renewableUK

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Raising the bar:

the world-leading energy commitments the UK should make ahead of COP26

May 2021

RenewableUK members are building our future energy system, powered by clean electricity.

We bring them together to deliver that future faster; a future which is better for industry, billpayers, and the environment. We support over 400 member companies to ensure increasing amounts of renewable electricity are deployed across the UK and access markets to export all over the world. Our members are business leaders, technology innovators, and expert thinkers from right across industry.

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Introduction

The Paris Agreement set a clear objective to limit global warming to 1.5C, which will require achieving net zero emissions by mid-century. The UK has led the world in enshrining this in a binding 2050 net zero target, with further commitments to the Sixth Carbon Budget. With the focus of this year's COP26 on delivery, advocates for climate action are looking for clear short-term targets for 2030, not long-term broad ambitions for decarbonisation at large.

With the technologies for electricity decarbonisation like wind power already well-proven and understood, the onus is particularly high on countries to set short term deployment ambitions and enabling policies to support energy decarbonisation – the crucial first step on the journey to net zero. It is unsurprising that one of the five key themes of the UK Presidency is "The Energy Transition". The UK should continue its global leadership on climate action ahead of COP26 by setting out a net zero strategy with clear targets and supporting policies for 2030 which set a credible roadmap for rapid decarbonisation of energy which will grab the world's attention.

UK is a world leader in power decarbonisation. We're ending any reliance on coal, we've developed large volumes of renewables and are at the forefront of developing new technologies like floating wind, wave and tidal stream energy and green hydrogen. We have so much to showcase to the world as a result.

The UK's success in offshore wind is not just in having the largest market, but in establishing Contracts for Difference (CfD) auctions as a market-stimulating framework which has been emulated world-wide, helping to reduce costs to c£40/MWh, and in beginning to address barriers to growth such as network connections, spatial planning and aviation. We can show the world our lived experience of the socio-economic and industrial benefits of the sector. Industry will be investing an average of £10bn each year in the UK, and employing tens of thousands of people in a vibrant supply chain across country[i].

Furthermore, having led the global market in fixed offshore wind, the UK is now leading the development of floating wind technology. This can be deployed in deeper waters, which is important for future markets such as Japan, South Korea, France, Spain, the USA and South Africa.

The Government is holding new CfD auctions for onshore wind; a recognition of both of the role the low-cost technology will need to play in supporting our net zero ambition, and also the vast economic and social benefits of doing so. For example, developing 35GW of onshore wind by 2035 – in line with recommendations from the Climate Change Committee[ii] and our own Energy Vision – would save each UK household £50 a year and would support over 31,000 jobs in the UK[iii].

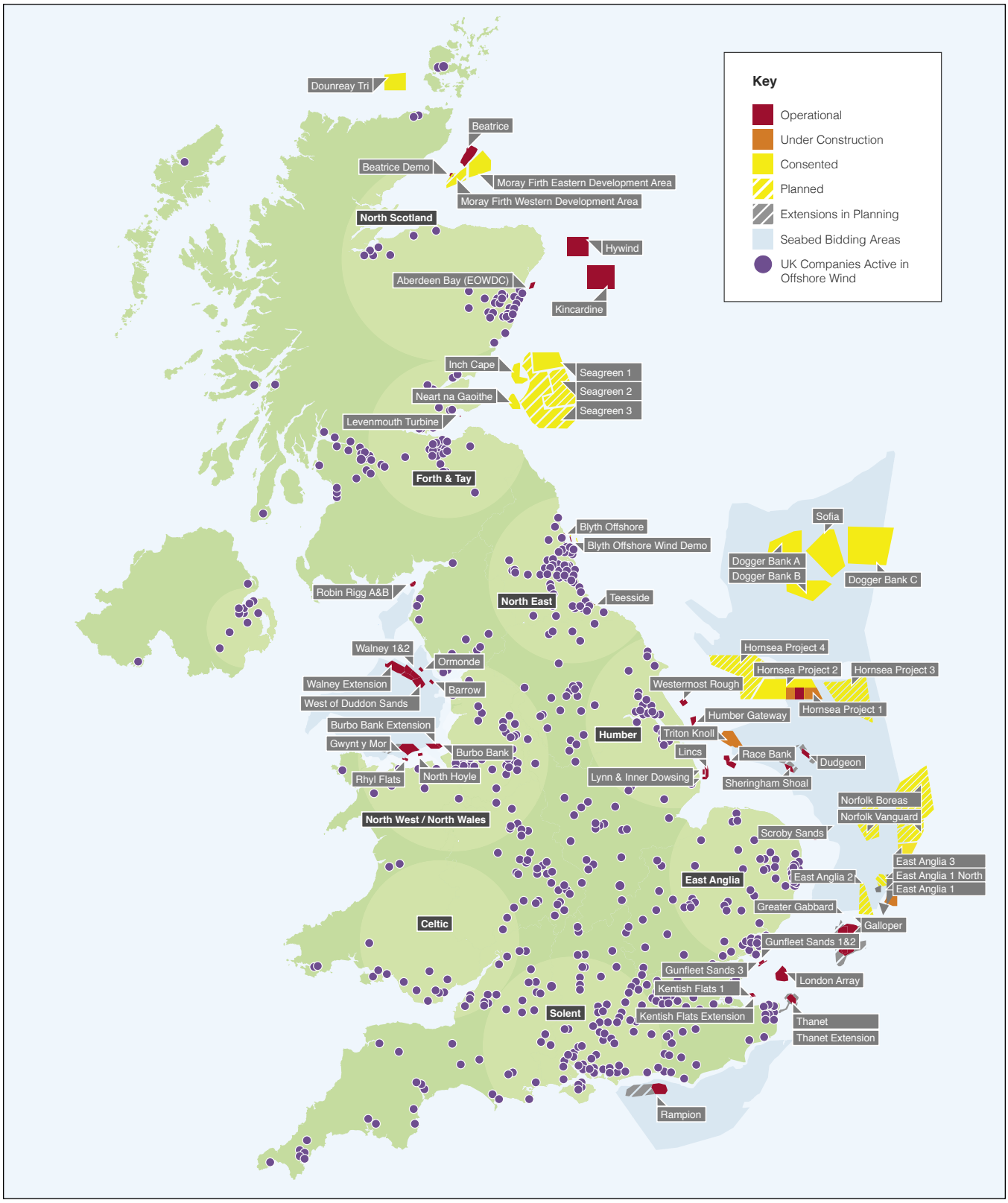
Together, the offshore and onshore wind sectors in the UK have been a lifeline for the UK economy. Investment has continued throughout the COVID-19 pandemic. For example, under the first lockdown between March and July 2020, wind energy companies invested £4 billion and created over 2,000 jobs[iv]. The offshore and onshore wind projects which could be unlocked through the next CfD Auction (AR4) will be vital for the green economic recovery, bringing £20bn of new investment in the UK and 12,000 jobs[v].

In addition to this, the UK is at the forefront of the development of green hydrogen, with some of the world's leading projects and component manufacturers. Studies show the green hydrogen industry could create 120,000 jobs and £320bn of investment in the UK by 2050[vi].

We remain world leaders in the development of wave and tidal stream technologies. Projects developed in Scottish waters are already providing homes, hydrogen electrolysers and EV charging stations with predictable clean power from the ocean's currents. Sites across the UK are primed for further development, confident in the industry's ability to continue to reduce costs and export, with the support of the industry's specialised supply chain. We are the home of innovative companies in system flexibility and battery storage too.

Much of the task of COP26 will be showcasing the success of the UK story and leveraging this to encourage others to increase their ambitions. Similarly, much of the task of Government this year will be setting the conditions to deliver our existing world-leading commitments – such as 40GW of offshore wind deployment by 2030 – and maximising the economic benefits of doing so. To this end, RenewableUK welcomes the joint work undertaken with the UK Government in recent months to secure new investment in the UK's offshore wind supply chain.

Summary of Offshore Activity in the UK



Our recommendations

However, with our focus at COP26 on encouraging the world to commit to short-term 2030 targets for energy decarbonisation, we must also look to ensure there are no gaps in our own ambitions. Although there is much for the UK to showcase in our targets for offshore wind, there is unexploited potential in other established technologies that could deliver rapidly, as well as in less-established technologies with greater medium and long-term potential.

There remain commitments the UK could make to the "Energy Transition" which we believe will capture the attention of the world ahead of COP26 and advise the Government to adopt. They would show a clear pathway for the UK to reach over 70GW of wind by 2030, enhancing our offshore wind ambitions with onshore and floating wind, accompanied by world-leading ambition in new technologies to support further global decarbonisation through green hydrogen and marine energy:

1. **A new target of 30GW onshore wind by 2030.** We should 'lead by example' on onshore wind and encourage other countries to establish a target for development by setting our own. Even with the increasing success of offshore wind, the majority of wind installations across the world are onshore and are expected to continue be so in the 2030s. In setting a short-term target, we could establish a supply chain development strategy for the sector, ensuring we maximise the manifold industrial and societal benefits of doing so.

2. **A 5GW minimum green hydrogen target by 2030.** This will demonstrate our commitment to the only truly zero emissions form of hydrogen production, and facilitate a strong domestic demand which will support the development of the UK's industrial base in the sector.

3. **Double our floating offshore wind ambition to 2GW by 2030.** Recent evidence suggests that, with enabling actions, we could increase our ambitions on floating wind development to 2GW by 2030. This would increase the pace of cost reduction in the sector and its economic footprint over the next decade through increased investor and supply chain confidence[vii].

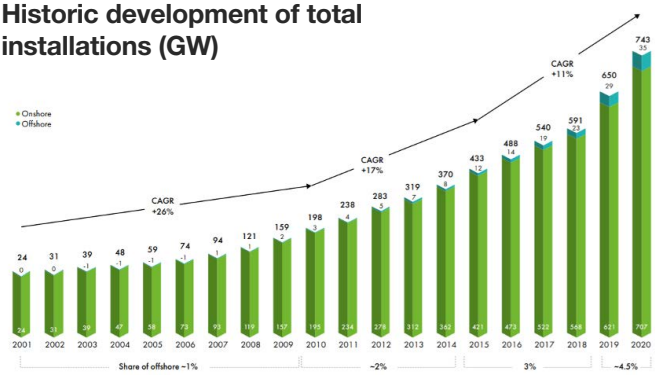
4. **Lead the transformation of marine energy with a 1GW target.** The UK is at the forefront of marine technologies. By 1GW of development, industry analysis suggests these technologies will become cost competitive, so in setting this target and enabling policy, the UK will demonstrate its intention to make marine energy a cost-effective new avenue for decarbonisation in countries like Indonesia, the Philippines and Australia.

5. **A 'Just Transition Strategy' to show how the UK is utilising energy decarbonisation to 'level-up' and ensure no one and nowhere is left behind.** The transition to a net zero economy will, in the UK and globally, create new opportunities and bring new investment to communities. We need to ensure, and show clearly to the world, that people and communities are able to fully take advantage of these opportunities, and that individuals and localities can be supported through the transition away from fossil fuels. A Government strategy, bringing together our existing initiatives with new Government funding, and building on investment by industry, would ensure that no individuals or communities across the UK are excluded from the transition. Importantly, it would give the world confidence that measures can be put in place to ensure a 'Just Transition'.

Recommendation 1

Set a 30GW by 2030 target for onshore wind development.

Historic development of total installations (GW)



Note: figures refer to GW of global wind installation
Source: GWEC Global Wind Report 2021

Even with the rising success of offshore wind globally, which is set to increase as the costs of floating wind continue to fall, the majority of wind development in the world has been and will continue to be in onshore wind.

The Climate Change Committee has recommended 35GW of onshore wind development as part of a lowest cost pathway to net zero, a level of development we also found was required in the modelling of our own Net Zero 'Energy Vision'. The Government has recognised the need for further onshore wind development; re-establishing Pot 1 CfD Allocation Rounds for onshore wind and confirming in the Energy White Paper that "onshore wind and solar… we will need sustained growth in the capacity of these sectors in the next decade to ensure that we are on a pathway that allows us to meet net zero emissions in all demand scenarios".

Given the current pipeline of projects in the UK, 30GW of onshore wind could be developed by 2030[viii]. Developing the onshore wind required for net zero will have numerous societal and economic benefits. As the cheapest form of new power generation, onshore wind will lower energy bills for businesses and consumers. For example, analysis from Vivid Economics suggests that continuing with the rate of deployment we're proposing up until 2035, at which we would have 35GW on onshore wind, could save each UK household £50 a year[ix]. At this point the industry would also support over 31,000 jobs and lift GVA in communities across the UK - with 14,000 people directly employed and more 17,000 indirectly. Add to this that it would deliver £360m a year in exports to the global onshore wind market, a fourfold increase on today. Furthermore, given the relatively quick speed at which onshore wind farms can be developed, we expect the sites unlocked in CfD Allocation Round 4 to play a critical part in the UK's green economic recovery from COVID-19 and levelling-up ambitions.

The potential for the UK to secure further global commitment to the development of low-cost onshore wind is vast. For example, according to a report by World Bank-IFC dated September 2020, Africa has enough onshore wind potential alone to meet the continent's electricity demand 250 times over[x]. While the continent is endowed with 59,000GW of wind power potential, only 5.5GW are so far installed.

However, the benefits of formally committing to a short-term target for onshore wind development aren't purely diplomatic. As we've seen in offshore wind, ambitious commitments to the sector's growth increases investor confidence. It signals to the supply chain the volume of development about to take place – thereby unlocking supply chain investment. Furthermore, it opens a discussion about how to maximise the economic benefits of the sector through a strategy and new initiatives to support supply chain development. This will complement current efforts in offshore wind supply chain development due to technological synergies, whilst capitalising on unique parts of the onshore wind supply chain. Finally, it would set a framework through which Government and industry can establish a long-term strategy to ensure we make the best use of our existing assets through repowering older wind farms with state-of the-art modern turbines, maximise the benefits to local communities and continue to build sites in harmony with nature conservation.

We would also encourage the Government's in Scotland and Wales to set complimentary 2030 targets for onshore wind development, to support this overarching UK ambition of 30GW. The arguments for an overarching onshore wind development target and industrial strategy are more intensely made in those nations which, by virtue of their vast wind resource, are home to most of the expected pipeline of future projects and the expected jobs and economic development from the sector. Scottish and Welsh targets should also recognise the critical enabling actions each will need to take, for example in reforming Scottish Planning to enable the development of the most modern and lowest-cost turbines, or upgrading energy infrastructure in Wales.

Recommendation 2

A hydrogen strategy with a 5GW minimum target for green hydrogen by 2030.

Hydrogen will play an important role in reaching net zero. Alternatives to carbon-based fuels will be required across the economy in heavy transportation, buildings, industry and electricity generation. The possibility of producing hydrogen by a zero-carbon route and storing it at scale will make it a potentially valuable complement to electrification in reducing emissions from energy use to a very low level, cost-effectively, by 2050.

The UK already has a head start in the global race for renewable hydrogen. Firstly, we are home to world leading electrolyser manufacturers, ITM Power, and have world-leading trials of renewable hydrogen, such as the Gigastack project in the Humber. Secondly, our world leading renewables industry - set to be boosted thanks to the Offshore Wind Investment Programme recently launched by the UK Department for Business, Energy and Industrial Strategy (BEIS) to support the delivery of manufacturing investment in the offshore wind supply chain - is providing large volumes of clean, affordable power. And thirdly, our research institutions, combined with the expertise, knowledge and skills of our engineers, provide a strong blueprint for cost reduction and innovation.

It is vital that we send a signal to the world, and investors, that the UK is determined to be at the forefront of green hydrogen development and we share the confidence of nations like Germany, China, and Australia, that cost-reduction in the sector will happen rapidly over the decade. We can do so by ensuring that the UK Government's upcoming hydrogen strategy clearly prioritises green hydrogen, within its ambitions for low-carbon hydrogen production. To this end, the upcoming hydrogen strategy should set a target of at least 5GW of electrolyser capacity by 2030, and 10GW by 2035, coupled with supply-side measures and a revenue support mechanism for hydrogen production.

The Government's 10 Point Plan for a Green Industrial Revolution outlined a 5GW target for low-carbon hydrogen production by 2030. The pace of development in the sector means that it is already time to upgrade this ambition. The Government should review this target in the forthcoming hydrogen strategy to reflect the ambitions of the devolved administrations and industry. It is essential that we have strong ambition for renewable hydrogen development, if we want to signal confidence in the sector to the international community and ensure we capitalise on our strengths and secure the industrial benefits of the sector's development. These targets for hydrogen production should be accompanied by clear measures to support future demand.

Green hydrogen has the potential to sustain thousands of high-skilled, green jobs across the country, mainly in regions outside of London and the South East. A report by the ORE Catapult for the Offshore Wind Industry Council shows that, if the UK harnesses the opportunity of renewable hydrogen from offshore wind and its associated export potential, up to 120,000 jobs could be created across offshore wind generation, the manufacturing of electrolysers and logistics[xi]. Furthermore, modelling by the ORE Catapult shows that exports of offshore renewable hydrogen from the UK could supply a growing import demand from Europe, with a value of up to £48bn by 2050, contributing to a cumulative GVA of £320bn by 2050, mainly from global electrolyser exports.

We are already beginning to see where these hubs of industry could be. The Government announced the Holyhead Hydrogen hub in the Budget. A collaboration of Scottish Power and partners is primed to transform the Port of Cromarty Firth into a hydrogen hub powered by onshore and floating offshore wind, and plans are maturing around a hub in East Anglia, in addition to developments in Milford Haven.

Recommendation 3

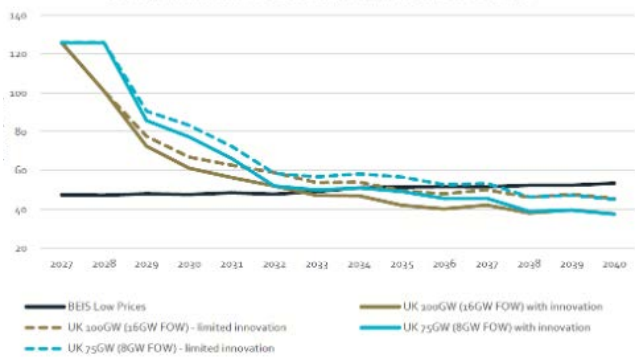
Increase our 2030 floating offshore wind ambition to 2GW.

Given the vast number of areas of deep water to which floating wind enables development, industry expect there will be significantly more floating than fixed-bottom wind farms in the coming decades. A number of countries are leading the development of floating wind, including the UK, Japan, USA, China, Taiwan, Korea, France, Spain, Portugal and Norway[xii]. However, the success of development in these counties has much wider implications for global decarbonisation. Countries such as Brazil, South Africa and India have the potential to develop 748GW, 589GW and 83GW of floating wind respectively[xiii].

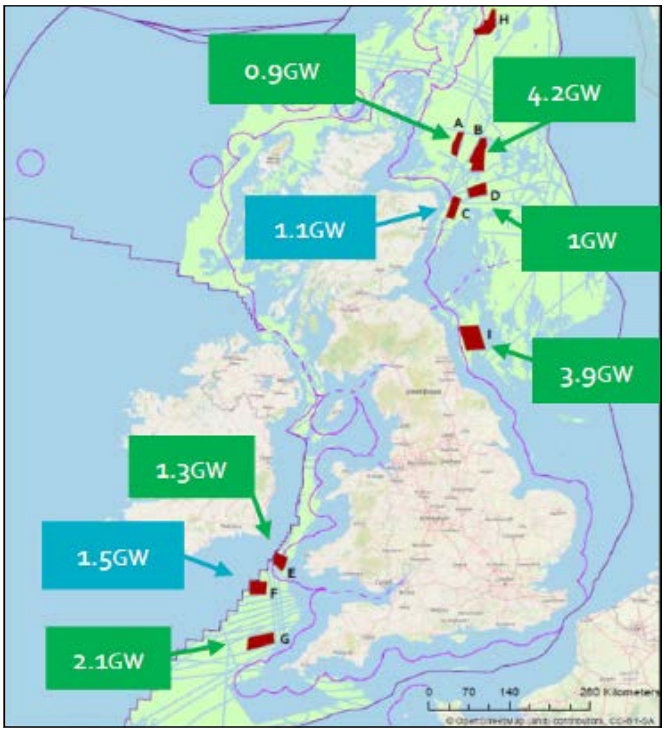
The UK Government set a target of 1GW of floating wind development by 2030, guided by initial industry research. However, recent analysis from the ORE Catapult, and ever-increasing market confidence, suggests that this could be increased to a stretch target of 2GW, with enabling actions. The benefits of this to the UK's COP diplomacy are twofold. First, it shows increased confidence in the sector we would encourage others to share. Second, analysis suggests that by increasing floating offshore deployment in the UK we could accelerate cost-reduction in the technology, increasing the susceptibility of other countries to consider the technology as part of their future decarbonisation commitments. This would be further bolstered by the £20 million of research and development funding announced in the budget for floating wind, which ORE Catapult see as 'essential to longer term cost reduction'.

The economic benefits of being an early mover in the floating wind market are clear. Industry estimates that, with the right support, floating wind can provide 17,000 UK jobs by 2050, delivering £33.6bn of gross value added (GVA)[xiv]. This growth would be particularly apparent in the hubs of the industry in Scotland, Wales and the South West of England, which would also benefit from synergies in skills and capabilities already held within the oil and gas sector as well as the established supply chain from our fixed offshore

UK FOW cost reduction vs BEIS forecast low wholesale price - Scenarios



Source: Offshore Renewable Energy Catapult (2021)



16GW of FOW deployment by 2040

wind industry. Given the expected global growth of the sector we believe the UK can deliver annual UK export value of around £230m by 2031 and £550m by 2050[xv].

A strengthened 2030 target of 2GW of floating wind should be coupled with a joint industry-Government strategy to maximise investment in the UK supply chain. Although much of this would complement supply chain development in fixed offshore and onshore wind, there are many unique components and services in floating wind the UK could be at the forefront of developing, and then exporting across the world[xvi].

Increasing the floating wind target and maximising UK jobs and growth would be contingent on enabling actions for development also being put in place. Just as the Government has used its £160 million fund for port infrastructure investment to secure investments in offshore wind manufacturing facilities in Teesside and Humberside, enabling port infrastructure investment will be required to enable a greater number of ports to handle the fabrication of floating wind components quayside assembly of substructures, turbine/ substructure assembly and launch. In addition to this, the sector will require continued CfD allocation rounds for floating wind, grant funding for demonstrator and scale-up projects, and The Crown Estate would have to continue to reform and expedite its seabed leasing process to allow for further development in England and Wales. Ongoing workstreams such as the Offshore Wind Sector Deal Pathways to Growth group are already addressing key environmental consent challenges for fixed offshore wind and these efforts should be continued, with a renewed focus on floating technologies. Finally, if the Government were keen to maximise investor confidence in the UK, it should consider a supplementary target for floating wind development by 2040, which the ORE Catapult analysis suggests could be set at 16GW[xvii].

Recommendation 4

Set a 1GW target for marine energy development

The UK's world-leading ocean-based renewable technologies could become an affordable and reliable clean energy solutions for many countries across the world. The Technology Collaboration Programme for Ocean Energy Systems (OES) has a vision for 300GW of marine energy technologies installed globally by 2050, creating 680,000 jobs. In the short term, marine energy provides a particularly competitive solution for countries with islands or remote populations who are dependent on expensive and polluting diesel generation. For example, many of the 17,000 islands of Indonesia, the 4th most populated and 16th largest economy in the world, are reliant on diesel generation. However, the wide distribution of wave and tidal energy resource means there is the potential to develop these technologies far beyond these initial sites.

Much like with floating wind, a 1GW target for marine energy, set in the 2030s, would not just signal a confidence in marine energy to the world, but would also demonstrate the UK's commitment to making these technologies a cost-competitive solution for others to adopt. The ORE Catapult's analysis of wave and tidal steam projects – the latter being turbines which generate electricity from the flow of currents from tides – found that tidal stream has the potential to significantly reduce the Levelized Cost of Energy (LCoE) to £90 per MWh at 1GW of global deployment. This would put marine energy on a cost-competitive par with other mainstream forms of low carbon generation, such as nuclear energy and reduce the need for long term storage. Given that tidal stream is currently also being developed in Canada, Japan, China and South Korea, the sector would hope to achieve 1GW of global development before the UK reaches its own 1GW target.

The UK already has promising technologies in the water. Scotland is home to the world's first tidal energy arrays. Nova Innovation installed the first in 2016 and its success in powering homes and businesses in Shetland over the past five years is enabling it to continue to expand. Atlantis installed the world's largest tidal energy farm (6MW) the MeyGen tidal stream project – in the same year. Each turbine has a capacity of 1.5MW, and the array has now exported 35GWh to the grid. Orbital Marine's 2MW tidal stream device was tested at the European Marine Energy Centre tidal test site in Orkney in 2017/18, at which it exported over 3.2GWh over 12 months of continuous generation, in one week around 8% of the requirement of the Orkney Islands.

Nova Innovation has recently announced plans to make Bardsey Island in Wales a blue energy island powered by the tide and create whisky distilled by the tide from its upcoming Òran na Mara tidal energy project in the Sound of Islay.

In being at the forefront of development of wave and tidal steam technologies, the UK stands to reap the economic benefits of the sector's global growth. For example, the ORE Catapult estimate the UK's tidal stream industry could support 4,000 jobs by 2030 and 14,500 by 2040. 50-60% of these high-wage, high-value jobs, and the £1,400 million net GVA benefit, would be focused in coastal areas the Government are looking to regenerate as part of its 'levelling up' ambitions[xviii]. Furthermore, the Energy Innovation Needs Assessment of tidal stream, commissioned by the Department for Business, Energy and Industrial Strategy, estimated that growth of UK tidal stream exports could add over £540 million GVA and nearly 5,000 jobs per annum by 2050[xix]. The UK is already exporting tidal energy technology, with Nova Innovation securing a 15-turbine export order for their project in Nova Scotia, Canada.

However, this target would need to be coupled with a revenue support mechanism to drive investment and development. We are heartened to see Minister's are actively considering setting the parameters of future CfD auctions to support the development of marine technologies. This will support the sector's development. However, to achieve cost reduction at pace, it is preferential to have a policy mechanism which enables a more rapid deployment of small projects, as this increases the pace of learning and innovation. To this end, the industry also recommends the introduction of a tax incentive for Power Purchase Agreements (IPPA's) of marine technology. This would seek to nullify the difference in price between marine and mature renewables in the PPA market, unlocking private investment in projects.

Recommendation 5

A 'Just Transition Strategy' to show how the UK is utilising energy decarbonisation to 'level-up' and ensure no one and nowhere is left behind.

The transition to a net zero economy will, in the UK and globally, create new opportunities and bring new investment to communities. Over the next five years, the offshore wind industry alone is expected to invest around £10.1bn in the UK each year in developing, constructing and operating offshore wind projects as the industry expands rapidly to help the Government to achieve its net zero emissions goalxx. As a result, the Offshore Wind Industry Council estimate that the number of people working in direct and indirect jobs in the offshore wind alone in the UK is set to rise significantly, from 26,000 currently to over 69,800 by 2026xxi. Most of the jobs are being created in parts of the country which urgently need levelling up, including the north east of England, Yorkshire and The Humber, East Anglia and Scotland.

The Government is taking an active role in ensuring that those people and communities which are home to the industry gain the most from it. We have already begun to see how the £160 million earmarked for port infrastructure development and co-investment is unlocking further growth in the UK's supply chain. The new GE blade manufacturing facility in the Teesside, confirmed this year following £20 million of enabling port investment, is set to create 750 direct renewable energy jobs and close to 1,500 indirect jobs in the area.

The North Sea Transition Deal sets out new measures to support the diversification of companies operating in oil and gas into offshore renewables. There has been greater mutual recognition of oil and gas and wind qualifications to ease the transfer of those working in each sector, and initiatives like the Futures Forum are encouraging young people into the industry.

There is, first and foremost, a need to string these schemes together so that, as COP26 President, we show that, whilst multifaceted, a Just Transition is achievable and being delivered in the UK.

Secondly, a Just Transition strategy could be utilised and an opportunity to enhance and synthesise existing initiatives. Further funding for skills, building on industry programmes could support apprenticeships at all levels to help new entrants into the sector as well as retraining and upskilling the UK workforce to take advantages of new roles in the sector. Retraining and skills transition is a particular priority as 80% of the UK's workforce in 2030 has already left school, and is therefore out of reach of the government policy on schooling. Funding under the Just Transition strategy could support individuals seeking to reskill or retrain to meet streamlined industry standards for transitioning into wind and renewables more widely.

Finally, growing of a competitive local supply chains will create new opportunities in communities across the UK and support levelling up. The renewed focus on offshore wind supply chain development outlined in the 10 Point Plan, for example, has been successful in securing new investment in communities we aim to level-up. Indeed, a re-invigorated onshore wind market will bring significant benefits to local economies, as the sector has a record of delivering projects with over 60% UK content. Investment secured to date in renewable supply chains could be enhanced with continued port investment and co-investment opportunities, continued research and development (building on the £100 million Offshore Wind Growth Partnership scheme funded by industry) and a broader focus on the supply chain across the renewable energy sector.

Actions to accelerate our progress towards power targets – existing and proposed

Although, we have chosen to focus the recommendations of this report on those commitments which may capture the world's attention ahead of COP26 and influence the power decarbonisation commitments of other nations, this is not the limit of the actions Government should take to ensure we are on the path to net zero emissions.

The Government should also:

- Continue to address barriers to the growth of renewables, including; establishing a well-resourced new planning system which puts the climate emergency at the heart of decision making, deeper engagement and clarity on environmental harmonisation and consent processes, and addressing restraints due to aviation radar.
- Reform the regulator's (Ofgem's) remit to support net zero, so it is embedded within all of its decision making. This would ensure it avoids reforms which unduly restrain vital investment in decarbonisation, as is the case with current proposals for network charging reform.
- Unlock the 16GW pipeline of energy storage in the UK to provide greater flexibility to our energy system.
- Press forward with system flexibility, which will enable households and other energy consumers to adapt their consumption patterns, and generators to vary their behaviour to support the energy system and further benefit from low-cost clean power. Part of this will come from a better utilisation of 'demand side response', where businesses and consumers can turn-up, or down, their electricity use in real time to benefit from periods of high generation.
- Continue to set 'demand-signals' to energy investors by making long-term commitments to the decarbonisation of other sectors of the economy which will require clean power to deliver.

Conclusion

The UK has one of the strongest records on decarbonisation in the world. As the Prime Minister has said, we are the 'Saudi Arabia' of wind, with the world's largest offshore wind market. Developers of onshore wind and solar, and world leaders in the innovative new technologies which will unlock much more rapid decarbonisation across the world, in green hydrogen, floating wind and marine technologies.

This report has shown that, through a series of policy adjustments, there are eye-catching commitments to decarbonisation that the UK can still make ahead of COP26 which will encourage other nations to increase their ambitions. Furthermore, that in doing so, we will boost investor confidence in our own domestic market, resulting in the generation of green jobs and industry that will support the Government's aim of levelling up the economy across the UK.

i. Analysis produced for the Offshore Wind Industry Council by RenewableUK, the National Skills Academy for Rail and independent data analysts Opergy Ltd (2020) https://www.renewableuk.com/news/557871/More-than-69000-jobs-and-60-billion-private-investment-in-UK-offshore-wind-by-2026.htm
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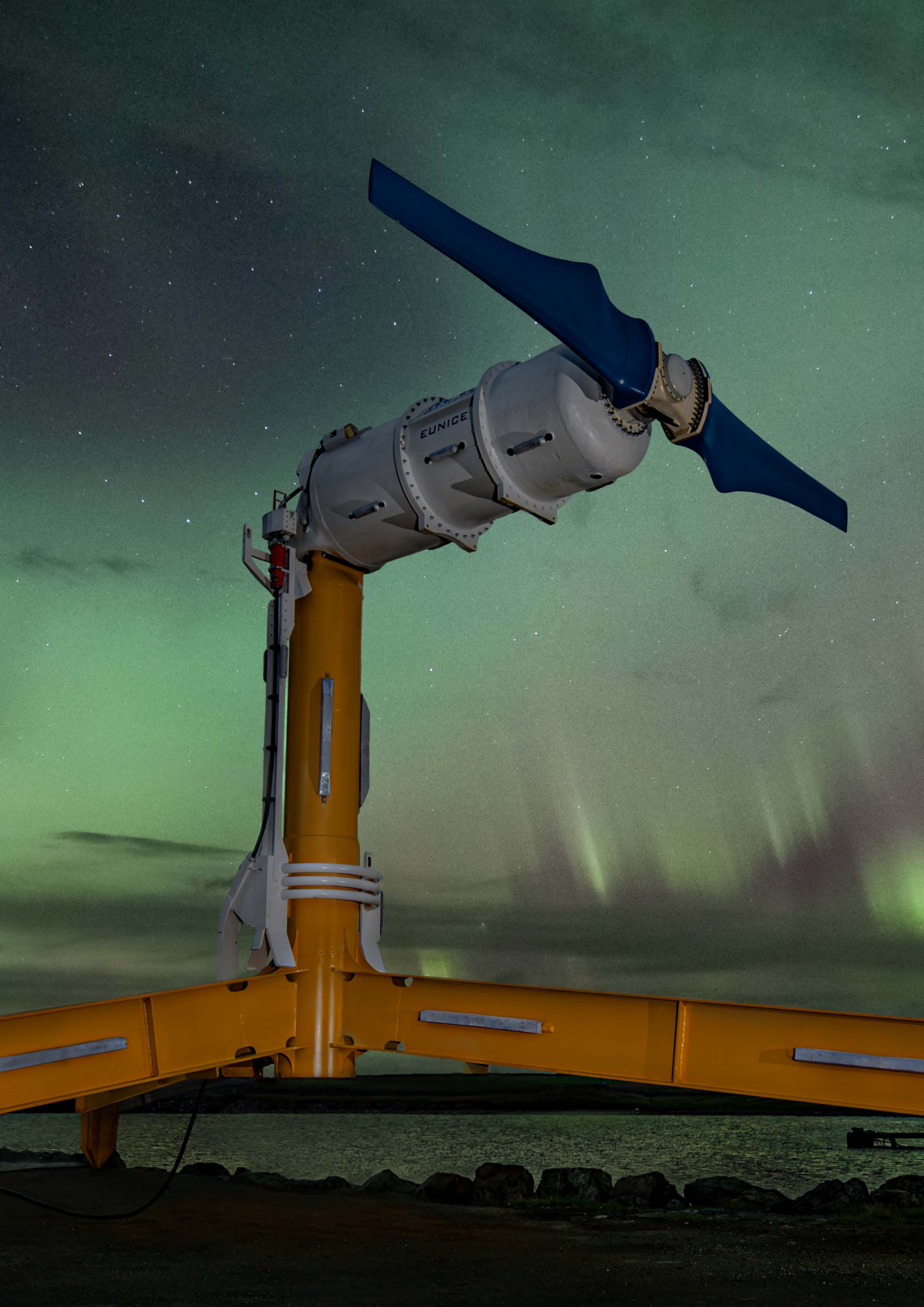
v. RenewableUK (2020) Recommendations for a Green Economic Recovery
vi. ORE Catapult & Offshore Wind Industry Council (2020) Green Hydrogen: Solving the Integration Challenge
vii. ORE Catapult (2021) Floating Offshore Wind: Cost reduction pathways to subsidy free
viii. Analysis draw from RenewableUK's Project Intelligence Hub
ix. Vivid Economics (2019) Quantifying the benefits of onshore wind to the UK
x. Analysis by Everose commissioned by the World Bank Group - https://gwec.net/exploring-africas-untapped-wind-potential/#:~:text=A%20new%20study%20for%20IFC,electricity%20demands%20250%20times%20over.
xi. ORE Catapult & Offshore Wind Industry Council (2020) Green Hydrogen: Solving the Integration Challenge
xii. Carbon Trust (2015) Floating Offshore Wind: Market and Technology Review
xiii. ESMAP (2019) Going global: Expanding offshore wind to emerging markets
xiv. RenewableUK & Scottish Renewables (2019) Floating wind: The UK industry ambition
xv. Crown Estate Scotland & ORE Catapult September (2018) Macroeconomic Benefits of Floating Offshore Wind in the UK
xvi. ORE Catapult (2020) Floating Wind in the Celtic Sea: Future Supply Chain Opportunities
xvii. ORE Catapult (2021) Floating Offshore Wind: Cost reduction pathways to subsidy free
xviii. Offshore Renewable Energy Catapult (2018) Tidal stream and wave energy cost reduction and industrial benefit
xix. Vivid Economics (Oct 2019) Energy Innovation Needs Assessment; Sub-theme report: tidal stream
xx. Offshore Wind Industry Council (March 2021) Skills Intelligence Model
xxi. Offshore Wind Industry Council (March 2021) Skills Intelligence Model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RenewableUK members are building our future energy system, powered by clean electricity.

We bring them together to deliver that future faster; a future which is better for industry, billpayers, and the environment. We support over 400 member companies to ensure increasing amounts of renewable electricity are deployed across the UK and access markets to export all over the world. Our members are business leaders, technology innovators, and expert thinkers from right across industry.

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