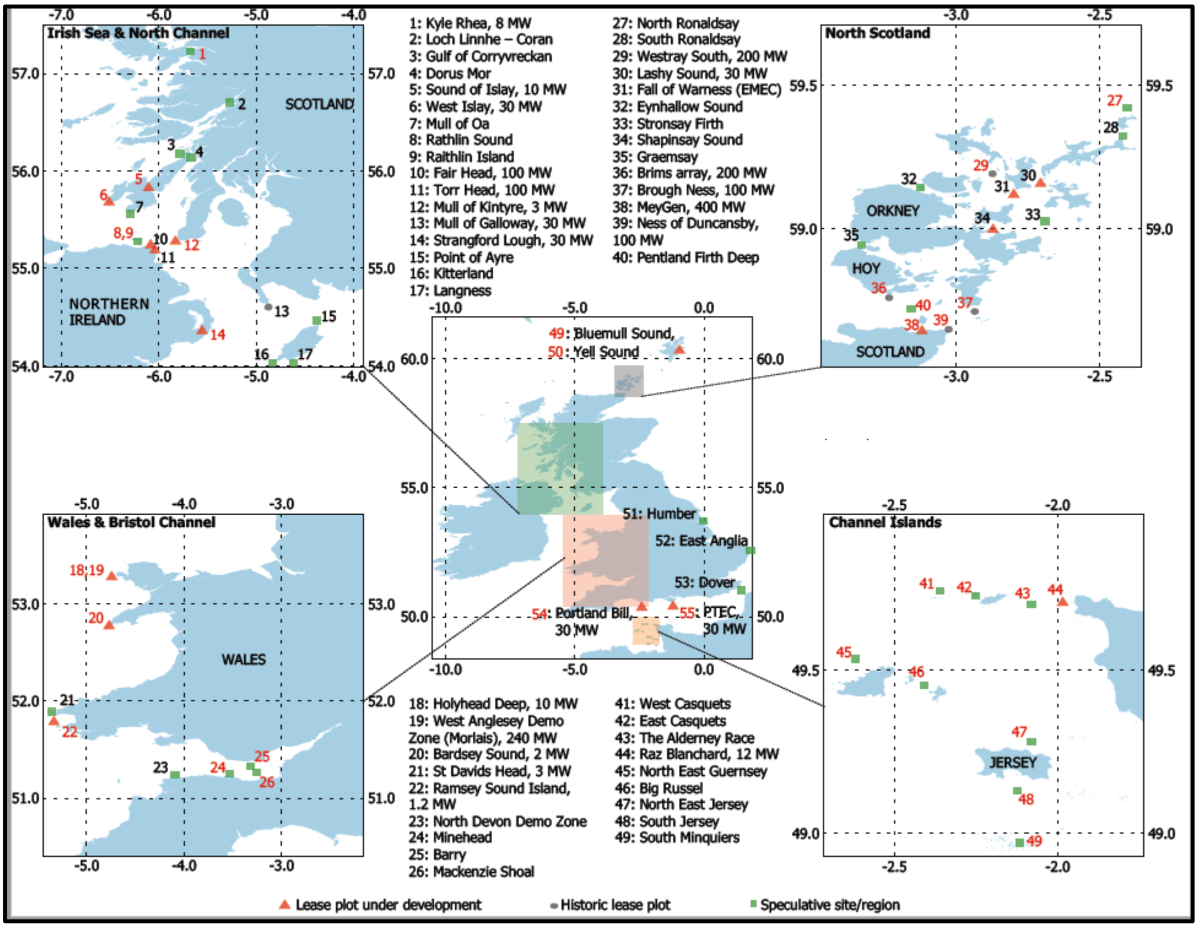
Electricity grid capacity needs to expand significantly to accompany a doubling of electricity generation by 2050.[5] Whilst this is being undertaken the UK Government, devolved administration and Ofgem should ensure that the burden of network cost and access does not deter TSE deployment.

Grid connection is costly, time consuming and a significant hurdle to MRE deployment. However, to alleviate some of this pressure, while grid capacity is increased, the Government, regulator and electricity networks, could consider allowing innovative projects (often with comparatively lower capacity demand than larger offshore projects) to connect to the network quicker, with reduced costs, and to receive payments for lost generation when constrained off. This will help support the UK Government's vision to make the UK a 'Silicon Valley' for green energy.

National Grid and other transmission operators (TOs) can be supported to prepare for increased MRE deployment by the Government setting clear targets. For tidal stream we already have a good understanding of where there is significant resource. TOs should be supported by the regulatory framework to build the necessary capacity to harness the UK's tidal resource.

[5] Climate Chage Committee (2022) *Net Zero Electricity Market Design (Expert Group).* Available online.

Tidal Stream Capacity in the UK



The UK's tidal stream energy capacity, and where this is located, is understood. Electricity networks should be supported and directed to have sufficient capacity to these sites to take advantage of this entirely predictable renewable energy resource.

[6]

The International Energy Agency expects that half of the reductions required to get to net zero will be from innovative technologies.[7] Ensuring electricity networks support innovation is therefore critical to the success of net zero delivery.

The generation provided by the predictability of tidal stream, and the generation profile of wave energy (which is more consistent that other renewables), can avoid unnecessary investment in electricity network infrastructure or the expansion of costly firm power capacity closer to when demand exists. Research by the University of Plymouth has shown that tidal stream can reduce the power rating and energy storage capacity of inter-seasonal energy storage which will be a key driver of cost in the future energy system. [8]

Delivery of a cost-effective net zero energy system may be at risk if decision making is devolved to local areas (in terms of network capacity). A whole-system approach is required. Deployment of just under 13GW of marine energy will reduce annual dispatch cost from £13.5bn to £12.5bn, an annual saving of over £1bn for UK households. This cost reduction comes from a higher dispatch of renewable energy

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[6] Coles DS at al., 2021, A review of the UK and British Channel Islands practical tidal stream energy resource, Proc. R. Soc. A 20210469
[7] International Energy Agency (2021) *Net Zero by 2050*. Available online.
[8] Coles et al (2022) *Impacts of tidal stream power on hybrid energy system performance: An Isle of Wight case study*. Available online.

– by up to 27 TWh (+6%), and thus a lower requirement for expensive peaking generation – by as much as 24 TWh (-16%) when wave and tidal generation are part of the electricity mix, compared with a scenario without marine energy generation.[9] The MEC believes that securing this benefit requires direction and leadership at a Westminster level.

4. What changes should be made to the planning system to enable it to increase the use of renewable energy?

N/A

5. Is our planning system able to deliver more rapid development of new local infrastructure?

N/A

6. Would regional, or nodal, pricing of energy facilitate a more flexible development of Grid infrastructure?

And

7. What can be usefully learned from power transmission systems in other countries?

The Review of Electricity Market Arrangements (REMA) process, and the summary of responses, has set out convincing arguments both for and shifting from the current national pricing, to nodal or zonal. The benefits of such a significant change need to be considered against the process in implementing the change. As SSE highlighted in its response to the REMA consultation, nodal pricing in Great Britain could add 2-3 percentage points to the cost of capital, which would in turn add at least an additional £90bn to the cost of the energy transition up to 2050. [10]

However, MEC supports the UK Government continuing to consider both nodal and zonal pricing for three primary reasons.

Firstly, nodal and zonal market design will encourage better optimisation of existing assets. Tidal stream and wave energy can support and provide a consistent energy resource during periods of intermittency for wind and solar. This could avoid or delay investment in costly transmission network infrastructure and ensure that development of sites where there is existing and unharnessed renewable capacity is encouraged.

Secondly, nodal and zonal pricing will allow local communities to benefit from the renewable resources that are being harnessed closer to their homes. This will help maintain democratic legitimacy for the net zero transition and incentivise communities to be active supporters of key project developments. It could also attract business investment into areas that have rich renewable resource and as a result consistently low electricity prices.

Thirdly, when the necessary and significant network investment that net zero will require is undertaken households can be confident that this is being implemented in a cost-effective manner. As the CCC forecast that electricity demand could treble by 2050 the amount of network investment required will be significant. As nodal and zonal pricing becomes better understood UK bill payers will understand that the renewable resource of offshore sites has been explored and invested in fully before more

[9] Supergen (2023) *What are the UK power system benefits from deployments of wave and tidal stream generation?* Available online.
[10] SSE (2022) *Decarbonisation of the Power Sector: consultation response.* Available online.

necessary and costly network investment is required. Zonal or nodal pricing could deliver £30bn of cost savings to 2035 with benefits to communities that are supporting the net zero transition.[11]

Renewable projects need to locate where there is rich resource, and the right balance needs to be struck between supporting large scale renewable projects and a cost-effective energy system. Currently in areas where there is a rich renewable resource the energy costs are higher due to constrained networks and Transmission Network Use of System (TNUoS) charges, in addition to national pricing. The impact of a change to the latter needs to be investigated and understood fully before any shift takes place. MEC notes the Swedish experience of zonal market pricing which, despite as a country producing more electricity than it uses, southern Sweden has seen energy prices increase dramatically due to poor transmission capacity.[12]

The MEC would support removing transmission costs from energy bills to general taxation. This is a progressive way of paying for the cost of the transition to net zero, rather than placing the burden on energy bills which is inherently regressive. This approach is common across European countries and would boost the case for low-carbon generation investment.[13]

Zonal or nodal pricing would deliver a more flexible and responsive grid. The cost of that shift however needs to be considered carefully. Regardless the UK Government should act to incentivise a most cost-effective and efficient energy system, through for example encouraging innovative deployment of renewables. Co-locating offshore wind and wave energy converters allows technologies to share assets and can reduce costs by 12% for both projects.[14] This could be incentivised by a shift to nodal pricing, or through other policy mechanisms (for example creating a dedicated pot for innovative deployment in future CfD rounds).

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[11] Catapult Energy Systems (2022) *Location, Location, Location Reforming wholesale electricity markets to meet Net Zero.* Available online.

[12] Information on congestion issues on Sweden's transmission lines leading to prices reach (on occasion) 100 times greater in the south than north is available here.

[13] Transmission system charges per country is provided on this infographic.

[14] OWC (2023) *Wave and Floating Wind Energy, opportunities for sharing infrastructure services and supply chain.* Available online.