Energy Security and Net Zero Select Committee inquiry
Securing the domestic supply chain
Marine Energy Council response

How can UK plc capture its fair share of the economic potential of emerging or less developed energy technologies?

The UK has a significant domestic marine energy resource, and the expertise to lead the world in its development.

Tidal stream energy is an entirely predictable renewable resource which could provide up to 11%[1] of the UK's current electricity demand. The predictability of our tides can help reduce supply/demand mismatch in an energy system dominated by intermittent renewables and reduce dependence on fossil fuels and imports.

Wave energy is abundant and the world's largest untapped source of energy with the Intergovernmental Panel on Climate Change (IPCC) estimating a potential annual global production of 29,500 TWh, enough clean electricity to power over 500 million homes. It is estimated that the UK's wave energy resource could provide 20%[2] of the UK's current electricity demand.

Emerging technologies require a clear route to market

Market pull mechanisms like the Contracts for Difference (CfD) scheme are critical in providing a clear route to market for emerging or less developed energy technologies. The CfD mechanism's pot structure is helpful in separating established and less established technologies, however as contracts are placed currently based on lowest Levelised Cost of Energy (LCOE) rather than the value, technologies like tidal stream and wave energy require ringfences to have a route to market.

The decision by the UK Government to set consecutive tidal stream ringfences (in Allocation Round 4 and 5) in its renewable auctions has put the UK on track to have 100MW of tidal stream capacity deployed by 2028. This has positioned the UK to lead the world in tidal stream deployment.

A lack of a ringfence for wave energy has stifled project development in UK waters. A ringfence has not been set despite significant technological progress being made by companies such as CorPower, which successfully piloted its wave energy device in Portugal, and the announcement of the Saoirse Wave project, a joint venture between Simply Blue Group and ESB which will deploy a 5WM wave array in Ireland. Simply Blue is also seeking a 5MW marine licence for a similar array in Orkney waters, utilising the European Marine Energy Centres (EMEC) wave berths. This pilot project is only possible if strategic revenue and funding support is provided. There is a significant increase of investments from major companies such as TotalEnergies, Aker Solutions, MOL+ in both CorPower and Mocean Energy offshore tests with the purpose to de-risk large scale wave energy projects.

The UK Government should set clear deployment targets for tidal stream and wave energy

An additional challenge for emerging technologies is that CfD budgets are set and ringfences are announced on an annual basis. This provides no sight for technologies that do not know if they will have a ringfence in future rounds. This is damaging for investor confidence. A route around this could be setting deployment targets and the Government committing to work with industry to deliver these. **The MEC is advocating a 1GW and 300MW deployment target by 2035 for tidal stream and wave energy respectively.**

---

[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.

The UK should identify where it has a strategic advantage in the global net zero transition

We have an opportunity to embed UK supply chain content in marine energy deployments here and around the world. For example, tidal stream projects have far exceeded offshore wind's UK supply chain content target of 60%: Nova Innovation and Orbital Marine Power have both achieved more than 80% UK content for site construction in their most recent installations. Nova Innovation have gone on to retain 98% UK content in their operational supply chain. This is creating and sustaining jobs. Tidal stream projects create 76 full time equivalent (FTE) jobs per MW during a project's construction in the UK, and 5.5 jobs/MW/year during operation.[3]

The London School of Economics' Grantham Institute identified tidal stream as a technology in which the UK could lead the world. This requires the right policy framework. UK-based companies are internationally leading innovators in marine energy and the UK is comparatively more specialised in this area than in other clean technologies, including offshore wind, nuclear and CCUS.[4]

The UK should learn from Denmark's approach to wind energy

In the 1980s Denmark invested early in its wind energy industry, delivering projects with high levels of local content, and developing its domestic market. In the process it gained first mover advantage. Its wind sector exports generate over £7bn annually for the Danish economy.[5] By contrast the UK's wind sector, Europe's largest generator of wind energy, exports less than £0.5bn annually and is a net importer of wind technology, principally from Denmark.[6]

[3] Element (2022) *European Tidal Energy Impact Analysis Report.* Available here.
[4] London School of Economics (2023) *Seizing sustainable growth opportunities from tidal stream energy in the UK.* Available online.
[5] Deloitte (2012) *Study of the macroeconomic impact of Wind Energy in Denmark*
[6] State of Green (2021) *The economic benefits of wind energy*. Available online.

What more can the Government do to encourage greater domestic supply chain investment in the energy industry by 2035, including through the Contracts for Difference scheme?

The Sustainable Industry Reward should be expanded to include renewable sectors other than wind.

The MEC welcomes that the Government is seeking to deliver broader benefits for the UK through the CfD mechanism via the introduction of the Sustainable Industry Reward (SIR). However, this is solely focussed on fixed and floating offshore wind and will not apply to tidal stream or wave energy technologies. As part of the Government's consultation to introduce the SIR from AR7 onwards it notes that introducing a support or reward scheme for other technologies would require further and a distinct consultation. This will delay support measures being introduced for renewable technologies other than wind. We believe this is a missed opportunity.

Emerging technologies require both market pull and technology push mechanisms for cost-effective deployment

The CfD has been a successful mechanism for increasing deployment of established renewables like wind and solar. In tandem these sectors have had access to technology push mechanisms, that enable innovation that accelerate learning rates and the cost reduction of deployment.

Research by the University of Edinburgh has found that an increase in the technology learning rate from 10% to 15% has the potential to reduce the total investment required for tidal stream from £18.6bn to £3.3bn and reduce the total investment required for wave from £20.5bn to £3.0bn when delivering 6GW of each technology by 2050.[7]

It is welcome that the UK is maintaining its participation in Horizon Europe. Last year it was announced that two projects led by UK-based Nova Innovation and Orbital Marine Power were successful in the recent tidal array calls. Nova Innovation's SEASTAR project secured €20M to deploy a 4MW tidal stream energy array in Orkney. With 16 turbines, the project will see the largest number of tidal turbines in an array anywhere in the world. This builds on Nova's experience in delivering the world's first offshore tidal array in Shetland, which has been powering homes and businesses for more than seven years. Orbital Marine Power's EURO-TIDES project will focus on accelerating the commercial deployment of its pioneering floating tidal stream technology, delivering a 9.6MW floating tidal turbine array.[8]

Whilst there are further wave energy calls coming as part of the Horizon programme the UK Government cannot solely rely on participation in Horizon Europe to drive innovation in marine energy. For other technologies it does not. The Net Zero Innovation Portfolio encouraged investment in a range of different technologies but did not include marine energy. In addition, there has been a delay in undertaking the Technology Innovation Needs Assessment (TINA) which could identify what areas technology push mechanisms should target within marine energy.

The Government should include marine energy within the Green Industries Growth Accelerator

As part of the Autumn Statement the Chancellor announced the introduction of a £960m Green Industries Growth Accelerator (GIGA) to support the expansion of clean energy supply chains across the UK. The fund, as announced, only identifies CCUS, electricity networks, hydrogen, nuclear and offshore wind as technologies that will be supported. The UK has significant domestic resource and maritime expertise to be a world leader in marine energy. However, as other countries including the

[7] University of Edinburgh (2023) *Ocean Energy and Net Zero: Policy Support for the Cost Effective Delivery of 12GW Wave and Tidal Stream by 2050.* Available online.
[8] For further information please see the Marine Energy Council press release, available here.

USA, Canada, France and China are introducing mechanism to support marine energy uptake, this lead could quite easily slip away.

There are foreseeable risks and potential bottlenecks in terms of port infrastructure, manufacturing facilities and skills that may minimise the growth of supply chains and industry in the UK. Including marine energy within GIGA will encourage greater domestic supply chain investment and exporting UK technology and expertise around the world.

The UK policy environment should incentivise investment in UK supply chains

The barrier and cost of setting up supply chains to manufacture and assemble marine energy devices could be reduced by providing capital support for companies investing and developing such facilities in the UK. The Government should align its tax regime with net zero, by replicating what is being provided for investment for O&G in the North Sea, into renewable technologies where the UK can lead the world. [9]

[9] London School of Economics (2023) *Seizing sustainable growth opportunities from tidal stream energy in the UK.* Available online.

Does the UK have the supply chain capacity to deliver the required energy infrastructure by 2035, including an expanded electricity network?

Supply chain capacity

The UK will need to significantly increase its supply chain capacity to deliver its ambitious net zero targets and realise its marine energy potential. As noted, tidal stream projects are currently being delivered with upwards of 80% UK supply chain spend. Deployed capacity is set for a tenfold increase with over 100MW deployed by 2028.

It is the ambition of the MEC and our members that high levels of supply chain content will continue as part of this new deployed capacity. HydroWing, which secured a contract to deploy a 10MW array in Anglesey in AR5, is already exploring moving its turbine manufacturing facilities to Wales. This is a direct cause of the Government setting the ringfence for tidal stream. Clear targets and a commitment to working with industry to deliver these will provide the confidence required to invest in UK supply chain capabilities for marine energy.

Creating jobs across the UK and growing clean supply chains will be critical in ensuring g the transition to net zero is delivered in a fair and just manner. The Offshore Renewable Energy Catapult has forecast that in supporting the growth of marine energy 50-60% of the economic benefit in terms of both GVA and jobs is expected to be generated in coastal areas, creating over 22,000 jobs by 2040.[10] The areas that will benefit from the UK supporting the marine energy industry are those identified by the Government's SIR consultation as areas with a need for economic regeneration.

The immediate benefit of marine energy to local economies is clear when considering the example of the European Marine Energy Centre (EMEC), located in Orkney. Since 2016, EMEC has contributed 370 million gross value add (GVA) to the UK economy. £263 million of that was accrued in Scotland; and half of that, £130 million, in the Orkney Islands. To date £42 million public funding has been invested in the centre by public sector organisations; thus over £8 has been accrued for every £1 spent by the public purse.

The MEC is confident that as the UK's marine energy deployment pipeline increases indigenous supply chain growth can match and deliver a high percentage of the content. The industry will be helped enormously in making investments now by having clarity on the direction of travel.

Supply chains will grow where governments provide clarity on the route to market and technology push mechanisms. There is a significant risk that the UK will be left behind countries like Ireland, which has a clear plan to deploy a 5MW wave energy array off its coast in the 2020s, and Portugal where CorPower's WEC is currently being piloted.[11]

Grid connection

Bidding into the CfD mechanism requires projects to have a lease agreement, marine licence and grid offer in place. Constraints on the electricity network delays securing grid offers and therefore limits the potential capacity that can bid into the CfD. This is a significant concern for the marine energy industry. There is currently around 100MW of eligible tidal stream capacity that can bid into Allocation Round 6, and under 7MW for wave energy.

Connecting a marine energy project to the grid can take upwards of 5 years. Projects often face delays, and this uncertainty is a severe barrier to investment and emerging technology development.

---

[10] Offshore Renewable Energy Catapult (2018) *Tidal Stream and wave energy cost reduction and industrial benefit.* Available online.
[11] Simply Blue Group (2023) *ESB to join Simply Blue Group on pioneering Saoirse Wave Energy project PRESS RELEASE*. Available online.

It is welcome therefore that the Government is seeking to reduce the average grid connection delay from 5 years to 6 months. In its consideration of how to deliver this the Government should engage with the marine energy sector. One of the key advantages of tidal stream and wave energy is that we have an informed understanding of where the resource exists. Therefore, supporting network companies to invest in infrastructure to prepare for future marine energy deployment will be a significant bolster for the industry.

One of the challenges for emerging technologies more generally is that the policy and regulatory environment has been designed for, and to the benefit of, more established technologies like wind and solar. For example, a marine energy array that is >1MW will need to undertake the same environmental monitoring as an offshore wind array that is >1GW. For grid connections there should be flexibility and an ability to prioritise technologies that will have a less material impact on network constraint as necessary network investment to increase capacity is undertaken.

Finally, a cost-effective transition requires making efficient use of existing infrastructure assets. Co-locating offshore wind and wave energy converters allows wave energy converters and offshore wind technologies to share assets will reduce costs by 12% for both projects.[12] The UK Government should follow the lead of the Dutch government which mandated for the next generation of offshore wind farms to deploy 5MW of floating solar capacity. This requirement is set to ramp up to 100MW for the next leasing round, creating a long-term market that will attract investment into innovative technology. Despite its benefits the UK energy system, the consenting regime and regulatory frameworks discourages and acts as a barrier to multiuse.

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

To what extent would growing the domestic supply chain bolster UK energy security?

The UK can harness its indigenous resource with indigenous supply chains

The wind industry and Denmark establishing itself as a leader is instructive for the UK Government. As noted, marine energy projects are being deployed with high levels of UK content and significant benefit to local communities. Clear market signals will make the UK more attractive to international investors and supports onshoring supply chains.

The UK's ability to act independently in developing supply chains and harnessing its marine resource is significant. By supporting marine energy now, the UK Government not only bolsters energy security but could embed UK supply chain content in projects around the world. Ocean energy has a global potential of 350GW by 2050.[13] The UK should seek to capture as much of this market as possible.

Indigenous supply chains will lessen the impact of fluctuating cost-pressures elsewhere. The offshore wind industry did not secure contracts as part of AR5 due to the cost of components increasing by 40%. While onshoring supply chains will not completely protect from global challenges and shifts, a diverse energy supply will reduce dependence on global imports. Tidal stream alone can reduce the UK's required CCGT capacity by over 40%, from 8.1GW to 4.9GW.[14]

Energy system benefit

Energy security requires a diverse energy mix with technologies having different roles. Marine energy will play a supporting and enabling role for the transition to a system dominated by wind and solar. It supports energy system security and cost as a cheaper alternative to more expensive options for when the wind doesn't blow, and the sun doesn't shine. Deployment of just over 12GW of wave and tidal stream energy will **save the UK £1bn in energy system cost**. This is due to avoiding expensive peaking generation and storage necessary in a net zero energy system dependent on intermittent renewables.[15]

Growing the domestic supply chain and supporting its growth will be critical in delivering the over 30GW+ of marine energy potential that the UK's shores provide.

90% of the world's economies are now covered by net zero targets, the predictability of tidal stream and the abundance of wave energy will play a key role in ensuring the transition is managed in a secure manner whilst positioning the UK to benefit from growing global export markets, creating, and sustaining green jobs and clean supply chains.

[13] IRENA (2023) *Scaling up investments in ocean energy technologies.* Available online.
[14] Imperial College London (2022) *Role and Value of Tidal Stream Generation in the Future UK Energy System.* Available online.
[15] University of Edinburgh (2023) *What are the UK power system benefits from deployments of wave and tidal stream generation.* Available online.