RenewableUK

Developing effective end-of-life policy frameworks for UK offshore wind

February 2025

Contents

I. Executive summary

Wind has become the UK's most important clean power source. Since 2003, 14.7GW of offshore wind has been installed.[1] In 2023, wind provided a record 30% of Britain's electricity.[2] As the role of offshore wind is set to grow with more projects going live in 2025, the UK's earliest offshore wind farms are currently entering the final lifespan stage. Over one-third of the UK's offshore wind farms will reach the end of their originally anticipated operational design life by 2035.[3]

Policy attention has so far focused on building new offshore wind farms with limited focus on end-of-life scenarios for offshore wind farms, which in addition to decommissioning, includes lifetime extension and repowering. However, the UK's existing offshore wind farms present a unique opportunity to leverage existing infrastructure and sites towards achieving clean power and energy security.

RenewableUK has identified five key challenges for end-of-life scenarios for offshore wind farms that the UK Government and regulators must urgently address:

1. **Decommissioning:** Clear direction and leadership are needed, as well as plans to update the existing guidance[4] to recognise the complexity of offshore wind farm decommissioning and to allow for the development of the best decommissioning option for an offshore wind farm that considers technical, commercial, and environmental challenges around decommissioning.

2. **Financial certainty:** To optimise late-life decisions and capital deployment, a fairer approach to tax treatment should be adopted and the use of alternative forms of financial securities, such as Parent Company Guarantees (PCGs) reviewed.

3. **Lifetime extension:** An average of 900MW per year risks being decommissioned during the 2030s.[5] Clarity on lifetime extension will be urgently needed to drive greater value from existing offshore wind sites.

4. **Repowering:** Repowering offshore wind assets is an opportunity to maximise increasingly limited seabed resources and retain vital generation capacity. There is a clear opportunity to develop a framework for offshore wind repowering and to build upon the recent positive steps made by the Government, as seen with the inclusion of onshore repowering in Allocation Round 7 (AR7).

5. **Establishing a clear OFTO framework for end-of-life:** Whilst significant progress has been made in creating End of Tender Revenue Schemes (EoTRS) frameworks for lifetime extension, it is important that effective policy, regulation, and guidance are delivered quickly and efficiently to avoid the Offshore Transmission Owner (OFTO) regime acting as a blocker to lifetime extension and repowering.

Effective end-of-life policy frameworks for UK offshore wind farms will be critical to support the UK Government's ambition for clean power. In addition to prioritising decommissioning alongside deploying new offshore wind farms, offshore wind farm developers will require clear policy frameworks that promote lifetime extension (LTE) or repowering options for offshore wind farms.

2. Definitions of end-of-life options for offshore wind farms

Several options are available when assessing end-of-life options for an offshore wind farm. These include decommissioning, lifetime extension and repowering[6] (which will require decommissioning of the original offshore wind farm). The options and the decision processes are captured in Figure 1.

Decommissioning: Decommissioning an offshore wind farm will involve de-energising and disconnecting the wind farm from the electricity transmission network. This will be followed by removing and transporting the wind farm's infrastructure and associated transmission infrastructure to shore before appropriate treatment of assets onshore, including recycling.

Full removal will require an offshore wind operator to ensure the removal of all infrastructure above and below the seabed. Partial removal of infrastructure allows operators to leave some infrastructure (e.g. scour protection) in place on the seabed. Clearing the seabed requires fully clearing all infrastructure on and above the seabed but leaving behind foundations cut and buried below the seabed.

Lifetime extension (LTE): LTE involves prolonging the lifespan of an existing wind farm asset beyond its original planned design life. This may require an upgrade and overhaul of existing machines and transmission assets and ongoing maintenance during any extension period.

Repowering: Replacement of infrastructure at an existing site with new components of a significantly different scale and nature from what was consented to in the original project design, e.g. installing entirely new foundations and turbines.

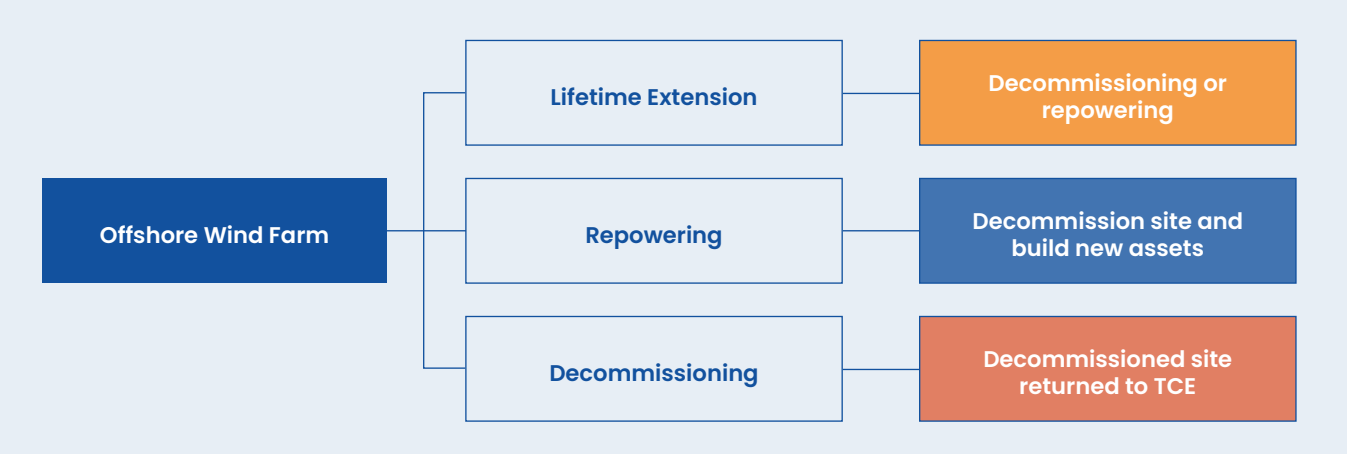

Figure 1: End-of-life options for offshore wind farms.[7] These processes can theoretically be repeated.

3. Introduction

Offshore wind is fast becoming the backbone of the UK's energy system. Since 2003, 14.7GW of offshore wind has been installed. In 2024, the total pipeline of offshore wind projects in the UK is nearing 100GW. To support the UK's ambitions for clean power, policy attention has so far focused on building new offshore wind farms. However, with an originally anticipated average lifespan of 20-25 years, the UK's earliest offshore wind farms are currently entering the final lifespan stage. According to RenewableUK analysis, the UK risks losing around 5GW of offshore wind capacity in the next decade.[8] Therefore, policy frameworks that promote lifetime extension (LTE) or repowering options for offshore wind farms in addition to focusing on – potentially limiting – decommissioning requirements are needed. Both solutions are ultimately critical to support the UK Government's ambition for clean power.

To support the development of effective end-of-life policy frameworks for UK offshore wind, RenewableUK has identified five core challenges that the UK Governments and regulators must address urgently:

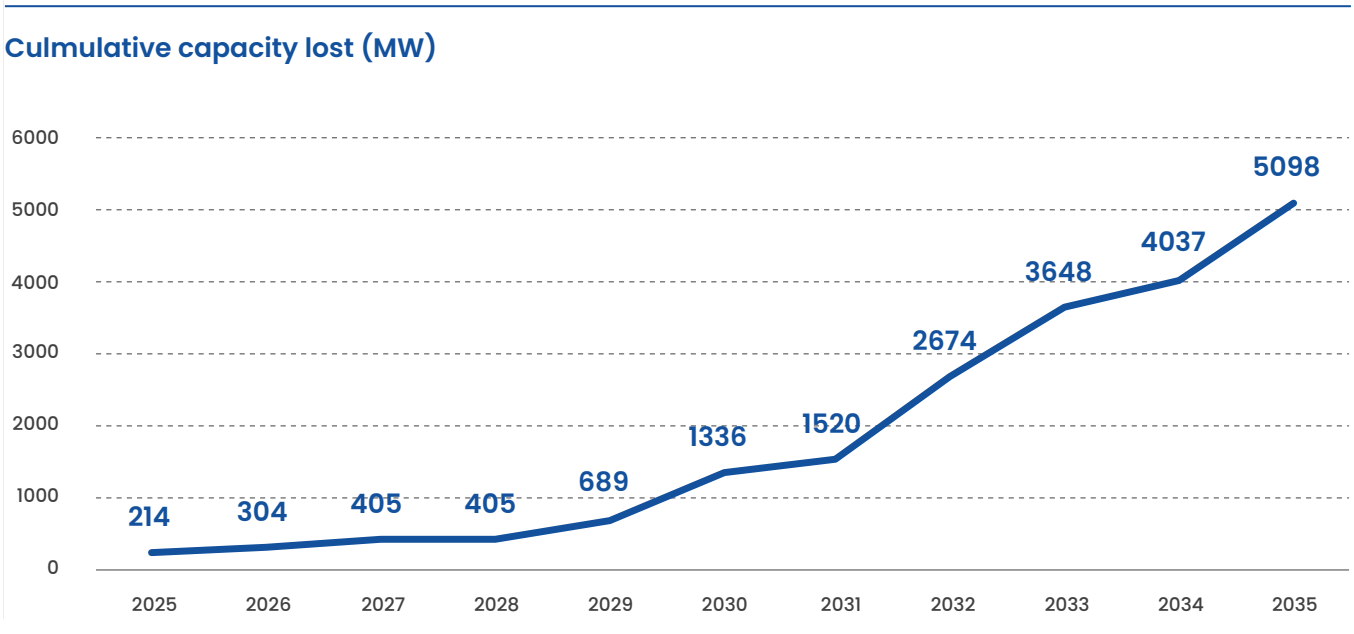

Figure 2: Cumulative offshore wind capacity at risk in the next decade. Current installed capacity is around 14.7GW. Per RenewableUK EnergyPulse.

3.1 Developing clear guidance for decommissioning

Over one-third of the UK's offshore wind farms will reach the end of their originally anticipated operational design life by 2035 and will have to be decommissioned should lifetime extension not be pursued.[9]

Decommissioning in the UK is predominantly regulated under the *Energy Act 2004* (amended by the *Energy Act 2008*) and the *Scotland Act 2016*.[10,11] The *Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004: Guidance Notes for Industry (2019)* for England and Wales and in Scotland under the *Offshore Renewable Energy: Decommissioning Guidance for Scottish Waters (2022)* – subsequently referenced as '*decommissioning guidances*', furthermore aim to assist businesses understanding the obligations, including the process of submitting a decommissioning scheme.[12, 13, 14]

Both *decommissioning guidances* furthermore set out that, at the end of a wind farm's operational life, all infrastructure is expected to be fully removed. While lessons can be drawn from the decommissioning of offshore oil and gas installations, offshore wind farms face sector-specific challenges. The removal of infrastructure should be considered through a commercial, technical and environmental lens. For example, significant uncertainty remains regarding what is technically or commercially feasible and will depend, for instance, on a wind turbine's monopile size, a wind farm site's integrity, and ground conditions. It will also depend on which solutions have already been developed by the supply chain, including the technical solutions to remove monopiles in their entirety and carry them ashore.[15] In addition, removing offshore wind farm infrastructure also risks impacting the marine environment, including potential impacts on established habitats. However, scour protections and the above-seabed extent of monopiles can also become an integral part of the marine ecosystem or contribute to biodiversity enhancement.[16]

With the UK's first offshore wind farms taking decisions on decommissioning preparation now, decommissioning must be prioritised alongside the deployment of new offshore wind farms.

Secondly, clear direction and leadership are needed on which department within each devolved Government is making the final decision on the offshore wind industry's decommissioning programmes. In addition, existing *decommissioning guidances* should be updated to recognise the complexity of offshore wind farm decommissioning and to allow for the development of the best decommissioning option for an offshore wind farm that considers technical, commercial and environmental challenges around decommissioning. This also includes developing an offshore wind-specific Comparative Framework Assessment[17] and providing clear guidance for offshore wind farms consented to pre-June 2006.

Finally, engagement between devolved Governments, Government departments (including the Department for Energy and Net Zero, DESNZ, and the Department for Environment, Food and Rural Affairs, Defra), as well as The Crown Estate, Crown Estate Scotland, and statutory consultees (including the Marine Management Organisation, MMO, and Natural England) will be critical to developing a decommissioning framework fit for purpose for the UK's offshore wind sector.

3.2 Providing financial certainty

Current financial requirements for the decommissioning of offshore wind farms are overly restrictive and limit the ability of developers to deploy capital in other key areas, including the development of new projects.[18] Letters of credit (LOCs) are currently the UK Government's preferred form of financial security for the decommissioning of sites. However, these strict provisions tie up capital that could be deployed in the development of further renewable capacity in the UK market.

There is also currently an unbalanced approach when looking at the tax treatment of offshore wind decommissioning relative to other sectors. There is a lack of clarity around the tax deductibility of decommissioning costs for offshore wind. This is inconsistent with the approach taken in the oil and gas sector, where these costs are clearly defined and deductible. In particular, there is uncertainty regarding a company's ability to effectively realise the benefit of capital allowances on its decommissioning costs after a wind farm has ceased to operate. Adopting a fairer approach to tax treatment and reviewing the use of alternative forms of financial securities, such as Parent Company Guarantees (PCGs), can optimise late-life decisions and capital deployment.

3.3 Lifetime extension for energy security

A wind farm's operational life may be extended beyond its original design life, anticipated at the point of investment following, for example, repairs or additional maintenance. Life extension will vary in duration but would, in essence, postpone the decommissioning phase and/or potentially lead to decommissioning in phases in step with turbine decline.

In addition to driving greater value from existing offshore wind sites with mature assets already in operation and slowing the demand for raw materials to build new wind farms and ease the pressure on supply chains, extending a wind farm's lifetime also offers a significant opportunity to help the UK reach its clean power targets. In fact, without an opportunity to extend the life of assets (and/or repower

those same sites), there is a risk of the UK's offshore wind capacity growth slowing, or plateauing. An average of 900MW per year risks being decommissioned during the 2030s.[19] This figure could increase to around 2.4GW by the 2040s[20], putting the UK's Governments' clean power targets at risk.

While the focus should remain on scaling up capacity to meet the UK's ambitious targets, the Government must recognise that the UK's maturing fleets present a unique opportunity to leverage existing infrastructure towards achieving clean power and energy security.

3.4 Opportunities through repowering

Repowering of offshore wind assets is another key opportunity to maximise increasingly limited seabed resources and retain vital generation capacity. Repowered projects, where a new generation asset is developed in an existing offshore wind location, can deliver more efficient and resilient assets in sites with favourable seabed conditions and existing infrastructure.

There are a number of outstanding challenges when considering repowering. Repowering of assets is unlikely to be viable within the original 50 to 60-year seabed lease term due to the time required for two rounds of construction and lifetimes which may incorporate lifetime extension. The process for a newly consented project being incorporated into the existing lease, particularly if there are changes in capacity, is unclear. Increasing the generation capacity of a site is one of the principal means of improving the efficiency of a project and enabling benefits of economies of scale to keep repowered assets competitive with other commercial-scale offshore wind farms. Leasing extensions will, therefore, likely be needed to enable repowering to ensure the commercial viability of projects over longer terms.

Repowering offshore wind projects also face similar commercial challenges as new 'greenfield' projects, as they involve extensive decommissioning and recommissioning of new infrastructure and have a cost profile similar to that of a new build project with high upfront capital costs. There is an opportunity to develop a framework for offshore wind repowering and to build upon the recent positive steps made by the Government, as seen with the inclusion of onshore repowering in Allocation Round 7 (AR7).

3.5 Providing OFTO clarity for end-of-life decisions

Whilst significant progress has been made in creating End of Tender Revenue Schemes (EoTRS) frameworks for lifetime extension, the current regime still requires further work to provide the necessary clarity to generators and developers. Key issues, such as how the Extension Revenue Stream (ERS) will be determined, what happens if assets are decommissioned early, and whether the current timeline is suitable for decision-making processes, still need to be addressed. Until the outstanding areas are addressed, it remains extremely challenging for robust financial business cases to be determined and, hence, decisions made.

It is important that effective policy, regulation, and guidance are delivered quickly and efficiently to avoid the Offshore Transmission Owner (OFTO) regime acting as a blocker to lifetime extension and repowering. It is also important that throughout these processes, the balance of risk between the OFTO and generator is considered. We believe Ofgem and DESNZ should proactively consider altering legislation to allow the option for generator-ownership of transmission assets for life extension periods, which would solve a number of the issues surrounding the regime.

Next steps

End-of-life decision-making remains largely uncharted territory for the UK's offshore wind sector. It is important to understand the financial, technical, social, and environmental trade-offs when looking at decommissioning, lifetime extension, and repowering to develop effective policy frameworks that enable optimal decision-making.

Policy frameworks should enable achievable pathways for these three end-of-life outcomes and recognise the opportunity for existing wind farms to support the Government's 2050 net zero commitment. Sufficient time is required to allow generators to make key decisions at the end of an offshore wind farm's lifespan and, as such, clarity is urgently needed.

4. Core challenges for end-of-life scenarios

The following sections outline five core challenges for end-of-life options for offshore wind farms in the UK identified by RenewableUK. Each chapter includes key recommendations to overcome these and how they contribute to developing effective end-of-life policy frameworks for UK offshore wind.

4.1 Developing clear guidance for decommissioning

Decommissioning is the final stage of the lifecycle of an offshore wind farm. By 2035, one-third, or around 5GW, of the currently operational wind farms could be decommissioned should lifetime extension not be pursued.[21,22]

The offshore wind sector currently relies on a few examples when considering processes and requirements for decommissioning. Only a small number of offshore wind farms have so far been decommissioned worldwide, including Blyth Offshore Wind farm off the coast of Northumberland and Vindeby on the Danish island of Lolland. In addition, learnings from the decommissioning of met masts and the oil and gas sector will be important for the sector.[23]

Legislative process

Decommissioning in the UK is predominantly regulated under the Energy Act 2004 (amended by the Energy Act 2008) and the Scotland Act 2016.[24,25] It is furthermore supported by the Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004: Guidance Notes for Industry (2019)[26] for England and Wales and in Scotland by the Offshore Renewable Energy: Decommissioning Guidance for Scottish Waters (2022).[27] It should be noted that neither document yet provides guidance for offshore wind farms consented to pre-June 2006. Furthermore, guidance for decommissioning of offshore wind farms does not yet exist in Northern Ireland.

The UK's position on decommissioning and international obligations to decommission disused installations originated from the United Nations Convention on the Law of the Sea (UNCLOS), 1982 and the International Maritime Organisation (IMO) Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, 1989.[28,29] The UK's position is furthermore underpinned by the OSPAR Convention on the Protection of the Marine Environment of the North-East Atlantic.[30]

Challenges and opportunities for decommissioning in context with existing decommissioning guidances

Under Section 105 of the *Energy Act* and Section 105 of the *Scotland Act*, a decommissioning programme is first required to be developed and submitted to provide evidence that decommissioning has been sufficiently considered. Final drafts of formal decommissioning programmes are to be submitted for approval by the regulator no later than six months before the start of decommissioning activities[31].

Under current *decommissioning guidelines* for England, Wales and Scotland, developers are expected to present a base case for full

removal of all offshore wind farm installations and structures at the point of a project's inception.[32,33] RenewableUK has identified the core environmental, commercial, and technical challenges of decommissioning that are currently not acknowledged or addressed in the existing decommissioning guidances. These challenges are particularly pertinent in the context of the expectation of full removal.

Technical challenges

- The removal of all offshore wind farm installations and structures remains technically challenging. For example, proven, commercially available technologies do not yet exist for full monopile foundation removal. Most potential solutions are at an early technology readiness level and need extensive testing before they can be used for large-scale offshore projects in varying ground conditions of offshore wind farms.
- The UK's existing port infrastructure, including bearing capacities and capability of onshore materials processing, is not yet fully developed.

Commercial challenges

- The costs of removal increase with the requirement for full removal of installations and structures compared to partial removal, for example, due to the need for larger vessels and more specialised equipment. This also links to long procurement lead times for specialised removal equipment and the overall constraints within supply chains, particularly vessels, to meet the increasing demand for decommissioning – which will sit alongside the construction of new offshore wind farms.
- Lack of clarity surrounding post-decommissioning surveys, specifically integrity monitoring requirements of buried or left infrastructure, causing significant uncertainty around future costs.

Environmental challenges

- The extent of disturbance and recovery of the seabed, for example, due to substantial seabed excavation from removing installations and structures. The full removal of all infrastructure could, furthermore, result in greater disturbance to the marine environment compared to partial decommissioning, for example, due to increased noise.
- Fully removing infrastructure could potentially result in the loss of additional habitat offered by the infrastructure, such as scour protection. Research is ongoing to better understand the value of submerged human-made structures, including offshore wind farm infrastructure, in fulfilling important ecosystem roles.[34, 35]

The expectation to present a base case for full removal of all offshore wind farm installations and structures at the point of a project's inception currently does not acknowledge the challenges around decommissioning. Furthermore, existing guidance does not provide the necessary flexibility needed for the complexity of offshore wind

farm decommissioning. Finally, the lack of clear leadership and guidance from the relevant decision-making bodies (including DESNZ and the Scottish Government) creates further uncertainty.

To address this, clear direction and leadership are needed on which departments within each devolved Government have the authority to make the final decommissioning decision. Secondly, moving towards a decommissioning framework that promotes a more flexible, evidence-based approach instead of an expectation set out in *decommissioning guidances* for full removal could allow industry and stakeholders to address the environmental, commercial and technical challenges and opportunities of decommissioning. This, for example, should include the development of an offshore wind-specific Comparative Framework Assessment.[36]

Clear leadership and direction and recognising the need for a flexible, evidence-based approach can help overcome the challenges outlined above. It could furthermore feed into the ongoing policy development of marine spatial planning, nature recovery, marine net gain, and strategic compensation.

In response to the challenges outlined above, RenewableUK has identified environmental, commercial and technical opportunities for a flexible, evidence-based approach to decommissioning:

Technical opportunities

- A flexible and evidence-based environment can support the development of a reliable and proven supply chain as well as investment in the development and testing of new technologies. Further development and improvement of technologies can reduce risks and the duration of decommissioning work.

Commercial opportunities

- Increased knowledge and experience of renewables decommissioning can result in risk and cost reductions. There is a potential to explore the coordination of repowering and decommissioning activities.

Environmental opportunities

- Offshore wind farms' underwater structures and features, such as scour protection, can be colonised by, for instance, mussels or invertebrates. This, in turn, can help increase local biodiversity, abundance, and connectivity between ecological communities and, in certain instances, provide an opportunity for restoration.[37,38] A flexible approach to decommissioning would also allow developers, regulators, and nature conservation advisors to better consider decommissioning with a nature-inclusive end goal in mind.

— A flexible and evidence-based approach can also lead to the development of an evidence base for the impacts of decommissioning options, as well as a coordinated and transparent regulatory approval process.

As the UK's first offshore wind farms are taking decisions on decommissioning preparation now, decommissioning must be prioritised alongside the deployment of new offshore wind farms. It will furthermore be critical to address the gaps in existing decommissioning guidances and to demonstrate clear leadership within Government departments, regulators and statutory consultees.

Recommendations	Lead
Leadership: Clear direction and leadership are needed on which departments within each devolved Government have the authority to make the final decommissioning decision.	UK Government, Scottish Government, Northern Ireland Executive
Collaboration: Engagement between the Governments of all devolved nations, relevant Government departments (including DESNZ and Defra), The Crown Estate, Crown Estate Scotland, and Statutory Consultees will be critical to developing a fit-for-purpose decommissioning programme for offshore wind farms.	DESNZ, Defra, The Crown Estate, Crown Estate Scotland, Scotland's Marine Directorate Statutory Consultees, MMO, NRW, DoENI, DAERA
Decommissioning guidance: Update existing decommissioning guidances for decommissioning in England, Wales and Scotland to set out a flexible and evidence-based approach to decommissioning that considers technical, commercial and environmental challenges.	DESNZ, Defra, The Crown Estate, Crown Estate Scotland, Scotland's Marine Directorate Statutory Consultees, MMO, NRW, DoENI, DAERA
Comparative assessment: Existing decommissioning guidance for offshore wind supports the use of comparative assessment. However, sector-specific guidance does not exist yet and is limited to high-level guidance available to the oil and gas sector. Developing a holistic offshore wind-specific assessment would prove an important tool for proportionately appraising various decommissioning options. It should also go beyond only presenting potential risks and instead emphasise the prospective ecological, sustainability and social benefits.	UK Government, Scottish Government, Northern Ireland Executive
Guidance for pre-June 2006 consented wind farms: Existing *decommissioning guidances* for England, Wales and Scotland do not apply to offshore wind farms commissioned pre-June 2006. Clear guidance and expectations for the industry for the approval process are urgently needed and should be incorporated into the existing decommissioning guidances for England, Wales and Scotland.	UK Government, Scottish Government, Northern Ireland Executive
Monitoring and ongoing liability requirements: Decommissioning guidances should provide greater clarity on what pre and post-decommissioning monitoring requirements and ongoing liabilities comprise. Offshore wind farm owners are responsible for assets left in situ in perpetuity. Clarity on both issues will give operators more certainty on monitoring, financial securities for assets left in situ, or lease financial arrangements.	UK Government, Scottish Government, Northern Ireland Executive

4.2 Providing financial certainty

Financial security in decommissioning

The UK's *decommissioning guidelines* set out clear requirements regarding financial liabilities for renewable energy projects. Stringent financial provisions in the form of Letters of Credit (LOCs) and bank guarantees are typically preferred by the Government, whereas other forms of security, such as Parent Company Guarantees (PCGs), will normally only be considered in exceptional circumstances.

- A **Parent Company Guarantee** is a contractual commitment made by a parent company (the guarantor) to cover the financial obligations of its subsidiary. In the context of renewable decommissioning projects, a PCG is often provided by the parent company to assure the project owner, Government authorities, or stakeholders that decommissioning costs will be covered if the project subsidiary defaults on its obligations.
- A **Letter of Credit** is a financial instrument issued by a bank that guarantees payment up to a specified amount if certain conditions are met. For renewable decommissioning projects, an LOC is typically provided by the project company to ensure funds are available for decommissioning costs in case the company fails to meet its obligations.

PCGs, a standard form of security used in the offshore wind sector, are a good alternative as they offer significant benefits for the broader sector. PCGs enable developers to maintain healthy cash flow and release capital otherwise tied up in LOCs. Recognising the strategic value of PCGs is essential to unlocking capital that can be reinvested into other renewable energy projects. This is particularly significant in the current environment, where inflationary pressures, supply chain challenges, and rising interest rates have sharply increased the costs associated with financing and delivering offshore wind projects. Where PCGs are accepted for financial security, it is important that credit rating requirements are not set unrealistically high. BBB upwards is a reasonable threshold, as this is considered investment grade and ensures most offshore wind developers are captured.

The vast majority of actors involved in the development of offshore wind can access PCGs, addressing any concerns regarding equitability, for instance, that it favours larger market participants and may distort competition. Any distortive effects are highly unlikely to emerge in practice and would be outweighed by the significant sector-wide benefits of the ability to release capital.

PCGs vs. LOCs in Renewable Decommissioning Projects:

Criteria	PCGs	LOCs
Security Level	Dependent on parent company's financial strength	High, backed by bank
Cost	Lower costs	Higher fees and collateral required
Liquidity Impact	No immediate cash outlay	Can restrict liquidity
Ease of Access	Easier to arrange with willing parent company	Requires negotiation with banks
Enforceability	Potentially challenging, depending on jurisdiction	Easier and quicker enforcement
Perception by Stakeholders	Could be viewed as less secure	Seen as more reliable and secure
Flexibility	More flexible, can be tailored	Less flexible, terms are rigid
Impact on Decommissioning Timeline	Low impact, as long as parent company is solvent	Minimal, but administrative processes may take time

Recommendation	Lead
Balanced approach: Offer a more balanced approach to financial securities, allowing a broader range of options to be accepted, including PCGs. This will prevent capital needed to drive the sector's growth from being locked away while ensuring financial security for decommissioning obligations.	HMT and DESNZ

Tax treatment for decommissioning

In addition to demonstrating financial security, tax treatment for decommissioning in the renewable industry presents several challenges, which are outlined below:

1. A significant issue for renewable energy projects is the lack of clarity around the tax deductibility of decommissioning costs. Unlike in the oil and gas sector, where decommissioning costs are clearly defined and deductible, there is a lack of clarity around the tax relief available to the renewable industry.

2. The disparity between the tax treatment of oil and gas and renewables is evident in the absence of mechanisms such as Ring-Fenced Corporation Tax (RFCT) and the ability to carry back decommissioning losses.

   The lack of clarity around a company's ability to effectively realise the benefit of capital allowances for decommissioning activities also creates uncertainty. This is particularly relevant for single asset companies, commonly referred to as Special Purpose Vehicles (SPVs), where they could be regarded as ceasing to trade for tax purposes before the decommissioning works have taken place and the associated decommissioning costs have been incurred. Without clear guidance in this area, renewable energy projects may miss out on significant tax relief.

Recommendation	Lead
Confirmation is needed on the tax deductibility of decommissioning costs in the case of a company ceasing trade.	HMT and DESNZ
Introduction of mechanisms to allow carry back of tax losses against earlier trading profits To facilitate this the below recommendations should be addressed: Amend the definition of qualifying expenditure in section 11 of the Capital Allowances Act 2001 to include all expenditure on decommissioning plant and machinery, and restoration of a site used in the qualifying activity involving electricity generation, transmission, distribution, and storage. Extend section 40 of Corporation Tax Act 2010 to companies carrying on a qualifying activity involving electricity generation, transmission, distribution, and storage. This will allow such companies to carry back tax losses arising on decommissioning to earlier periods where sufficient taxable profits arise, allowing full tax relief on decommissioning and improving project economics.	

4.3 Lifetime extension for energy security

Lifetime extension (LTE) presents an opportunity to retain existing offshore wind capacity on the system for longer, extending operation of the offshore wind farm beyond its original design life.

We have established five key benefits for lifetime extension:

- Retaining operational offshore wind capacity can enable prolonged contribution to energy security.
- LTE maximises the use of previously extracted raw materials (supporting circularity) and infrastructure, including but not limited to grid connections, operation and maintenance regional hubs, and wider grid infrastructure (such as cables).
- LTE provides more time for technology, associated methodology, and wider supply chain required for decommissioning and repowering to mature and develop.
- Extending the time available to developers and/or operators for conceptualisation and development of a repowered project at the same site – thus reducing the potential for premature final decommissioning. Repowering likely requires lengthy consenting and planning timelines, and LTE can allow for regulatory issues and gaps in the policy frameworks to be addressed and resolved.
- LTE supports local employment by preserving local jobs (both direct and indirect) involved in the operation and maintenance of offshore assets and associated onshore infrastructure.

However, despite the opportunities LTE presents, significant barriers currently persist. These include:

- There remains a lack of clarity on key aspects of LTE and interaction with the OFTO regime. In particular, regarding generator visibility of expected cost levels (extension revenue stream, ERS). This is a critical element needed to allow the offshore wind generator to carry out a robust assessment of the business case for LTE[39]. This is explored further in Section 5.
- LTE may require fresh investment in replacing parts coming to the end of their design life. This may be challenging if relevant parts are no longer in production, with greater costs required for bespoke orders. The wear and tear on assets at this stage of their lifecycle may require more intensive maintenance, hence increased frequency of operations and maintenance (O&M) campaigns. Both of these aspects will need to be carefully considered as part of the business case when looking at LTE. In addition to this, LTE projects may also be competing with new development projects when it comes to the availability of specialist vessels to undertake work offshore.
- There may also be additional risks associated with difficulty securing and retaining a skilled technical labour force with experience and knowledge of mature asset maintenance due to new job availability for newer, larger turbine models.

- LTE still involves relying on older assets that are likely to have decreasing reliability and availability as they age, so although the megawatts on the system remain the same, the output in terms of megawatt-hours (MWhs) may be less, as there is likely to be increased maintenance required.
- There also remains a lack of flexibility within existing processes. Further changes can be made to ensure the most efficient LTE decisions, such as allowing for potential amendments to The Crown Estate and Crown Estate Scotland lease conditions to allow for capacity reduction during LTE periods (reflecting the uncertain nature of life extension) and, linked to this, providing flexibility in decommissioning approvals processes to allow amendments to be made to planned decommissioning dates, again reflecting the risk of unforeseen life extension events occurring.

Recommendations	Lead
Currently, the route to consenting is opaque, making it challenging to develop viable LTE strategies. Thus, we recommend: **Clearer guidance on the consenting approach for developers interested in LTE (as well as clear guidance on approaches per section 1).**	DESNZ
Clarity on OFTO End-of-Life approach, per section 5.	DESNZ and Ofgem

4.4 Opportunities through repowering

Repowering presents a significant opportunity to 'breathe new life' into sites with wind resources, and existing access to grid connection points. These sites have existing onshore infrastructure and community acceptance, and allow the UK to maximise the use of its limited seabed resource. Repowered sites can efficiently generate the same, if not greater, power through the use of more effective modern turbine technology.[40] Repowering is key to ensuring that the UK retains the capacity needed in its clean power system.

Some core benefits of repowering that should be considered include:

- Repowering can help realise the full potential of the UK's seabed space. The Crown Estate's Future of Offshore Wind report highlights that future spatial planning will require careful consideration of marine space to ensure optimal locations.[41] Many existing assets are already located in prime locations and repowering presents a major opportunity to fully utilise the UK's limited seabed space, which is key to meeting the UK's decarbonisation targets.
- Repowering clearly links to the importance of retaining homegrown renewable energy to insulate the UK from the volatility of international energy markets. Repowered sites could have operating lifetimes of thirty years or more, providing longer-term security of supply. Repowering enables older infrastructure at the end of its life to be replaced by more efficient and resilient technology capable of increased energy capture and thus power generation.
- Developers and operators hold existing knowledge of offshore wind sites. Through ongoing post-construction and operational monitoring, operators have a wealth of data and understanding of the environment within which the projects is located which can be draw upon within the repowering development consent process.
- Finally, repowering would support local employment through the preservation of local jobs involved in the operation and maintenance of offshore assets and associated onshore infrastructure. Repowering also facilitates continued use of existing O&M regional hubs.

At present, repowering as an option for maturing offshore wind farms faces considerable challenges – in particular the two core barriers set out below. If these can be addressed, repowering of mature offshore wind sites can deliver major benefits.

- Repowering offshore wind projects face the same commercial challenges as new 'greenfield' projects. Repowering will involve decommissioning, and recommissioning of infrastructure and has a cost profile that is similar to that of a new build project. Therefore, the case for intervention aligns to the case for intervention for a new build project bidding for a Contract for Difference (CfD). There is an opportunity to build upon the positive direction of travel seen with the

likely inclusion of onshore wind repowering in AR7. Given repowered sites are effectively new projects they should be treated equally in the scheme, as onshore wind will be for AR7.[42]

— The current lease length of 50-60 years is likely insufficient to enable repowering. This is because significant timelines are required for decommissioning and construction of new assets. It is currently unclear if The Crown Estate and Crown Estate Scotland would be willing to extend the lease tenure. Potential increases in capacity for repowered projects are dependent on amendments to lease agreements concerning turbine specifications, potential changes to site boundaries and other considerations. A lack of clarity on these areas may reduce the commercial viability of a project.

Recommendations	Lead
Lease agreements: We recommend exploring the option of extending existing leases to de-risk repowering projects.	TCE
CfD: The Government should also begin consulting with industry to establish how repowering of offshore wind will be enabled and develop policy clarity for the eligibility of repowered offshore wind sites in the CfD. Some initial high-level areas to explore through consultation include: • **Forward bidding:** Allow forward bidding where a generator can apply for a CfD for the purposes of repowering whilst a site is still operational. This would be subject to meeting the same eligibility requirements as 'greenfield' sites, including consent, grid connection, and lease. The developer would have to provide written assurances to the National Energy System Operator (NESO) that they intend to repower in line with the delivery date of their awarded CfD. • **Capacity levels:** Establishing strict eligibility criteria could restrict some repowering projects, leading to the loss of the repowering benefit. Flexibility in requirements for capacity levels (MW) for the repowered site should be granted, especially in early sites with limited space that will use a smaller number of turbines, each of greater capacity.	DESNZ
Consent agreements: Streamlining of the consents process for repowered offshore wind projects, where the knowledge of the environmental impact of the initial generation asset can be leveraged to expedite the planning inspection process would de-risk repowering developments and reduce expenditure.	DESNZ, Defra, The Crown Estate, Crown Estate Scotland, Scotland's Marine Directorate, Statutory Consultees, MMO, NRW

4.5 Establishing a clear OFTO framework for end-of-life

Uncertainties in the current OFTO regime act as a critical barrier to LTE and the repowering of sites. Offshore transmission assets (i.e. assets connecting offshore wind sites to the onshore electricity networks) are typically built and developed by the generator before being divested to an entity that is able to hold a transmission licence. This process takes place via a competitive tender, after which the successful OFTO receives a Tender Revenue Stream (TRS) in return for owning and operating the transmission assets. The duration of the TRS period ranges from 18.5 years to 25 years, depending on which tender round the asset participated in, which means the initial OFTO TRS periods will be concluding in the early 2030s. Thus, owners and operators (both generator and transmission) will need to make imminent decisions on their assets.

However, there is a lack of clarity regarding the process of ownership and revenue stream-setting during an extension period of the OFTO asset post-TRS. This acts as a barrier to late-life decision making and clarity needs to be provided as soon as possible.

Current engagement and policy development

Ofgem has engaged with industry on the OFTO end-of-life regime over recent years and it is encouraging to see progression toward a clearer policy framework in this area.

- In March 2021, Ofgem focused on the roles and responsibilities of OFTOs, generators and Ofgem in reaching life extension decisions as well as the timescales required for these processes.[43]
- In June 2022, specific issues around competition, valuing assets and performance incentives for OFTOs in any extension period were the focus.[44]
- In 2023, as part of Ofgem's decision on OFTO licence modifications for the pass-through of cost of asset health reviews and investment works, Ofgem provided a view on the Generator Ownership Option proposal stating Ofgem and DESNZ have agreed to consider the merits of this proposal, alongside other options, over the medium-term.[45]
- The recent guidance consultation and policy decisions on the OFTO health review process are an important step in aligning incentives for the maintenance and long-term preservation of assets.[46]

Clarity is key to enabling end-of-life decisions

Clarity in this area is key to end-of-life decisions and can help ensure offshore transmission assets can continue to operate efficiently beyond the TRS. OFTOs incentives may not support high levels of maintenance activity to ensure the long-term health of the asset, e.g.

beyond the term of the OFTO arrangement. Additionally, the economic margins in LTE decisions are thin, and the role of OFTOs and ERS is key to this. A generator may have an asset that is technically capable of LTE, but the economics could make it unfeasible due to a lack of insight into the potential ERS level or an ERS that is set too high for the decision to be workable.

When deciding whether to life-extend, the business case for a generator will be marginal, with each cost input critical. This includes the anticipated ERS, which then feeds in as a component of the Transmission Network Use of System (TNUoS) for each individual asset. If generators observe a level of risk from uncertainty that outweighs the potential benefit of life extension, they will opt to decommission their project, and the opportunity for an extended lifespan will be lost.

Generator control of OFTO asset post-TRS

While Ofgem has been working to provide a clear pathway for LTE within the OFTO regime, it is important that this is delivered quickly and efficiently to allow the first wind farms rapidly approaching critical decision points to have full visibility of the regime. It also remains important that any solutions balance the risks between the OFTO and the generator fairly. Ofgem and DESNZ should fully consider the option of reverting to generator ownership for any extension periods.

Challenges

There are a number of outstanding challenges regarding the OFTO regime for LTE, such as:

- How will the scope of required improvement works and the timeline for undertaking them be agreed upon?
- Clarity on the process that will be used to determine shorter life extensions, for example, life extensions of less than five years.
- The process for early decommissioning/shut down ('early withdrawal') of either the generating assets or the transmission assets – which will be addressed in Ofgem's December 2024 consultation.
- How will the revenue stream in any extension period be determined and shared with the generator, such that it is useful and meaningful when assessing the business case?
- How will performance and availability incentives be applied to any extension period for the OFTO?

In the scenario where the incumbent OFTO does not remain in place in any extension period, there is a significant risk to the generator and overall LTE decision. As such, Ofgem's preferred approach to focus on bilateral negotiation with the incumbent in the first instance is welcomed by industry. However, reverting control of the transmission infrastructure to the generator would provide a lower cost, more efficient solution but would require legislative change.

Recommendations	Lead
Clarity over ERS: The Government and Ofgem need to establish the ERS in a clear and transparent manner and provide generators with early insight into the anticipated level. This will ensure a fair return for offshore transmission owners whilst also increasing the likelihood that generating assets will be able to operate efficiently beyond the TRS.	DESNZ and Ofgem
Reverting control: The option to revert control of the offshore transmission assets to the generator post-TRS for LTE should be included. This would be a low cost and efficient solution to maintain these assets and would provide a clear route to enable lifetime extension for mature assets.	DESNZ

Glossary

AR	Allocation Round
BEIS	Department for Business, Energy and Industrial Strategy
CfD	Contracts for Difference
DAERA	Department of Agriculture, Environment and Rural Affairs (Northern Ireland)
DESNZ	Department for Energy and Net Zero
Defra	Department for Environment, Food and Rural Affairs
DoENI	Department of the Environment (Northern Ireland)
EoTRS	End of Tender Revenue Stream
ERS	Extension Revenue Stream
GW	Gigawatt
IMO	International Maritime Organisation
LOCs	Letters of Credit
LTE	Lifetime Extension
MMO	Marine Management Organisation
MW	Megawatt
MWh	Megawatt-hour
NESO	National Energy System Operator
NRW	Natural Resources Wales
Ofgem	Office of Gas and Electricity Markets
OFTO	Offshore Transmission Owner
OSPAR	Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
PCGs	Parent Company Guarantees
SPV	Special Purpose Vehicles
TNUoS	Transmission Network Use of System
UNCLOS	United Nations Convention on the Law of the Sea

Endnotes

1 https://www.renewableuk.com/news-and-resources/facts-and-figures/

2 https://www.renewableuk.com/news-and-resources/press-releases/new-statistics-show-wind-generated-more-electricity-than-gas-for-the-first-year-ever-in-2024/

3 RenewableUK EnergyPulse, will assume 20 years based on RO support length.

4 Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004: Guidance Notes for Industry (2019) for England and Wales and in Scotland in the Offshore Renewable Energy: Decommissioning Guidance for Scottish Waters (2022).

5 RenewableUK EnergyPulse, based on 20-year operating period.

6 Divestment and repurposing are also options available when considering end of life opportunities.

7 Options available should the lease duration enable two rounds of offshore wind farm projects.

8 RenewableUK Energy Pulse, will assume 20 years based on RO support length.

9 RenewableUK EnergyPulse

10 https://www.legislation.gov.uk/ukpga/2008/32/contents

11 https://www.legislation.gov.uk/ukpga/2016/11/contents

12 In line with IMO guidance, exemptions can be applied and would include the potential effect on the marine environment or "the costs, technical feasibility, and risks of injury to personnel associated with removal of the installation or structure." https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/AssemblyDocuments/A.672(16).pdf

13 In line with IMO guidance, exemptions can be applied and would include the potential effect on the marine environment or "the costs, technical feasibility, and risks of injury to personnel associated with removal of the installation or structure." https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/AssemblyDocuments/A.672(16).pdf

14 It should be noted that decommissioning plans already submitted currently only include proposals for partial removal.

15 It is currently not technically possible to fully remove the buried section of a monopile.

16 For example, by acting as reefs.

17 Existing guidances reference the Comparative Assessment Framework used in the oil and gas sector.

18 DESNZ currently considers the following methods of financial security provisions as acceptable: upfront cash, cash in escrow, Letters of Credit (LoC), bank guarantees, performance bonds.

19 RenewableUK EnergyPulse, based on 20 year operating period.

20 RenewableUK EnergyPulse, based on 20 year operating period.

21 RenewableUK EnergyPulse, will assume 20 years based on RO support length.

22 RenewableUK EnergyPulse

23 It should be noted that the already decommissioned offshore wind farms weren't fully removed and that certain parts of oil and gas infrastructure is also left in situ.

24 https://www.legislation.gov.uk/ukpga/2008/32/contents

25 https://www.legislation.gov.uk/ukpga/2016/11/contents

26 https://www.gov.uk/government/publications/decommissioning-offshore-renewable-energy-installations

27 https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/

28 https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

29 https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/AssemblyDocuments/A.672(16).pdf

30 https://www.ospar.org/convention

31 Recently, TCE have suggested that they need to approve the decommissioning option before a marine licence is submitted containing the details of the decommissioning option. Clear direction from a designated lead authority will be required.

32 BEIS 2019 guidance section 7.2: https://assets.publishing.service.gov.uk/media/5f5b2724e90e0718e212a22d/decommisioning-offshore-renewable-energy-installations-energy-act-2004-guidance-industry__1_.pdf

33 Decommissioning guidance for Scottish waters section 7.2: https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/

34 Antony Knights, et all, "Developing expert scientific consensus on the environmental and societal effects of marine artificial structures prior to decommissioning", Journal of Environmental Management, No 235, January 2024.

35 https://insitenorthsea.org/

36 Existing guidances reference the Comparative Assessment Framework used in the oil and gas sector.

37 Offshore Wind Farm Artificial Reefs Affect Ecosystem Structure and Functioning: A Synthesis (pnnl.gov)

38 Renewables-to-reefs? - Decommissioning options for the offshore wind power industry - PubMed (nih.gov)

39 We note Ofgem is intending to issue a further consultation in December 2024.

40 https://www.offshorewind.biz/2022/10/10/siemens-gamesa-offshore-wind-turbine-prototype-breaks-24-hour-output-record/

41 Offshore wind | The Crown Estate.

42 Proposed amendments to Contracts for Difference for Allocation Round 7 and future rounds - GOV.UK (www.gov.uk)

43 Draft consultation document - 16 December 20

44 Consultation_EoTRS_DRAFT

45 Decision on proposed modification to offshore electricity transmission licences | Ofgem

46 Guidance on offshore transmission health reviews | Ofgem