RWE

RWE's vision for the Celtic Sea

Foreword

Tom Glover, UK Country Chair

Applying our proven track record in offshore wind deployment and innovation to the Celtic Sea Floating Wind opportunity.

Creating a new industry to deploy floating wind in the Celtic Sea presents a multi-billion pound economic development and investment opportunity for Wales and the South West of England.

The region offers some of the best floating wind potential in the world, with all the requisite ingredients necessary to develop the economy to meet these needs in a way that will flourish well into the next century.

In recognition of the huge potential on offer, The Crown Estate has set out a clear and ambitious target of 24GW of floating wind power to be developed and deployed in the region by 2045. This will facilitate greater home-grown clean energy production, together with major new opportunities for research, advanced manufacturing and innovative logistics that will enable new synergies and co-location of the low carbon industrial processes of the future.

The forthcoming Celtic Sea leasing round presents a hugely exciting opportunity for RWE to deliver world class floating wind project(s) that can help realise Wales' and the wider UK's net zero ambitions, whilst delivering far-reaching and long-lasting economic benefits through investment in infrastructure such as ports, engineering facilities and manufacturing industries across the supply chain - supporting the retention and creation of thousands of jobs in the coming decades.

The UK is a leader in fixed offshore wind deployment, with the success of this sector recognised globally. Other nations are seeking to catch-up and attract offshore wind development through large-scale leasing rounds, investment and market enabling practices. First mover advantage is key if the economic opportunity from floating wind is to be maximised here in the UK. Failure to do so will allow overseas competitors to steal a lead in establishing the associated infrastructure, manufacturing and supply chain opportunities.

RWE has been at the forefront in developing the UK's offshore wind sector. We were part of the country's very first offshore wind demonstrator and developed the first commercial scale offshore wind farm at North Hoyle, which we continue to operate today. In the following 20 years, we have grown our offshore fleet to eleven projects that are either in operation or under construction in British waters, with a further six in development.

The Celtic Sea region is pivotal to RWE's 'Growing Green' strategy in the UK, where we expect to invest £15 billion in clean energy infrastructure by 2030. Putting this plan to work in the region will help facilitate and forge the energy, industrial, societal and economic transformation urgently needed to meet the UK's net zero ambitions.

Combining the extensive breadth of our presence across Wales and the UK, and the depth of our experience in the offshore wind sector, RWE is setting the pace in establishing the necessary understanding and foundations for maximising the floating wind opportunity in the Celtic Sea region.

Tom Glover
UK Country Chair, RWE

Maximising the UK's offshore wind superpower

Unlocking clean energy in new areas offshore

Wind power contributes over half of the UK's total renewable energy production and is the second largest source of electricity in the UK. In pursuit of ambitious offshore wind targets, the UK is turning its attention to waters further out to sea, where wind speeds are stronger but deeper waters present technical and logistical challenges for the construction of traditional 'fixed' offshore wind platforms.

The solution to this challenge is the use of floating offshore wind platforms, which can be installed in deeper waters, further offshore with greater wind yields.

The Celtic Sea region presents the opportunity to develop large-scale, commercial floating offshore wind power. Development here will strengthen our energy independence as weather systems in the region work differently to those on the UK's east coast, where the majority of our wind infrastructure is currently.

80 percent of potential offshore wind capacity in the UK is located in waters more than 60 metres deep and can be made accessible by floating offshore wind.

RWE intends to participate in the upcoming Crown Estate Celtic Sea Leasing round with the aim of securing at least **1GW** to develop through 2020s and **deploy in the early 2030s.**

The Crown Estate is holding its first Celtic Sea offshore leasing round in 2023 for the deployment of **4GW of new clean energy capacity between 2030 and 2035**, with plans of further leasing rounds to encourage deployment of another **20GW of power by 2045** - more than the total amount of offshore wind generation today.

The Offshore Renewable Energy Catapult has stated that new floating wind opportunities in the UK have the potential to deliver **£43 billion in Gross Value Add and 29,000 jobs by 2050.**

What is floating offshore wind?

Floating wind uses the same generating turbines as conventional 'seabed-fixed' offshore wind but they are deployed on top of floating structures (made from concrete and/or steel) that are secured to the seabed with mooring lines and anchors. Electricity is transmitted to shore via subsea cables and connected to the national grid to power homes and businesses. The electricity can also be converted to other forms of green energy such as Hydrogen.

Find out more:

www.rwe.com/floating-wind

RWE: committed to the clean energy transition

RWE has a long-established history and reputation in the delivery of UK power projects ensuring security of home-grown electricity supplies through our diverse asset base. In recent decades our work has taken us beyond traditional generation sources. We have responded to climate challenge through the development of new clean energy projects, including onshore and offshore wind.

As a result, RWE has transformed into one of the world's leading renewable energy developers, second in the world for offshore wind development, and a key facilitator of the energy transition, with an clear commitment to achieve carbon neutrality by 2040.

To realise our commitment to achieving this, RWE expects to invest up to £15billion in clean energy infrastructure in the UK by 2030.

Over the last 20 years our projects have delivered £25 million in community benefit funds across the UK – funding that provides transformational opportunities for communities the length and breadth of the country.

Unrivalled technical capability in floating wind

RWE has been hard at work to building world-leading expertise and knowledge on floating wind, implementing an unparalleled plan for development and deployment at a commercial scale.

Our dedicated technical team has spent the past four years comprehensively evaluating foundation technologies, and how each can work at commercial scale with the supply chain and ports facilities offered in South Wales and the South West of England**.**

Our programme also includes three pioneering demonstrator projects in the US, Spain and Norway. Studying how different technologies respond to varying conditions provides real-life insights beyond structural competence; pointing us towards port and energy infrastructure, supply chain requirements, production strategies, planning and more.

As well as being deeply embedded with key industries in our own right, RWE is also working alongside its counterparts to further the development and understanding of floating wind in the UK. RWE is a member of Offshore Renewables Catapult Floating Wind Centre of Excellence, established to develop an internationally recognised initiative to reduce the cost of energy from floating wind.

RWE is also a founding member of the Carbon Trust's Floating Wind Joint Industry Project, which has been working since 2016 to address technological challenges and accelerate the commercialisation of this vital technology in the push to net zero.

RWE in Wales - A rich energy heritage and ambitions for a transformative green future

Key Milestones in RWE's and Wales' decarbonisation story

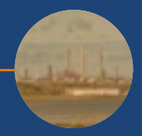
Early 1900s:
Development of Welsh hydroelectric sites, five of which are still generating up to 45MW of power

1960s
Development and commissioning of Aberthaw Coal Power Station and Pembroke Oil Fired Power Station

2004:
North Hoyle commissioned as the UK's first commercial-scale offshore wind project off the coast of North Wales – constructed and operated by RWE

2005:
RWE acquires Pembroke Power Station

2009:
Rhyl Flats Offshore Wind Farm commissioned



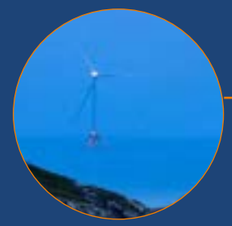
2012:
UK's most efficient combined cycle gas turbine power station opens at Pembroke Power Station

2015: Gwynt y Môr offshore wind farm commissioned

2020:
Coal generation in Wales ends as RWE closes Aberthaw Power Station

2021: RWE's Welsh renewables projects reach a milestone of providing £10m in community funding

2022:
RWE commissions its largest UK onshore wind farm at Clocaenog



Stiesdal Offshore Technologies TetraSpar Demonstrstor ApS

Looking ahead:

2020s:
RWE's Awel y Môr offshore wind farm, a sister project to Gwynt y Môr, is set to be the largest private sector renewables investment in Wales this decade

Development of Pembroke Net Zero Centre around green hydrogen, carbon capture and floating wind in the Celtic Sea

What is RWE doing to realise its Celtic Sea ambitions?

Putting our asset base to work

- We are the **largest renewables generator in Wales** and are in the unique position of already working within the **socio-political landscape to deliver** successful large-scale renewables projects.
- We have **offices located in Baglan Bay, Pembroke Dolgarrog and Port of Mostyn** and employ 300 people from a range of disciplines. New job roles arising from our work in the Celtic Sea have been offered to colleagues seeking new opportunities. Our offices will expand as the project grows.
- **Our people working across our projects in Wales** hold the key to success. Our people hold the local knowledge, relationships, and experience needed to deliver responsible projects.
- **Our extensive project pipeline** and ambition in Wales, the UK, and Ireland have the capability to **create project synergies, economies of scale, and create new opportunities** for the Region.

RWE floating wind knowledge capability programme

- We have invested **in three demonstration projects** offering a variety of take-home lessons that will be put to work on Celtic Sea projects.
- We have an **in-house floating wind capability programme, working with both the Carbon Trust and ORE Catapult** and taking learnings from our technical feasibility studies from other markets to use in Celtic Sea projects.
- We have been studying the technical feasibility of floating wind designs for our projects in the Celtic Sea for the past four years, comprehensively studying **technologies and carrying out engineering feasibility studies** of technologies and supply chains.
- **Our in-house team of offshore wind specialists** have decades of experience of delivering successful offshore wind projects. This foundation has been supplemented with the works of our FLOW capability programme of specialised FLOW engineers and project managers.

Embedded with the local Supply Chain

- Local deep water ports are essential for the delivery of FLOW. We recognised this early and **created working partnerships with both ABP Port Talbot and Port of Pembroke.** We are working closely with both ports to exchange technical and deliverable capability requirements to co-design the essential capability characteristics required for FLOW.
- We are creating working partnerships with key supply chain parties who will benefit greatly from the opportunity. Our **partnership with TATA Steel UK** is one example of where we are working with supply chain partners to help realise their role and potential within the Celtic Sea and to seek supply chain benefit.
- Our in-house team of supply chain managers are embedded within all stages of our offshore wind projects and have a current expertise of the regulatory framework and grass-roots supply chain requirements and capabilities.
- We have invested in several suuply chain feasibility studies that will deepen our understanding of the unique supply chain opportunity presented by the Celtic Sea.

Defined route to market

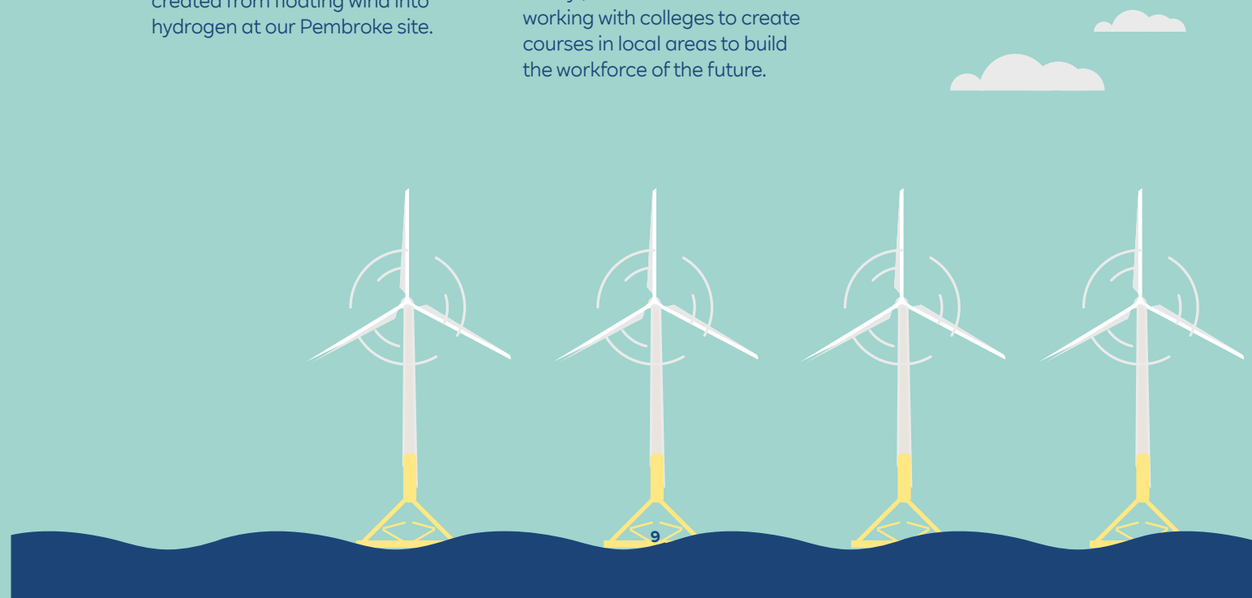
- We have already secured a 1GW and a separate 400MW grid connection agreement.
- We have further flexibility around our ultimate grid connection location: for instance, we have secured an option to build and operate a substation at the site of our ex-power station Aberthaw. We hold a considerable land bank surrounding our waterside location at Pembroke Power Station and we have earmarked land for substation development there too.
- To further increase our flexible approach to route to market, we are also developing a blueprint for the conversion of electricity created from floating wind into hydrogen at our Pembroke site.

Skills and workforce creation

- We already have links with Swansea and Cardiff universities with further partnerships being explored.
- We have supported PhD research at the University of Exeter and at Bangor University.
- We developed a national apprenticeship hub in 2012 at Coleg Llandrillo, Wales. This programme produces skilled wind technicians to help meet the growing needs of the offshore wind sector.
- We are also supporting the development of a new £12 million engineering training facility for Grŵp Llandrillo Menai in Rhyl, and are committed to working with colleges to create courses in local areas to build the workforce of the future.

Deliverability

- We have demonstrable experience of delivering commercial scale offshore wind projects in the UK and worldwide.
- We have major UK investment ambition (£15 billion by 2030).
- We have a global financial commitment to renewables investment and development (€50 billion by 2030).



Pembroke Net Zero Centre case study

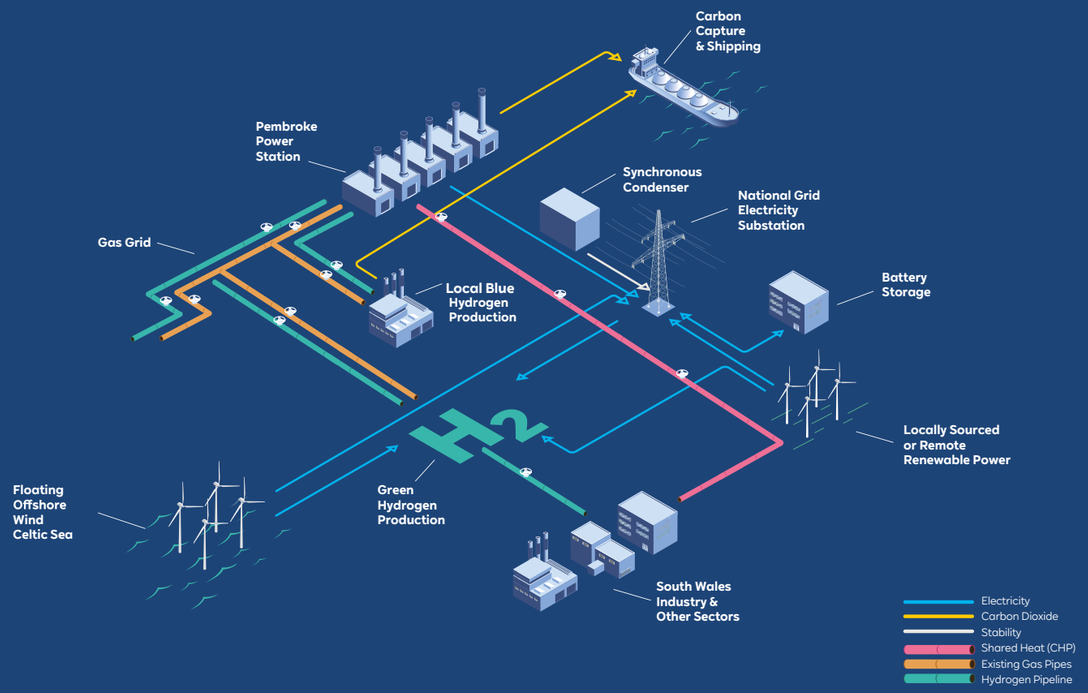
RWE is progressing the development of its 'Pembroke Net Zero Centre', based around Pembroke Power Station. Bringing together new technologies, including hydrogen use and production, carbon capture and storage, as well as battery storage, supported by the deployment of floating offshore wind in the Celtic Sea, this project would see the creation of a major decarbonisation hub.

Pembroke Net Zero Centre takes forward RWE's commitment to supporting the decarbonisation of Wales and is made up of three distinctive pillars:

1. Decarbonisation of the power station, including carbon capture and storage and hydrogen consumption feasibility studies;
2. Green hydrogen production feasibility studies, and the potential development of an electrolyser on the site; and
3. Floating offshore wind development in the Celtic Sea

Pembroke has all the elements to become a major hub for decarbonisation, including access to floating offshore wind, land for the development of large-scale electrolysers, electricity and gas grid connections, alongside RWE's gas-fired power station providing firm and flexible power.

Our investment in decarbonisation at Pembroke Net Zero Centre has the potential to see RWE become the foundational green power and gas provider to Wales, helping many industries and communities meet their decarbonisation targets and helping the Welsh and UK Government's to achieve their ambitions for net zero.



The Celtic Sea:
An unmissable opportunity to...

Deliver at pace towards net zero, in new areas offshore

- The UK has set ambitious targets to develop its home-grown energy supply and expand the deployment of offshore wind in the country's journey to net zero by 2050.
- RWE's impressive UK asset base, including in Wales, our development and generation expertise, combined with our strong financial performance, makes us a safe pair of hands in which to deploy multiple commercial scale floating projects.

A new floating wind industry for the region

- The Celtic Sea offers a new frontier for offshore wind deployment, utilising floating technology to harness the potential of deeper waters.
- RWE is in a leading position on understanding true floating wind costs via our €30m (~£26m) investment into three floating wind demonstrators, and over €5m (~£4.4m) invested in technical and cost studies. RWE is active in floating research and design, driving cost reduction through all phases of asset life.

Working in collaboration with critical enabling infrastructure

- Development of the correct capabilities in critical enabling infrastructure with the right investment, in advance of project deployment, is vital if the region's floating wind potential is to be realised within the 2030-2035 timeframe.
- This need was identified very early on by RWE, and we have been working intensively under partnership and co-operation agreements with the region's key ports and the wider supply chain to ensure that the correct capabilities will be developed and that infrastructure parties are pulling in the same direction.

Unlock new skills and drive economic growth

- South Wales already offers multiple industrial clusters with skilled jobs, including energy in the west, and several vital manufacturing hubs.
- RWE's assets in the region are located along the industrial backbone of South Wales, including Pembroke and Baglan – we are committed to growing the teams we already have within the region to deliver multiple floating wind projects as well as supporting the wider supply chain to upskill and grow in response to the market demand.

Responsible approach to site selection, social and environmental needs

- As a new industry for the region, the existing sea and land uses must be identified and balanced with the need to develop home grown clean energy. The Crown Estate has already gone to considerable lengths to avoid immediate constraints through its site selection approach.
- Having developed the first UK offshore wind farm in 2000 and having one of the largest offshore wind fleet and pipeline in the UK and globally, RWE is highly experienced in the responsible siting of our projects and identifying positive mitigation. Further, we have committed £25m to community benefit funds in Wales for the next decade.

Find out more

To find out more about RWE in the Celtic Sea or about floating wind technology, visit:

rwe.com/celtic-sea

rwe.com/floating-wind-education

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