Insight paper

# A Second Wind: Unleashing the potential of repowering

Key challenges, opportunities and policy requirements to breathe new life into onshore wind across Great Britain.

February 2026

## About this paper's sponsors

nadara

Nadara is a leading renewable energy generator and independent power producer committed to delivering sustainable impact and shared value. It owns and operates more than 200 energy sites across Europe and the US, with over 4 GW of installed capacity and a further 18 GW under development. With 1 GW of installed onshore wind capacity and some of the UK's oldest wind farms under operation, Nadara is at the forefront of making repowering a reality. Through a full-lifecycle commitment to both community engagement and energy production, Nadara aims to build meaningful long-lasting relationships and contribute to local development, while leading the way on industry challenges such as circularity and repowering.

Osborne Clarke

Osborne Clarke is an international legal practice that has provided strategic and on-point advice for more than 250 years. It has a presence across Europe, Asia and the US and clients range from well-known market leaders to disruptive, high-growth start-ups. OC's UK energy team of more than 100 lawyers (including 40 partners) have worked in the sector for over 25 years. They advise developers, financiers, owners and energy utilities on energy generation, distribution, storage, supply and efficiency. Combining technical excellence with commerciality, they understand the market and take the time to understand clients' businesses. They are able to identify key risks up front and provide early advice and guidance at the planning stage of developments. Their work ranges from initial advice, site appraisals and project management, through to negotiating complex development and infrastructure agreements, and undertaking planning inquiry and High Court work.

## About Regen

Regen provides independent, evidence-led insight and advice in support of our mission to transform the UK's energy system for a net zero future. We focus on analysing the systemic challenges of decarbonising power, heat and transport. We know that a transformation of this scale will require engaging the whole of society in a just transition.


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| Version | Final – 04 February 2026 |

## Acknowledgements

This work benefited greatly from the support and assistance of many people. We would like to express our gratitude to:

- BiGGAR Economics
- The Circularity Collective
- EMR Metal Recycling
- National Grid Electricity Distribution
- RES
- RWE Renewables
- Savills
- Scottish Power Renewables
- Thrive and Zero Waste Scotland.

# Foreword

**Nadara** is proud to co-sponsor this important report. Onshore wind repowering is vital to help secure cleaner and more reliable energy for decades to come. With 1 GW of installed onshore wind capacity, our portfolio of 45 wind farms includes some of the UK's oldest sites and we are a leading voice on the future of onshore wind repowering. Across Great Britain, Nadara builds, owns and operates wind farms that generate and deliver dependable renewable electricity for the benefit of communities.

From creating benefit funds and distributing financial support, to educational initiatives and sharing profits through local cooperatives, sharing value with the communities that host our energy sites has been fundamental to Nadara's approach for almost two decades.

As members of the government's Onshore Wind Taskforce, we supported the actions set out in the Onshore Wind Strategy to accelerate repowering. Maintaining and enhancing the existing onshore wind fleet is essential to meeting future decarbonisation and energy security goals. Positive policy support outlined in this report for repowering will be critical to realising this ambition. The positive policy measures outlined here, particularly those aimed at improving the planning regime, will be critical to realising this ambition.

Nadara already has repowering planning applications submitted at our Ben Aketil and Beinn Ghlas sites in Scotland, and we continue to build a strong repowering pipeline. We are proud to contribute to this work and to help shape a policy environment that enables the next generation of onshore wind.

**Osborne Clarke** is delighted to be working with Regen and its co-sponsor Nadara on preparing this paper. Osborne Clarke was involved in the development of the UK's first commercial wind farm in Delabole, Cornwall in 1991 and again, when that wind farm was repowered in 2011. Osborne Clarke's energy team has worked on over 10 GW of renewable generation projects throughout the UK and Europe.

As legal advisers to developers, operators and investors of renewable energy generation, transmission and distribution, our team is embedded in developing client strategies that interact with government policy and legislation. We are at the cutting edge of advising on the benefits of positive government support for clean power and the effect that supportive policies have on delivering the infrastructure necessary to meet government objectives.

Following the Onshore Wind Taskforce identifying the need for an additional 15 MW of onshore wind to be delivered through the UK, the importance of maintaining the existing wind energy fleet and repowering this fleet has become evident. Positive policy support for repowering is crucial to deliver on this ambition. Osborne Clarke is proud to be part of that story by contributing to and sponsoring this paper.

# Executive summary

As operational wind farms approach the end of their operational life or planning consent, developers are faced with difficult decisions: decommission, life-extend or repower – replacing old turbines with modern, higher-capacity technology.

**More than 200 wind farms across Great Britain, representing over 3.2 GW of capacity, will face repowering decisions by 2030**, with a potential to deliver an additional 1-2.5 GW by 2040 and up to 6 GW by 2050, if enabling conditions are met.

Upgrading wind farms can enable more power to be generated in locations where people are already familiar with turbines. Early examples of successful repowering demonstrate the potential it offers for increased capacity, improved efficiency and enhanced community benefits. However, realising this opportunity requires careful consideration of environmental, social and economic impacts.

The end-of-life process for onshore wind sites is not straightforward. Some sites may only be suited for life-extension, while others face barriers such as land and leasing constraints, planning uncertainty, public objection, grid constraints, high costs and the need to manage older turbine components responsibly.

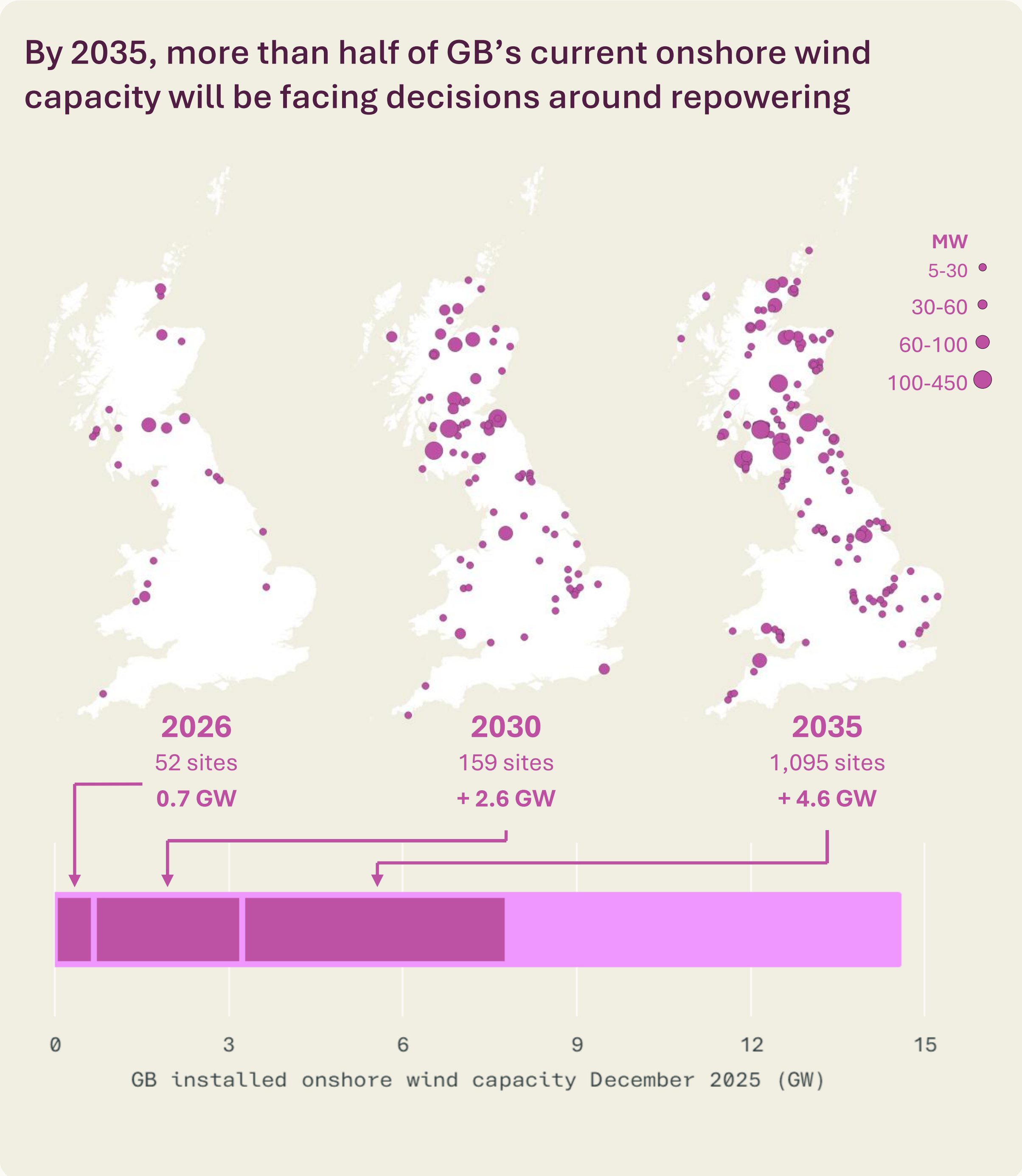
**The lack of a consistent approach to categorising repowering decisions creates uncertainty for developers, planners and stakeholders.** Clearer policy direction and support will be essential to navigate these challenges and support developers, communities and local authorities.

This paper sets out the challenges that are hindering the timely and effective repowering of onshore wind in GB and identifies urgent changes to unlock the potential of the existing fleet. Our key recommendations include:

- **Make repowering a national priority and ensure consistency in end-of-life terms.** Explicitly recognise repowering in UK energy strategies; provide clear, consistent planning guidance; and designate all commercial-scale renewable projects as a Critical National Priority to remove uncertainty and accelerate investment. Define and implement consistent terminologies for end-of-life options to provide clarity across all stakeholders involved in decision making.
- **Treat repowering as a core component of the Strategic Spatial Energy Plan (SSEP) and connections reform.** NESO should use the SSEP to review the 2035 allocation of grid connections to onshore wind in Scotland and to recognise that repowering is an opportunity to increase clean power capacity at successful, proven sites.

- **Ensure repowered projects have stable, predictable revenue streams.** DESNZ, should support the commercial viability of large-scale repowering projects by revisiting the CfD forward-bidding rules to better reflect asset timelines and conditions, and introduce a programme to support small-scale generators through repowering
- **Introduce a repowering-specific environmental assessment process.** The Ministry of Housing, Communities and Local Government should provide a clear presumption in favour of repowering, recognising its strategic importance, and allow long-term operational monitoring data to be used as the baseline.
- **Change public land bidding to prioritise socio-economic factors over financial considerations.** DESNZ should introduce standardised, or capped, lease terms on public land and encourage developers to compete on delivering socio-economic benefits.
- **Ensure repowering is used to deliver tangible, enhanced benefits to local communities.** Developers should embed early engagement and expand community benefit funds. GB Energy should facilitate community shared ownership during repowering though finance support or temporary ownership stakes.
- **Apply circular economy principles across repowering.** Maximise turbine reuse, refurbishment and recycling; reduce waste and integrate environmental improvements, such as habitat restoration and efficiency gains, into project design to lower costs and strengthen sustainability.

Figure 1: Onshore wind sites approaching end-of-life are those between 20 and 25 years old (this map only shows sites above 5 MW). Data from RUK EnergyPulse Data, accessed December 2025.



# Contents

**Section 1:**

# Introduction

As the first generation of onshore wind projects near the end of their consented life, decisions on repowering, life-extension or decommissioning are becoming critical considerations that will shape the UK's future energy security.

The UK's onshore wind fleet is entering a pivotal phase. Many of the earliest projects, typically consented for 25 years, are now reaching the end of their planning permission. At this decision point, developers and operators face a range of options, including extending the operational life of existing assets, upgrading or replacing turbines, expanding sites or decommissioning them entirely. The choices made will have a material impact on the UK's energy security and resilience, as well as the long-term value delivered to local communities.

**Repowering – the replacement of older turbines with modern, more efficient technology – offers one of the most significant opportunities for the UK's energy transition across the next decade.** Repowering can maintain or potentially increase renewable generation, strengthen energy security and avoid the permanent loss of established wind capacity. Conversely, failing to repower viable sites risks a substantial reduction in onshore wind output.

Not all onshore wind sites will be suitable for repowering. Planning, technical and environmental constraints and the considerations of local communities must be carefully addressed, and in some cases alternative approaches may be more appropriate. However, the potential across the existing fleet in GB is considerable. Modern turbines are more powerful and reliable, meaning fewer of them can deliver the same, or even greater, output. Repowering also provides an opportunity to redesign projects to deliver better outcomes for communities, enhance biodiversity and maximise long-term local benefits.

Both government and industry recognise the strategic importance of these decisions. The UK's onshore wind ambitions, reinforced by the Onshore Wind Taskforce Strategy[1] and the deployment target of between 27 and 29 GW,[2] depend in part on ensuring that established sites can continue to contribute to national energy goals. Enabling timely, well-designed repowering will be essential to maintaining momentum, supporting local economies and realising the full value of the UK's onshore wind resource.

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[1] DESNZ, 2025. Onshore Wind Taskforce Strategy.

[2] UK government, 2024. Clean Power 2030 Action Plan.

## 1.1. **Framing end-of-life options**

As onshore wind projects across GB reach the end of their original consented lifetimes, it is increasingly clear that the definitions surrounding end-of-life are not consistently used or always well understood across industry, planning authorities and communities. This lack of shared language can create uncertainty, hinder constructive engagement and obscure the range of options available at key decision points.

The definitions set out below are intended as a practical framework for industry, providing clearer and more consistent terminology to describe the different pathways available to onshore wind projects at end of consent. Adopting common definitions means that developers, policymakers and communities can engage earlier and with greater transparency, supporting more streamlined decision making and helping to ensure that repowering and other end-of-life options are considered in a way that maximises energy security and delivers long-term value for local communities.

### Options for end-of-life

**Decommission:** All removable infrastructure is taken out and the site is restored or managed in line with any planning conditions to ensure safety, environmental compliance and suitability for future use, while acknowledging that some structures or features may remain.

**Life-extension:** The existing infrastructure is retained and the operational period is extended by increasing the duration of the time-limited planning consent. This may involve replacing parts of the turbines on a like-for-like basis; however, all parameters – including turbine dimensions, locations and overall layout – will remain consistent with the original consent and within the original footprint.

**Partial repower:** Upgrades are made to some components of existing turbines – for example, blades, drivetrain (gearbox, hub, generator) – while retaining the existing tower, foundation and overall wind farm footprint. This approach can create performance improvements (higher output, better reliability).

**Repower:** The existing turbines are decommissioned and removed, and new turbines are constructed within the original footprint of the wind farm. The new turbines will usually be of a different height, capacity and number; therefore, the overall layout of the site is likely to be different. The overall MW output of the site may increase, particularly for the oldest wind farms.

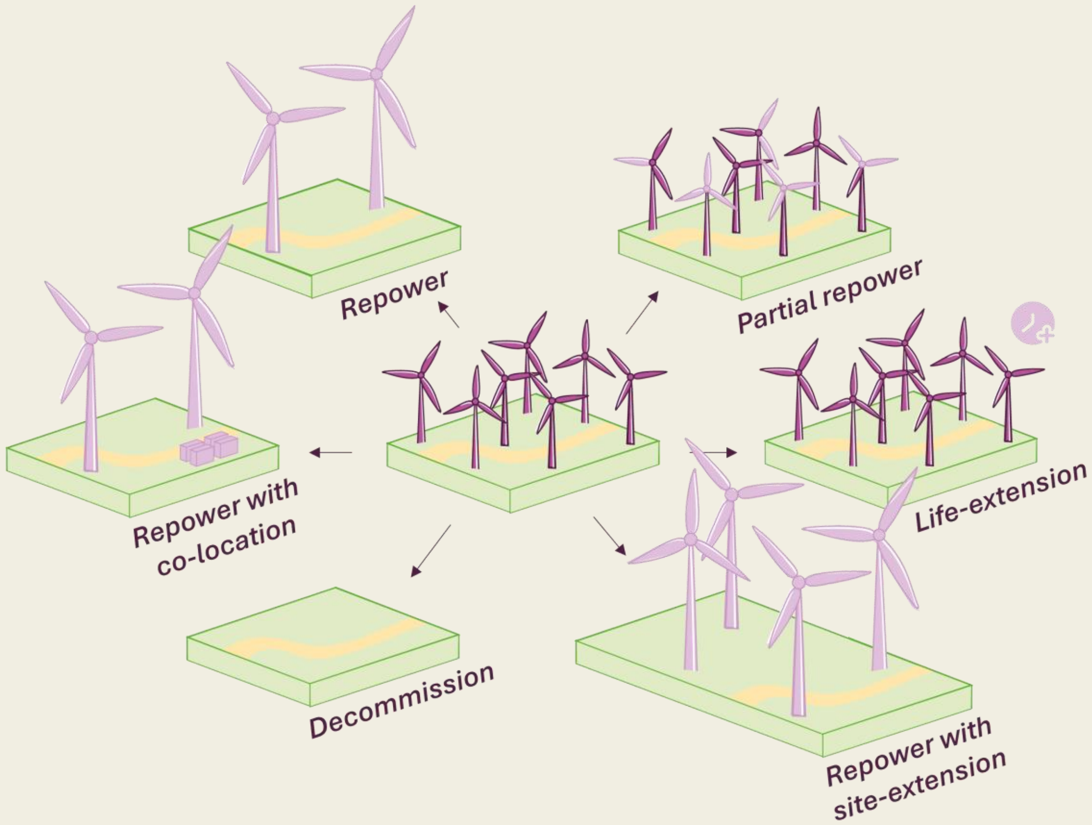
**Repower with site extension:** The existing turbines are decommissioned and removed, and new turbines are constructed within and outside of the original footprint of the wind farm.

**Repower with co-location:** The existing turbines are decommissioned and removed, and new turbines are constructed and sited alongside other technologies – such as battery storage, solar PV – that connect to the same grid connection point.

Figure 2: End-of-life options for onshore wind

## Onshore wind developers may consider several end-of-life scenarios as turbines approach the end of operation

Decisions are site specific, considering factors such as commercial operability, network capacity and consents processes

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**Section 2:**

# Scale of the opportunity

With over half of GB's current onshore wind fleet expected to face end-of-life decisions by 2035, repowering presents a significant opportunity. However, political challenges are limiting investment in repowering.

Repowering is not a marginal consideration for the onshore wind sector; it is becoming a defining challenge and opportunity facing the existing fleet. By 2035, over half of all onshore wind capacity currently installed in GB will have reached, or be approaching, a decision point on whether to repower, extend operational life or decommission. This concentration of operational consent milestones means that decisions taken in the next decade will determine the scale, performance and strategic contribution of the onshore wind fleet.

Regen analysis of Renewable UK EnergyPulse planning data indicates that the existing pipeline of repowering projects could deliver up to 690 MW of additional capacity by 2035, while decommissioning around 500 ageing turbines**Error! Reference source not found.**. Looking further ahead, the scale of the opportunity grows significantly. Regen modelling of the age and capacity of existing turbines, alongside the scale of their deployment and planning permission expiry dates, estimates that between 1 and 2.5 GW of additional onshore wind capacity could be delivered through repowering by 2040, rising to 2.5-6 GW by 2050, subject to enabling conditions.[3]

However, the ability to capture this opportunity is not guaranteed. In the near term, Scottish onshore wind sites may be constrained by the onshore wind allocation set out in the Clean Power 2030 Action Plan.[4] Results for the National Energy System Operator (NESO) Gate 2 to Whole Queue (G2TWQ) process confirm that the entirety of this 21 GW allocation has already been filled.[5] This could restrict around 113 Scottish sites, representing approximately 1.9 GW of existing capacity, to life-extension rather than repowering. Without timely intervention, this risks locking sites into suboptimal outcomes, delaying the delivery of additional clean power.

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[3] Regen modelling based on Renewable UK EnergyPulse project data. Full modelling approach and assumptions can be seen in Appendix 2.

[4] DESNZ, 2024. Clean Power 2030: Action Plan.

[5] NESO, 2026. Connections Reform: Detailed Results Data.

Repowering is not a new or untested approach. Across GB, 32 projects have already been successfully repowered, providing valuable evidence of what can be achieved in practice (**Error! Reference source not found.**). Many early commercial sites were developed with turbines up to 50 metres in height and capacities of 0.3-0.5 MW each. By contrast, a typical large-scale site built today features turbines 200 metres tall, capable of generating 4-6 MW each and producing significantly more electricity per unit of land than older sites.[6] By replacing smaller, less efficient turbines with modern technology – often resulting in fewer turbines overall – these projects have added
156 MW of additional capacity to the generation mix. Additionally, they have provided a range of other improvements, such as enhanced community benefits and environmental enhancements that meet modern standards.

[6] Evidenced in Renewable UK EnergyPulse project data.

Figure 3: Past and in planning repowered projects. Data from RUK EnergyPulse Data, accessed December 2025.

## Repowered sites have already added a further 156 MW into GB's electricity mix, with 710 MW currently in planning

## The UK’s largest repowered project: Hagshaw Hill

Commissioned in 1995 as Scotland’s first commercial wind farm, Hagshaw Hill has played a pioneering role in the development of onshore wind in the UK. The site was repowered in 2025, becoming the largest repowered onshore wind project in the UK to date. The original array of 26 turbines (0.6 MW each) was replaced with 14 modern turbines rated at 5.7 MW, across an expanded site and making use of existing access tracks where possible.


Figure 4. Site layout before and after repowering. Source: Scottish Power Renewables

The repowering project delivered an additional 68 MW of installed capacity. The site’s community benefit fund was significantly enhanced and is now expected to provide nearly £400,000 per year – a 26-fold increase on previous payments.

Figure 5 & Figure 6. Hagshaw Hill wind farm pre and post-repowering. Source: Scottish Power Renewables

## 2.1. **Unlocking the opportunity**

While the overall opportunity for repowering is substantial, turning this potential into delivered projects depends on a combination of physical, regulatory, commercial and social factors. Across the fleet, the main considerations shaping delivery are:

- **Technical feasibility:** The potential of a site to accommodate modern turbines depends on footprint, turbine spacing, topography, foundations and site access
- **Planning and consenting:** Consistent and timely planning processes and supportive policies are critical to enable projects to proceed efficiently
- **Grid and network access:** Availability of transmission and distribution network connections to deliver additional generation in a timely manner, and the management of local network constraints
- **Commercial and business model factors:** Robust revenue streams which can be reliably forecast are key to enabling investment in ambitious repowering projects
- **Community engagement and acceptance:** Local support can accelerate project delivery and maximise social and economic benefits; understanding and incorporating stakeholder priorities is essential
- **Land rights and ongoing management with land owners:** The ability for developers to gain a land lease that makes the site commercially viable
- **Circularity and end-of-life management:** Efficient reuse, refurbishment and recycling of turbines and infrastructure can reduce costs, environmental impacts and supply chain pressures.

Collectively, these considerations highlight that repowering requires coordinated attention across multiple dimensions.

**Section 3:**

# Planning and consenting

Planning policy is a critical factor in determining whether onshore wind repowering can proceed efficiently. There is a key opportunity to speed up the consenting regime by better reflecting the experience and evidence from existing sites.

The planning regime for onshore wind plays a decisive role in determining whether repowering projects succeed, serving as both a critical bottleneck and a powerful enabler. Many of GB's onshore wind sites were originally consented under a different policy context. Since then, policy has evolved, surrounding landscapes and patterns of development have changed, and expectations around environmental protection and community engagement have increased.

In the meantime, sites have generated decades of operational data, providing valuable evidence on issues such as noise, environmental impacts and system performance. This wealth of real-world information is currently underutilised, with repowering applications often treated in much the same way as proposals for entirely new sites. As a result, the repowering planning process remains lengthy and uncertain, presenting a significant hurdle for developers and placing pressure on planning authorities that lack clear, tailored guidance.

There is a clear opportunity to modernise the planning approach to repowering, making better use of existing evidence and experience to support timely, well-informed decision making.

## 3.1. Planning policy in England, Scotland and Wales

### 3.1.1. Planning timescales for life-extension or repowering

In general, life-extension is not problematic from a planning perspective. It typically involves a variation of an existing planning condition to extend the planning consent by a relatively short period, most commonly around five to ten years. As a result, the scope of assessment is generally narrower and focused on whether the continued operation of the site remains acceptable. In most cases, proposals for life-extension are not highly contentious, particularly where impacts are well understood and have been demonstrated to be acceptable over the lifetime of the project to date. Life-extension can provide a valuable opportunity to bring older projects into closer alignment with current planning guidance and best practice, for example in relation to noise standards, habitat management and biodiversity enhancement.

Repowering, by contrast, often triggers a more comprehensive planning process, similar to, or the same as, a full application. In many cases this requires significant time to process.

### 3.1.2. National differences

Planning policy and decision making is a devolved matter, so the approach to repowering and life-extension varies across England, Wales and Scotland. In the first instance, different capacity thresholds across the nations determine whether onshore wind projects are considered at a local or national level, shaping both process and risk for repowering proposals:

- **England**
    - Projects over 100 MW are determined nationally through the Nationally Significant Infrastructure Projects (NSIP) regime
    - Projects under 100 MW are consented through the Town and Country Planning Act (TCPA)
- **Scotland**
    - Projects over 50 MW are consented nationally under Section 36 of the Electricity Act. (The 50 MW threshold is currently subject to consultation by the Scottish government.)
    - Projects 50 MW and below are determined through local planning authorities
- **Wales**
    - Projects over 50 MW are determined as Significant Infrastructure Projects and are decided by the examining authority before being passed to the Welsh Ministers for a final decision. As of 15 December 2025, this process has superseded the Development of National Significance process, where projects between 10 MW and 350 MW were determined by Planning and Environment Decisions Wales on behalf of Welsh Ministers.
    - Projects below 50 MW are now determined by the local planning authority, as well as projects submitted prior to 15 December 2025 that are below 10 MW.

Further to these differences, while all three nations recognise the role of onshore wind in delivering decarbonisation and energy security, different levels of consideration have been given to enabling repowering and life-extension.

Of the three nations, Scotland has given the most explicit and structured consideration to repowering within national planning policy, while England's framework remains comparatively less comprehensive and offers limited clarity. Wales sits between the two, with a more supportive strategic approach than England but less detailed policy guidance than Scotland.

Table 1: Planning policy for repowering in England, Wales and Scotland

| Country | Policy document | Policy wording |
|---|---|---|
| **England** | National Planning Policy Framework (NPPF) (2024) | *"In the case of applications for the repowering and life-extension of existing renewable sites, give significant weight to the benefits of utilising an established site."* |
| | National Policy Statement EN-3 (2025) | *"While there may be benefits to making use of an existing site, given the likely change in technology over the intervening time period, any repowering of sites is likely to involve wind turbines of a different scale and nature. This could result in different, additional or more significant adverse impacts as well as a different electricity generating capacity.*<br><br>*"Applicants must submit a new consent application for any repowering of an existing site, and this must comply with the relevant application requirements, such as EIA and HRA.*<br><br>*"In determining an application for the repowering of a site, the proposed replacement scheme should be determined by the Secretary of State on its own merits. The Secretary of State should give significant weight to the benefits of utilising an established site.*<br><br>*"Critical national priority/CNP: A policy set out at Section 4.2 of EN-1 which applies a policy presumption that, subject to any legal requirements... it is likely that the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy, in all but the most exceptional circumstances. CNP Infrastructure is defined as nationally significant low carbon energy.* |
| | The Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025 | *"This Order amends the Planning Act 2008 (c.29) ("the 2008 Act") to reintroduce onshore wind generating stations into the definition of nationally significant infrastructure projects under the 2008 Act. It also sets the capacity threshold at which onshore wind and solar projects are nationally significant infrastructure projects at more than 100 megawatts."* |

| | | |
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| **Wales** | Planning Policy Wales (2024) | *"Planning authorities should support such schemes and take into account changes in renewable energy technology and viability, which may mean, for example, that the format of a repowered wind farm will be different from an existing scheme. Planning authorities should set out broad criteria for the determination of life-extension and re-powering applications."* |
| **Scotland** | National Planning Framework 4 (2023) | *"Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported. These include wind farms, including repowering, extending, expanding and extending the life of existing wind farms."* |
| | Onshore Wind Policy Statement (2022) | *"We are encouraging developers to offer shared ownership opportunities to communities as standard on all new renewable energy projects, including repowering and extension to existing projects.*<br><br>*"We continue to encourage all renewable energy businesses, regardless of technology type, to offer community benefits packages – including in relation to the repowering of existing sites and extensions to existing projects."* |

Table 2: Planning policy for life-extension across England, Wales and Scotland

| Country | Policy document | Policy wording |
|---|---|---|
| **England** | National Planning Policy Framework (NPPF) (2024) | *"In the case of applications for the repowering and life-extension of existing renewable sites, give significant weight to the benefits of utilising an established site."* |
| **Wales** | - | None mentioned. |
| **Scotland** | Onshore Wind Policy Statement (2022) | *"The associated operations and maintenance costs required to keep existing turbines operational , and the availability of parts to service older turbines mean that we cannot rely on life-extension to ensure our current fleet remains operational."* |
| | National Planning Framework 4 (2023) | *"Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported. These include wind farms, including repowering, extending, expanding and extending the life of existing wind farms."* |

### 3.1.3. Decommissioning policy

There is currently no standalone planning policy dedicated to decommissioning onshore wind farms in England, Wales or Scotland. Instead, planning consents normally contain a condition requiring the site to plan for decommissioning.

This is set to be formalised in England. The draft NPPF for England has specified that "applications should be accompanied by proposals for decommissioning and site restoration, including details of how these measures are expected to be implemented".

In Scotland, planning permissions and Section 36 consents for wind farms typically contain a condition relating to decommissioning, restoration and aftercare that requires turbines and associated infrastructure to be dismantled and removed and the land restored in accordance with an approved decommissioning statement. Planning authorities and consultees (such as NatureScot and SEPA) are involved in preparing and approving these plans. In England and Wales, statutory instruments for specific wind farm developments include provisions for decommissioning plans to be approved by the relevant planning authority prior to any decommissioning works.

Given that detailed decommissioning methods cannot be fixed decades in advance, such outline approaches are widely regarded as sensible planning practice. They allow planners and developers to ensure there are robust mechanisms for removal and site restoration while retaining flexibility for future technological and regulatory changes. Incorporating this approach more explicitly into national planning guidance and planner training could help ensure consistency and awareness across planning authorities.

### 3.1.4. Local planning policy

Specific consideration of repowering within local planning policy remains extremely limited. Regen analysis identified that only 4% of local plans in England explicitly reference repowering,[7] and where it is mentioned, approaches vary significantly. Some plans require repowered sites to meet the same criteria as entirely new developments, while others offer greater support in recognition of the efficiency and land-use benefits of repowering. As such there is a need for clear policy and guidance at the national level.

[7] Regen, 2025. 'A landscape of chaos'... renewable energy in local plans across England.

## 3.2. Common planning challenges

### 3.2.1. Use of existing environmental data

Wind farms that have been operating for c.20 years will typically have generated extensive environmental data, including long-term monitoring of birds, bats, habitats, noise and landscape effects. Despite this, repowering proposals are usually required to undertake the same baseline surveys and Environmental Impact Assessments (EIAs) as entirely new developments. The current system does not make use of historic operational data, leading to duplication of surveys, increased costs and longer consenting times, even where real-world evidence shows impacts to be well understood and effectively managed.

There is a strong case for a more proportionate approach to environmental assessment for repowering. This could allow robust, site-specific monitoring data, gathered during operation, to inform the baseline for assessment, focusing scrutiny on what has changed, such as turbine size, layout or technology, rather than reassessing impacts that are already well evidenced.

### 3.2.2. Strength given to repowering

At present, there is inconsistency in how developers and planning authorities approach repowering decisions. There is a need for greater clarity and stronger policy wording on repowering, particularly in England and Wales. While the NPPF and Future Wales policies are broadly supportive of repowering, they lack the detailed guidance and certainty needed to underpin consistent planning decisions. In England, the two-tier planning process between Town and Country Planning and Nationally Significant Infrastructure Projects has created an inconsistent message on policy support for repowering. The opt-in (and soon to be introduced opt-out procedures under Section 35 Planning Act 2008) mean that projects could follow the path of least resistance and use the most favourable policy routes, which may not be the most efficient consenting route.

### 3.2.3. The need for Critical National Priority designation in England

At present, only Nationally Significant Infrastructure Projects (NSIPs) are designated as a Critical National Priority (CNP) under National Policy Statement (NPS) EN-1. Recent changes to the NSIP thresholds for onshore wind mean that projects up to 100 MW in England will now be decided at the local authority level. This means that most repowering projects (unless they opt in) will be excluded from the CNP category that benefits DNO projects, relegating them to a comparatively weaker policy framework with less policy support.

It is recommended that the NPPF incorporates the CNP designation by classifying all commercial-scale renewable and low-carbon energy projects – not just those under the NSIP regime – as CNPs. This would emphasise their critical importance to national energy security and economic resilience. This could be achieved by the NPPF referencing Section 4.2 of the NPS EN-1, which states that, "*subject to any legal requirements, the urgent need for CNP infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, means that it is likely the need case will outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy, in all but the most exceptional circumstances*".

The CNP policy gives increased weight to the need for renewable energy against the residual impacts not capable of being addressed by application of the mitigation hierarchy in all but the most exceptional circumstances. All renewable energy contributes to the objectives of meeting Clean Power 2030 and therefore there should be no distinction between the application of this heightened policy based on the output of the proposed development.

In applying the CNP policy, decision makers also need to be cognisant of the existing wind development that is proposed and carefully consider the different impacts between the existing scheme, its residual terms and decommissioning, and the proposed scheme. Guidance on the baseline to be considered for assessing environment impacts would be helpful, to avoid unnecessary legal challenge against applying CNP policy to the statutory environmental assessment process.

### 3.2.4. Resourcing of planners and guidance

Local planning authorities across the UK face persistent resourcing pressures which are slowing down application processing. To address this, we propose the introduction of dedicated renewable energy planners working across regions, whose sole focus is on assessing renewable energy applications.

Compounding staffing pressures is a lack of formal, accessible guidance for planners on how to handle repowering and other end-of-life applications. Research has identified that planners have faced uncertainty about how to interpret policy and balance competing considerations when assessing repowering proposals, in part because national guidance lacks detail on these specific circumstances.[8] Greater certainty in both planning policy and supporting guidance would help address this.

[8] Windemer, R., 2019. Managing (im)permanence: End-of-life challenges for the wind and solar energy sectors (Doctoral dissertation, Cardiff University).

## 3.3. Key recommendations for planning

### Recommendation 1: Introduce a repowering-specific environmental assessment process

The Ministry of Housing, Communities and Local Government should introduce a proportionate, repowering-specific environmental assessment process that formally allows long-term operational monitoring data to be used as the baseline, focusing assessment on materially changed impact rather than duplicating greenfield EIAs.

### Recommendation 2: Introduce a presumption in favour of repowering

Policy should provide a clear presumption in favour of repowering, recognising its strategic importance for maintaining and increasing renewable energy output as older sites reach the end of their operational lives. Improved policy should emphasise the benefits of repowering, including efficiency gains and opportunities for environmental enhancements. Consistent definitions for ‘repowering’, ‘life extension’ and ‘replacement turbines’ would help developers and planning authorities apply policies.

### Recommendation 3: Recognise repowering as a national priority

Repowering should be explicitly recognised in UK energy strategies, with the NPPF designating all commercial-scale renewables projects as a Critical National Priority to remove uncertainty and accelerate investment. Clear and consistent planning guidance should be used throughout.

### Recommendation 4: Address resourcing challenges facing local planning authorities

There is a need to address the under resourcing of local authority planners to respond to the expected increase in end-of-life applications. One approach to addressing this could be through the introduction of specialist renewable energy planners working across local authorities (e.g. regionally) to focus on renewable applications. Alongside resourcing, additional training and guidance should be provided for planners that are making end-of-life decisions.

Section 4:

# Grid and network access

A key barrier to onshore wind repowering is the ongoing uncertainty created by reforms to grid connections and network charging.

Grid access and network charging is a central consideration for onshore wind repowering in GB. While adapting to changes across the grid regulation landscape, most recently to the connections process, repowering projects must navigate a unique set of additional network challenges. Understanding requirements around updating existing connection agreements as well as the more advanced nature of end-of-life decisions further influences the timings, cost and scale of reinvestment.

Repowered projects face a challenging and unpredictable network charging environment. Transmission and distribution charges are volatile and are projected to rise significantly in regions such as northern Scotland, detrimentally affecting project economies. Repowered sites inherently cannot relocate to avoid high locational charges and future charging regimes that fail to account for this could unintentionally limit additional capacity at these sites or deter reinvestment in existing assets.

The emerging Strategic Spatial Energy Plan (SSEP) provides an encouraging framework for coordinating future connections, determining where and when generation and storage can be deployed. However, the protracted timelines and current lack of clarity around treatment of end-of-life projects introduces further uncertainty for repowering projects that rely on early investment signals.

Collectively, evolving grid regulation, prohibitive network charging and emerging spatial planning introduce material uncertainty for investors, with direct implications for the delivery and expansion of repowered onshore wind capacity.

## The connections process

An operational site's connection agreement is based on the specific equipment currently installed. If that equipment is changed through repowering, the network operator must assess whether the existing connection agreement needs to be updated or replaced, even where no increase in export capacity is proposed.

The costs and timeframes associated with securing new connection agreements for repowered projects will largely determine what options can be pursued at a given site. How these interact with timeframes for planning consents further define how a project can progress. Adding to this complexity is inconsistency in approaches taken by different network operators. There is neither standardisation of different routes to repowering for new or updated connection agreements, nor clarity around the variety of possible approaches to be taken; this causes high uncertainty for developers. These repowering routes may involve:

- **Life extension with existing turbines, or like-for-life replacement,** where the existing grid connection agreement may be maintained
- **Repowering with new equipment but not additional capacity,** where G99 process may be required with no Gate 2 interaction
- **Repowering with new equipment and additional capacity,** where G99 process and some Gate 2 interaction may be required.

With this level of complexity, pre-application communication between the network operator and developer is a pre-requisite to deciding which path is the most suitable for a given site. However, since the implementation of NESO's connection reform process in mid-2025, NESO and Transmission Operators (TOs) have not been undertaking pre-application communication, despite TO licence obligations. They have also signposted that no pre-application communication will resume before the next Gate 2 application window, creating an immediate barrier to projects approaching end-of-life in the near term. **Effective pre-application communications between network operators and developers should resume immediately.**

## Non-firm connection agreements

Non-firm connection agreements, which allow sites to connect ahead of network reinforcement in exchange for accepting some level of curtailment, will be critical in enabling additional capacity to be delivered at repowering sites in optimal timeframes. Most recently commissioned onshore wind sites hold non-firm connection agreements. Network operators are required to define an annual curtailment limit and a curtailment end date, after which the connection becomes firm. Confidence in these limits and end dates, and in the compensation mechanisms should the former be exceeded, must be maintained to ensure developers can continue to invest ahead of network reinforcement.

Older sites which are approaching end-of-life currently hold firm connection agreements for their export capacity. This existing level of firm capacity should be maintained within any new non-firm arrangements for the repowered site.

## Co-located energy storage

Co-located energy storage has a role to play in maximising the flexibility of repowered sites, enabling them to work profitably within grid constraints while delivering flexibility services to the grid. However, under the Gate 2 connections process there is no bespoke treatment for hybrid/co-located projects, meaning combined technologies are treated separately and can receive misaligned connection dates that affect project viability. NESO should consider the system benefits which can be delivered through co-located storage when it reviews its connections reform methodologies this year.

## 4.1. CP30 Action Plan and queue management

As part of connections reform intended to ensure the delivery of Clean Power 2030 (CP30) targets, NESO reorganised the connections queue in 2025, removing speculative projects and prioritising those which were ready to build and could contribute to such targets. This was termed the Gate 2 to Whole Queue (G2TWQ) process.[9]

For a site to be offered a Gate 2 connection offer, which enables a connection before 2035, it must be assessed by NESO as ‘ready’ and ‘strategically aligned’:[10]

- **Ready:** Project has secured key development milestones including land rights or planning permissions
- **Strategically aligned (i.e. ‘needed’):** Project aligns with strategic capacity goals set out in the CP30 action plan.[11]

This assessment and prioritisation of projects in the existing queue and any future connections according to pre-determined capacity allocations has significant region-specific implications for onshore wind projects which will be approaching end-of-life by 2035.

### 4.1.1. Little room for additional repowered capacity in Scotland before 2035

The results of the reorganised connections pipeline were announced by NESO in December 2025 with detailed results published in January 2026. They confirm that the 21.2 GW allocation for onshore wind in Scotland has been filled.[12]

A list of projects with Gate 2 offers has not been published, however Regen analysis of Renewable UK EnergyPulse data indicates that a maximum of c.700 MW of allocated Gate 2 capacity is contributed by repowering sites. This means that for 113 Scottish sites which will

[9] NESO, nd. About connections reform (accessed 2025).
[10] NESO, 2025. Gate 2 Criteria Methodology.
[11] DESNZ, 2025. Clean Power 2030 Action Plan.
[12] NESO, 2026. Connections Reform Detailed Results Data.

approach end-of-life over the next 10 years, totalling 1.9 GW of existing capacity, repowering with additional capacity before 2035 will not currently be possible.[13]

These sites could choose life-extension and delay repowering to post-2035 when additional network capacity may be available. However, where life-extension is not viable, sites will be forced into either repowering with no additional capacity, below the full potential of the site, or decommissioning entirely.

The capacity allocation set by CP30 for 2035 will be reviewed by the SSEP. This is an important opportunity to reassess the potential of onshore wind in Scotland, and repowered projects in particular, to contribute to the UK's clean power goals.

### 4.1.2. Near-term opportunities remain for repowering in England and Wales

Due to the lack of onshore wind projects in planning in England and Wales, the Clean Power 2030 allocation for 15.8 GW to be deployed by 2035 is currently undersupplied by approximately 5 GW. With lower levels of wind resource and high land use constraints in these regions, there is some scepticism in industry that there will be enough viable sites in England and Wales to fill this allocation.

In Mid-Wales, strategic investment in the transmission network would be required to enable additional onshore wind capacity to connect. Existing sites which are currently approaching end-of-life, some of which have well progressed repowering plans, could be key sources of pre-2035 capacity growth.

Projects approaching end-of-life in England and Wales will be able to receive Gate 2 connection offers to repower with additional capacity. Analysis of sites approaching end-of-life indicates that up to 685 MW of additional capacity could be delivered through repowering in these regions by 2035.

[13] Sites in Scotland reaching planning consent expiry, or 25 years from commissioning, before 2035; where there is no evidence of a repowering scheme in planning.

#### Grid constraints are already holding back repowering in Wales

Nadara's Bryn Titli (10 MW) and ScottishPower Renewables' Llandinam (30 MW) are sites with substantial repowering potential. Bryn Titli has the potential to deliver an additional 50 MW and Llandinam has been granted planning consent to repower to over 100 MW.

Despite this potential, neither has been able to progress. The local electricity grid in mid-Wales is already operating at maximum capacity, and delivering the necessary network upgrades to accommodate the increased output of either project would require major investment – approximately £150 million – which is prohibitively expensive if attributed to a single project.

Without coordinated investment in grid infrastructure, sites like Bryn Titli and Llandinam risk being unable to realise their full repowering potential. Unlocking these ageing wind farms is not just a technical challenge – it requires strategic, national-level planning.

## 4.2. Network charging and the Strategic Spatial Energy Plan

The SSEP is set to become the master document for the GB energy system, guiding when and where new generation, storage and demand should connect. The SSEP will inform the Centralised Strategic Network Plan (CSNP), which will define how the electricity network will connect this future capacity. These plans will have major consequences on the availability of network capacity for repowering projects. The Reformed National Pricing (RNP) workstream aims to align network charging with the delivery of these plans, this must ensure that network charges do not work against the objectives of the SSEP and repowering projects do not experience contrary signals.[14,15]

### 4.2.1. Network charging for large-scale projects

#### Volatile and increasing charges under the current regime

Transmission-connected generators and embedded generators above 100 MW are subject to TNUoS tariffs. These charges are significantly higher in northern GB than in the south, where tariffs are low or negative – and the north–south differential is widening.

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[14] Regen, 2025. Update on the SSEP.

[15] NESO, 2026. Strategic Spatial Energy Planning (SSEP).

For repowering projects, TNUoS represents a material and increasingly uncertain operational cost. Charges have become volatile in recent years and have risen sharply in areas with high repowering potential, notably northern Scotland. NESO's five-year forecasts (September 2025) indicate that onshore wind TNUoS tariffs in the north of Scotland could more than double from £27/kW in 2026/27 to £58/kW in 2029/30, with additional pressure from rising Transmission Loss Multipliers.[16,17] Should these increases materialise, they will be a significant barrier to additional capacity being delivered at repowering sites. Further to this, Ofgem's rejection of the Cap and Floor has surfaced concerns that escalating and unpredictable charges could constrain investment in repowering and additional capacity,[18] particularly as the UK government prepares for record levels of procurement in upcoming CfD allocation rounds to meet the Clean Power 2030 target.

## Transition to enduring charging regime

Following the decision under the 2022-2025 Review of Electricity Market Arrangements to retain a single GB wholesale price, reformed connection and network charges will remain the primary mechanism for incentivising generation to connect in line with available grid capacity, guided by the emerging SSEP.[19,20]

Under current timelines, the first SSEP is due in autumn 2027, with aligned TNUoS reform expected by 2029. This creates a prolonged period of uncertainty for TNUoS-paying sites approaching end-of-life by 2030, for which future network charges represent a material investment risk. The government should therefore accelerate these reforms and establish an enduring charging framework as early as possible. For life-extension and repowering projects where investment decisions are under way, careful management of the transition to any new charging regime will be essential. As acknowledged by Ofgem,[21] transitional measures, such as phased implementation or time-limited charge stability, may be required to avoid sudden cost shocks, particularly for long-standing Scottish projects that have paid transmission charges for decades and cannot reasonably accommodate unpredictable changes.

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[16] NESO, 2025 Five-Year View of TNUoS Tariffs for 2026/27 – 2030/31

[17] For further analysis on the impact of TNUoS on Scottish wind, see Regen's report Investability and Scottish Wind: An update (2025).

[18] Ofgem, 2025. Minded-to Decision on CMP444: Introducing a cap and floor to wider generation TNUoS charges.

[19] DESNZ, 2025. Review of electricity market arrangements (REMA): Summer update, 2025.

[20] Ofgem, 2025. Open Letter: Reforming network charging signals to align with the government's decision on the future design of Great Britain's electricity system.

[21] Ofgem, 2025. Open Letter: Reforming network charging signals to align with the government's decision on the future design of Great Britain's electricity system.

### Treatment of repowering projects under an enduring regime

The detailed design of enduring TNUoS and connection cost reforms, including any repowering-specific provisions, will be critical to sites approaching end-of-life. Repowered projects are constrained by their existing locations and cannot respond to locational charging signals by relocating. Network charging must therefore recognise existing Transmission Entry Capacity and ensure locational signals remain proportionate, aligned with the SSEP and do not inadvertently disincentivise viable capacity.

Where repowering delivers substantial additional capacity and triggers network reinforcement, higher connection costs may be justified. However in unconstrained areas where reinforcement is not required, particularly where repowering involves limited or no capacity increase and assets have paid TNUoS for decades, material cost increases would not be appropriate.

## 4.2.2. SSEP methodology

Given the central role of the SSEP in determining future onshore wind deployment across GB, its treatment of end-of-life outcomes is critical, especially as over 10 GW of existing onshore wind capacity will reach end-of-life between 2035 and 2050. Currently, the SSEP methodology does not adequately consider onshore wind end-of-life, failing to internalise either the whole system benefits of repowering with additional capacity, or the whole-system costs associated with decommissioning.

While economic modelling underpins the SSEP, NESO has confirmed that this does not include repowering – although it did say it welcomed the opportunity to explore how the benefits might be captured through Appraise or in the SSEP narrative. The exclusion of repowering from the modelling implies an assumption that existing onshore capacity continues unchanged to 2050, overlooking the scale of interventions required by developers and network operators simply to maintain today's operational fleet through life-extension and partial repowering.

Although it costs to maintain network capacity, repowering delivers a net whole-system benefit by maximising the use of existing assets, reducing the risk of stranded infrastructure and avoiding the consenting risks associated with new sites and network routes. Where such interventions are required, additional value can be realised by enabling repowering with increased capacity and by making efficient use of established land, grid connections and community relationships.

## 4.3. Key recommendations for network/grid

**Recommendation 1: NESO and DESNZ should ensure the SSEP reviews the limits on the capacity of onshore wind in Scotland that will be granted grid connection agreements by 2035**

Repowering onshore wind in Scotland is constrained by the CP30 allocation, preventing projects progressing. The SSEP should review the opportunity offered by repowering of proven and successful sites and consider increasing the allocation of grid connections, providing early visibility to enable decisions around repowering.

**Recommendation 2: Delivery of the SSEP and TNUoS reform should continue at pace and repowering should be integrated into SSEP economic modelling**

TNUoS charges must not rise to levels incompatible with developing projects and delivering Clean Power 2030. Certainty on the future of network charges should be reached as early as possible. In its economic modelling, the SSEP should include repowering. This assessment should consider the whole-system benefit of maintaining existing connected capacity and the further whole-system efficiencies in using that opportunity to deliver additional capacity. Furthermore, the SSEP should draw upon post-G2tWQ capacity realities – future capacities should account for any attrition that has occurred from the CP30 ranges.

**Recommendation 3: Network operators, in tandem with NESO, should publish clear guidance on approaches to repowering as well as resume pre-application communication with developers with immediate effect**

Consistency in approach to repowering projects should be sought across all TO and DNOs, with clear guidance published. This would simplify the decision making process for sites approaching end-of-life. Open and effective communication in the pre-application phase of repowering projects is important to ensure all available options are understood. As such, the current hiatus in preapplication communication should cease immediately.

**Section 5:**

# Business and commercial viability

The commercial viability of repowering is a major driver of project decisions, with costs often comparable to developing a new greenfield site. Much of the existing fleet was supported by legacy revenue schemes, making future support and projected market revenues critical in determining whether a project is financially feasible.

Onshore wind repowering is a strategic, capital-intensive undertaking. It reintroduces development risk and upfront capital requirements of a greenfield site while being constrained by legacy layouts, land agreements and existing infrastructure, which can limit design flexibility and shape costs. Repowering involves both the decommissioning of older turbines and the installation of new, larger ones, each with associated costs. Although decommissioning is typically anticipated in original project planning, it remains a discrete cost alongside investment in new turbines and balance-of-plant.

Repowering is not inherently cheaper than greenfield development. While existing access routes, cabling or gird connections can, in principle, offer commercial advantages, these benefits are highly site-specific and often limited for older wind farms. Modern turbines typically require larger foundations, upgraded access infrastructure and strengthened hard standings, meaning that in most repowered projects, much of the original infrastructure cannot be reused, and repowered sites may only avoid certain grid connection costs compared to greenfield sites where no increase in export capacity is required.[22]

Repowering decisions are further shaped by wider market and financial pressures. Underlying interest rates have risen significantly since the early 2020s, increasing the cost of capital for onshore wind projects, while prolonged periods of low and negative wholesale prices – driven by growing renewable generation and consequential price cannibalisation – have heightened volume and revenue risk. This is particularly acute for CfD-backed projects from Allocation Round 4 (AR4) onwards, which receive no payment during negative pricing periods. In addition,

[22] ARUP, 2025. Renewable Energy Generation Cost and Technical Assumptions – Onshore Wind and Solar PV. When compared to greenfield sites, connection costs paid by developers for network extension/upgrade can form 10-20% of overall CAPEX. A repowered site with no additional capacity would not face this cost.

repowering can trigger accounting impacts where existing turbines are retired before the end of their depreciable life, resulting in asset write-downs that affect short-term reported returns and can influence financing and investment decisions, even where long-term project economics remain robust.

## 5.1. **Past and present revenue arrangements**

Legacy GB market arrangements have shaped the commercial context for onshore wind repowering. While alternative routes to market, such as Power Purchase Agreements (PPAs) or Corporate PPAs (CPPAs), have been available, developers have historically relied on formal revenue support mechanisms. Prior to the CfD, the Renewables Obligation (RO) was widely regarded as the most commercially robust option due to its long-term stability, with operators sometimes extending planning consents to align turbine operational lives with RO eligibility, allowing technically sound assets to continue operating once initial costs had been recovered. For small-scale renewable generators (under 5 MW), the Feed-in-Tariff (FiT) was the primary scheme.

As policy shifted towards the CfD, developers increasingly viewed it as the primary route to market. When onshore wind first accessed the CfD in 2014, just under 750 MW of capacity secured contracts, demonstrating strong demand under a credible long-term revenue framework.[23] However, the subsequent exclusion of onshore wind from AR2 and AR3 (2017-2019), following the RO's closure, led to an almost complete halt in new deployment. While CPPAs have provided an alternative for some projects, they are not capable of supporting GW-scale deployment, underscoring the critical importance of revenue certainty in supporting deployment in onshore wind.

The evolution of these support mechanisms illustrates how long-term revenue certainty has guided strategic investments. As existing contracts near their end, terms and duration of new agreements will be pivotal in decisions on repowering, life-extension or decommissioning onshore wind assets.

### 5.1.1. Implications of the RO and FiT expiring

A pivotal moment is approaching for the onshore wind commercial landscape as a couple of these long-standing revenue support mechanisms begin to expire:

- **Renewables Obligation cliff edge from 2027:** Contracts for early RO beneficiaries will begin to expire in March 2027, meaning over 5 GW of onshore wind capacity could lose their guaranteed income stream and transition into exposure to the wholesale market.[24]

[23] DECC, 2015. Contracts for Difference (CFD) Allocation Round One Outcome.
[24] UCL, 2025. UK renewable energy cliff brings both risks and opportunities.

- **Feed-in Tariff expiries post 2030:** Most of the 770 MW of onshore wind supported under the FiT (deployed 2010-2016) will reach the end of guaranteed payments between 2030 and 2036, leaving project fully exposed to wholesale price risk.[25,26] Repowering may be required to maintain commercial viability, but this is likely feasible only at sites with strong wind resource, local grid availability and developers able to meet higher connection costs, leaving many small-scale sites at risk of decommissioning. Ofgem's P442 has improved commercial prospects for sub-5MW sites by reducing and enabling time-matched local supply, creating new market opportunities for small-scale projects.

The cumulative effect of these expiries is not just individual revenue loss for a given site; it is also a systemic risk for the sector. With large volumes of onshore wind capacity coming off long-term contracts around the same time, competition for alternative revenue mechanisms, such as CfDs, is likely to intensify. This 'cliff effect' amplifies commercial uncertainty across the repowering pipeline.

## 5.2. Future commercial arrangements

With the RO and FiT schemes closed to new generators, the market context and commercial viability for repowering are inherently more uncertain, depending on how future market arrangements and revenue mechanisms evolve. Several key developments – particularly changes to the CfD framework, evolving electricity pricing structures and alternative revenue pathways – will shape investment risk and opportunity for repowered projects.

### 5.2.1. Repowering eligibility for a CfD

A significant policy milestone for repowering in GB is the inclusion of repowering onshore wind projects in the CfD scheme from AR7 onwards.[27] This represents an important commercial signal for investors. It offers a mechanism to reintroduce revenue certainty for existing sites that may be losing legacy support under the RO or FiT. Under these reforms, onshore wind projects that meet defined eligibility criteria can compete for a 20-year contract. However, the reformed CfD framework, in line with the broader market context, introduces commercial implications.

[25] Regen analysis of Renewable UK EnergyPulse data.

[26] DESNZ, 2024. Feed-in Tariff load factor analysis.

[27] DESNZ, 2025. Further reforms to the Contracts for Difference scheme for Allocation Round 7: consultation document.

## Scale thresholds and project size

While there is no requirement for a repowered project to match or exceed the legacy project's capacity to obtain a CfD, the minimum capacity threshold of 5 MW creates a differentiated impact across the onshore wind sector. While the threshold is unlikely to present a significant barrier for larger developers capable of consolidating sites or investing in multi-turbine repowering schemes, it is more challenging for smaller-scale projects, particularly those that originally developed under the FiT.

Many of these, including those associated with community energy groups, may be physically constrained by site size, planning conditions or grid availability, limiting their ability to scale above the threshold. For these sites, repowering to access CfD support may not be feasible, even where the underlying wind resource remains strong. Where scaling to the 5 MW threshold is technically possible, smaller projects will face commercial challenges. Not only does the competitive nature of the CfD auction favour larger repowering schemes that can achieve economies of scale and submit a lower strike price, but the complexity of both the auction process and the contract can place significant demands on time, expertise and finances, making it particularly challenging for smaller projects and eroding their economic viability.

These challenges are further compounded by network connection costs, which typically increase materially once installed capacity exceeds 1 MW. For sub-1 MW projects considering repowering, the step change in connection charges and reinforcement requirements can significantly affect commercial viability, particularly where revenue certainty beyond the FiT is limited. In combination, these factors limit the extent to which the CfD can provide a viable revenue route for smaller repowering projects, narrowing their available options as legacy support schemes come to an end.

## 'End-of-life' definition and forward bidding

Under the current CfD, one criterion for repowering is that generating stations reach or will reach the end of their operating life – defined as 25 years – on or before their Target Commissioning Date. To provide some flexibility, the CfD framework allows projects to apply for support in advance of this through a process called forward bidding. This enables sites to secure future revenue before decommissioning existing turbines, reducing the risk of a generation gap and providing early financial certainty. It can also support more efficient project delivery by coordinating decommissioning and recommissioning within a single construction phase, potentially shortening development timelines and lowering overall costs.

However, commercial constraints remain. The assumed 25-year operating life does not align with the duration of legacy or current revenue support mechanisms, including the CfD and RO contracts, which typically run for 15, or recently, 20 years. As a result, projects may face periods of merchant exposure as they approach the end of their operating life, particularly affecting sites using earlier turbine technologies, where continued operation beyond 20 years may not be technically or economically viable.

In addition, some sites may be technically and commercially ready to repower before reaching the full 25-year lifespan. This can be to address asset reliability risks, capture improvements in turbine efficiency, or respond to land and grid constraints. Even with forward bidding, the requirement of projects to reach the end of their 25-year operating life on or before the Target Commissioning Date can complicate investment planning and increase the risk of periods of lost generation or, in particular, suboptimal yield.

To make best use of the full site and maintain the project's commercial viability, multiple phases are often planned and permitted as one combined repowering scheme. In practice, while the first phase may satisfy the 25-year eligibility threshold, later ones can fall short by a small margin – sometimes only a year or two – resulting in the entire project becoming ineligible and delaying investment. The issue is further complicated where an existing RO-accredited site has added an extension after the original site's commissioning, for example through the addition of new turbines. In such cases, the site is restricted from participating in the forward-bidding mechanism because the RO extension, having not yet operated for the full 25-year period, results in it being classified as excluded.

This challenge is made more acute by the fact that early onshore wind turbines were typically designed for only around 20 years of operation, meaning many sites could be forced to stand idle before meeting the current criteria.

To avoid these unnecessary delays and to expand the number of projects able to participate in future allocation rounds, the government should reduce the 'end of operating life' requirement to 20 years. Alternatively, additional flexibility should be introduced for phased or extension projects. For instance, the 25-year threshold could be retained for the initial phase, while allowing subsequent phases on the same site to qualify after 20 years.

## Policy stability and future CfD evolution

While the CfD scheme has played a critical role in supporting renewable deployment to date, there is widespread recognition that the CfD framework is likely to evolve over time, regardless of future government composition. Changes to eligibility criteria, contract terms, budget allocations or auction design remain possible as the electricity system decarbonises.

For repowering projects with long development horizons and significant upfront capital requirements, this potential for policy evolution introduces an additional layer of uncertainty. Investment decisions must therefore account not only for current CfD rules, but also for the risk that future iterations of the scheme may differ in ways that affect project viability.

This uncertainty is compounded by evolving market dynamics. As more renewable generation comes online, extended periods of very low or negative wholesale prices are expected, reducing potential revenues. Since AR4 CfD contracts, no payments are made during negative price hours, meaning that even projects with secured CfDs may face significant exposure to low market-price periods.

### 5.2.2. Alternative revenue pathways: CPPAs

CPPAs can be defined as long-term agreements for the purchase of electricity at an agreed price between a developer and a corporate counterparty, which includes businesses and public sector organisations. They are a market-based solution which can protect electricity buyers and generators from energy price volatility. For repowering, they can provide developers with confidence in future revenue needed to raise finance and invest in repowering schemes.

The market for CPPAs is currently small, but growing. At present, they are believed to represent 2.5% to 5% of the GB power trading market.[28] Large-scale onshore wind projects have also entered into agreements with large energy users, notably Sainsbury's, which purchases energy from eight wind farms,[29] and Tesco, which recently entered into the UK's largest solar CPPA, covering 65% of the electricity generated by the 373 MW Cleeve Hill Solar Park.[30] The expected increase in electricity demand from data centres is expected to increase demand for CPPAs, as technology companies seek to secure long-term electricity supplies.

Expansion of the CPPA market is a priority for the UK government, which outlined its perceived opportunities and challenges in a call for evidence, launched in January 2026.[31] Notably, short-term CPPAs are highlighted as an option for generators coming off the RO scheme from 2027.

For large-scale generators seeking repowering, a 20+ year government-backed CfD would likely be preferable to a CPPA. There is a higher risk associated with the CPPA route, even with the largest corporate buyers, and this will increase financing costs. In addition, corporations will often be unwilling to commit to a 20-year fixed-rate with the risk of wholesale prices falling. However, CPPAs and CfDs can be used in combination, as demonstrated by the Moray West offshore wind farm.[32] For smaller-scale sites considering repowering, administrative and commercial complexity presents a significant barrier, particularly where developers lack the resources to manage protracted negotiations and contracting arrangements. Smaller counterparties are also often unable to offer the long-term revenue certainty required to support investment. While private-wire or direct-supply models are sometimes cited as an alternative route to market, the fixed costs associated with these arrangements – including civils, land access and infrastructure – are likely to render them commercially unviable for small projects, such as single- or two-turbine sites. Targeted support mechanisms will therefore be required if small-scale repowering is to remain viable.

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[28] DESNZ, 2025. Energy Trends: September 2025. The percentage total is not an official figure but rather an extraction based on data showing that CPPAs represent just under 5% of total renewable generation on the grid, and that renewables generate around 54.5% of UK electricity.

[29] J Sainsbury plc, 2024. Wind in the sails: Eighth wind farm now helping to power Sainsbury's.

[30] Tesco, 2024. Tesco agrees largest UK corporate PPA for solar power in landmark infrastructure project.

[31] DEZNZ, 2026, Open call for evidence: Corporate Power Purchase Agreements.

[32] OceanWinds, 2021. Moray West.

# 5.3. **Land considerations**

Land agreements are a critical determinant of the commercial viability of repowering projects. Repowering cannot proceed automatically on an existing site; a new lease must be agreed with the landowner, who retains full discretion over whether to offer it to the incumbent developer or a third party. This makes land negotiations a central factor in project feasibility and highlights the importance of maintaining strong relationships and a reputation with landowners. The distribution of economic benefits from a wind farm, including payments to landowners and local communities, is therefore a key consideration in shaping repowering opportunities.

## 5.3.1. **Land market dynamics and implications for repowering**

Land costs for onshore wind farms are an increasingly significant and variable component of project economics as available land becomes scarcer and competition for suitable sites intensifies. Historically, land costs for onshore wind have ranged from £9,000/MW/annum to over £35,000/MW/annum, with an average of around £20,000/MW/annum.[33] While lease structures vary, including fixed rents and revenue-linked mechanisms, these land payments represent a substantial share of a project's lifetime revenue (e.g. £20,000/MW/annum equates to approximately 7-9% of total project revenue).[34] In many cases this exceeds developer profits, and in all cases it exceeds the value allocated to community benefit contributions, highlighting the significance of land costs relative to other long-term project expenditures.

In recent years, as opportunities for new onshore wind sites have become scarcer, landowner expectations for lease terms have risen, adding significant cost pressure to the whole sector. Market insight suggests that negotiation starting points are increasingly being pitched at unsustainable rental values, which are challenging the commercial viability of wind farms in development. As such, the only way to maintain a bankable margin and accommodate higher land rents is through increased CfD prices, which will trickle to increased consumer costs.

Repowered sites – with existing consents, grid connections and established infrastructure – can be especially attractive. Recognising the value embedded in repowered or soon-to-be-repowered sites can give landowners leverage in lease negotiations, as re-entry into the leasing process can attract multiple parties. This dynamic, occurring alongside constrained developer margins under competitive strike prices in CfD auctions, can add significant cost pressure. High land payments can erode developer returns or risk pushing costs onto consumers, and at scale, this dynamic exerts upward pressure on the strike prices that repowered projects must achieve to remain commercially viable.

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[33] Arup, 2025. Renewable energy generation cost and technical assumptions – Onshore wind and solar PV

[34] BiGGAR Economics, 2025. Maximising the socio-economic benefits of renewables through publicly owned land.

### 5.3.2. Opportunities for repowering

High land costs are a particular challenge for smaller-scale or community-led projects. Even sites that are lower risk and technically straightforward to repower may face prohibitive lease costs. Land agreements for onshore wind are typically negotiated on a bilateral basis, with no statutory requirement for private landowners to disclose lease terms or revenues. As a result, there is limited transparency about what constitutes a reasonable or sustainable level of land payments, particularly for repowering projects where benchmarks from comparable projects are not readily available. Without incentives or requirements for disclosure, private landowners have little reason to cooperate in improving market transparency, making it difficult to establish shared expectations or norms around land value for repowering.

#### The role of public landowners in shaping the market

Public land already plays a meaningful role in hosting onshore wind across the UK, particularly in Scotland and Wales, and therefore has a direct bearing on the future repowering landscape and the stability of the land lease market. A number of operational, consented and proposed onshore wind projects are located on land owned or managed by public bodies. In Scotland, large areas of the National Forest Estate have supported commercial onshore wind development over the past two decades, while in Wales, publicly owned forestry and water company land has similarly hosted wind projects.

As repowering requires negotiating new land agreements, public landowners are uniquely positioned to influence market behaviour, rather than simply mirroring prevailing private-sector lease rates. Unlike private landowners, public bodies can take a longer-term, system-wide view, balancing fair land value with wider public-interest objectives such as cost-effective clean power delivery, community participation and consumer bill impacts. Given the scale of publicly owned land suitable for wind development, particularly in areas where repowering opportunities are concentrated, coordinated approaches to leasing on public land could help establish more predictable and sustainable benchmarks for land costs.

By offering land on more moderate, predictable terms, public landowners could exert downward pressure on market benchmarks for land costs, helping reduce overall project costs ultimately borne by consumers. Lower and more stable land costs could expand access to repowering opportunities, particularly for community energy groups and smaller developers, for whom high land payments can be a binding constraint. Hence, public land policy could directly influence not just the amount of capacity delivered, but also *who can participate* in repowering.

#### Competing on socio-economic benefits

One option for public landowners could be to adopt standardised or capped lease terms. By standardising lease rates, for example, a fixed fee per MW or a percentage of revenue indexed over time, public landowners can provide a baseline that ensures projects remain viable while maintaining fair returns for landowners. By removing the economic competition for land, there could be an opportunity for developers to compete on their ability to deliver wider value. This could include community benefits, local economic impact, supply chain development and biodiversity enhancement.

This approach is apparent in other UK leasing processes, for example offshore wind, where competition has focused on non-price criteria rather than maximising landowner income. Applying similar principles to repowering could provide greater certainty for developers, reduce speculative bidding for land and incentivise earlier engagement and better long-term behaviour. particularly for incumbent operators with established community relationships.

## 5.4. Key recommendations for business and commercial models

**Recommendation 1: DESNZ should lower CfD forward-bidding rules to better align with commercial realities**

The CfD forward bidding framework should be refined to better reflect repowering timelines and asset conditions. In particular, the rigid assumption of a 25-year operating life should be revisited to allow projects that are technically and commercially ready to repower earlier to access CfD support, reducing periods of merchant exposure, avoiding lost generation and enabling more efficient use of existing sites.

**Recommendation 2: Introduce a programme of support for small-scale (<5 MW) generators through repowering**

Small-scale onshore wind farms will face challenges to repowering or continued operation when FiT contracts expire, mostly between 2030 and 2036. Neither CfDs nor CPPAs are currently applicable or well-suited to these generators, and operating on a merchant basis may not be viable for some sites. GB Energy could have a role in supporting these projects through repowering. In doing so, 770 MW of low-carbon generation could be supported.

### Recommendation 3: Support CPPAs as a complementary, not a substitute, route to market for repowering

The government should continue to support the expansion of the CPPA market as a complementary revenue route for repowering, particularly for projects transitioning off the RO, while recognising that CPPAs are unlikely to provide a full replacement for CfDs for most repowering projects. Targeted measures, such as standardised CPPA templates, credit-enhancement mechanisms, or aggregation support, could help reduce transaction costs and counterparty risk, especially for smaller-scale and community-led repowering projects.

### Recommendation 4: Change the bidding process for public land to incentivise socio-economic benefits at a set market rate

Public landowners should adopt standardised or capped lease terms for repowering projects and encourage developers to compete on delivering wider socio-economic and environmental benefits. By providing transparent benchmarks for land agreements, they can help lower overall project costs, expand access for smaller-scale and community-led projects and incentivise developers to provide wider benefits.

**Section 6:**

# Communities

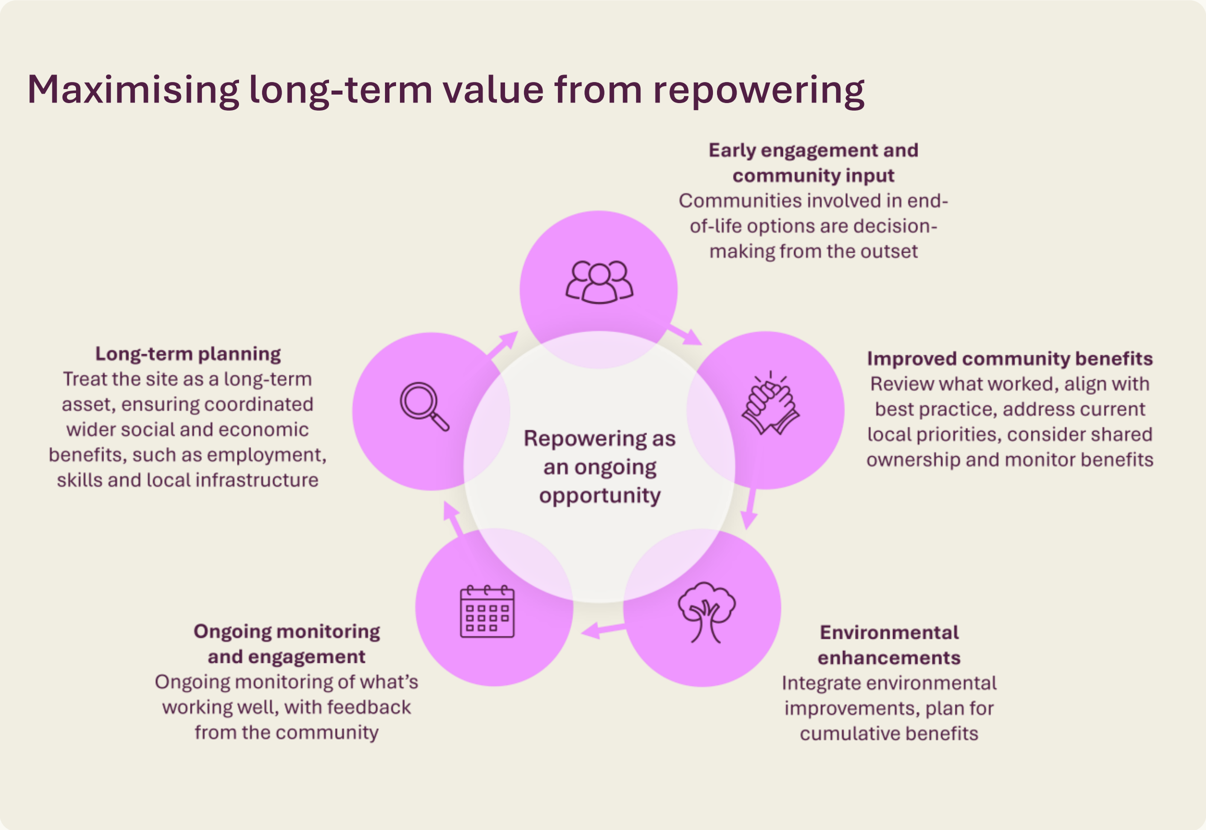
Communities are central to the success of onshore wind repowering, as extending the life of existing sites represents a significant change from the original project expectations. Early, meaningful engagement allows developers to rebuild trust, align projects with local priorities and create opportunities to enhance community benefits, delivering lasting social, economic and environmental value.

Communities sit at the heart of successful onshore wind repowering. Many of the UK's existing wind farms were originally consented for a time-limited period, typically around 25 years, with a shared understanding that turbines would be removed at the end of their operational life. Repowering proposals, therefore, represent a significant shift, extending the presence of wind infrastructure beyond what was first envisaged. This makes early, open and meaningful community engagement essential.

Repowering provides an important opportunity to reset relationships with local communities, revisit community benefit arrangements and reflect lessons learned from earlier phases of development. It allows developers to respond to evolving local priorities and align projects with current best practices. Getting this right is critical. **Repowering that delivers tangible improvements for communities will help sustain trust, secure long-term support, and maximise the lasting value of onshore wind.**

Beyond the immediate project, repowering can deliver wider and more durable benefits, including targeted local infrastructure improvements, employment and skills development and enhanced environmental outcomes. Taking a long-term view helps communities see wind farms not as temporary interventions, but as enduring assets that deliver ongoing social, economic and environmental value. Maximising long-term value requires designing and managing repowered sites with their future use in mind. This includes minimising land disturbance, retaining flexibility for future upgrades, and managing sites as long-term assets rather than short-lived projects. Doing so allows high-quality sites to continue contributing to renewable energy generation while reducing environmental impacts and community disruption.

Figure 7: Taking a long-term approach to sites can help to maximise benefits




## 6.1. **Early engagement: Utilising community experience**

Where wind farms have long been a feature of the landscape, local communities possess valuable, place-based knowledge of living near the site. Early, transparent and proactive engagement during the repowering process enables developers to draw on this experience, building trust while improving project design, maximising social value and helping ensure that repowered projects deliver meaningful and enduring benefits.

Repowering allows developers to reflect on lessons learned, revisit previous commitments and renegotiate arrangements with communities in light of current priorities, expectations, and best practices. Effective early engagement can therefore play a critical role in shaping key aspects of repowered projects, including site layout and design and mitigation measures.

### Early community engagement when repowering Beinn Ghlas

The Beinn Ghlas Wind Farm repowering project proposed replacing the existing operational wind farm near Taynuilt, Argyll and Bute, with up to seven modern turbines – a five-turbine reduction from the 2023 site layout.

A pre-application consultation (PAC) was undertaken as part of the early planning and design phase – a statutory requirement in Scotland's planning phase. The engagement programme aimed to inform local communities about the proposal, explain the rationale and provide clear opportunities for feedback. Public exhibitions and drop-in events were held at accessible local venues and advertised widely, supported by a dedicated project website and online feedback forms to ensure broad participation.

Feedback gathered during the PAC was systematically reviewed and fed directly into the evolution of the repowering proposals, demonstrating a clear audit trail between engagement and design decision making. Community and stakeholder responses informed refinements to the turbine layout and helped to scope and focus the environmental assessments, ensuring that locally relevant issues were addressed at an early stage. The consultation indicated broad community support, illustrating how transparent, targeted engagement can build trust, reduce planning risk and enhance the acceptability of repowering projects while delivering more efficient infrastructure.

Figure 8. Beinn Ghlas wind farm. Source: Nicky Cuff

## 6.2. **End-of-life as an opportunity to enhance community benefits**

Repowering represents a critical opportunity to revisit, refresh and strengthen community benefit arrangements associated with wind farm developments. Many existing benefit schemes were established when sector practice, guidance and community expectations were less developed. Experience gained over the operational lifetime of a wind farm can provide valuable insight into which approaches have delivered meaningful and lasting value for local communities, and where arrangements have fallen short.

To support this learning process, a community benefits register in each of the devolved nations should be used to improve transparency and consistency, enable benchmarking of benefit packages and support knowledge-sharing across projects and regions.

There is also a need for enhanced support for community-led decision making. Providing greater support for communities to identify, articulate and deliver their priorities would help ensure benefits are genuinely locally driven. Programmes such as the Community and Renewable Energy Scheme (CARES) in Scotland provide a useful model for supporting communities to engage confidently, build capacity and maximise the value of benefits.

### Enhancing community benefits through repowering on Forestry and Land Scotland sites

Along with Local Energy Scotland, Forestry and Land Scotland (FLS) is using repowering to strengthen community benefits at public wind farm sites, supporting the Scottish government's goals to involve communities in the energy transition through community ownership. As part of a pilot scheme, 10 FLS sites – under 50 MW and due to repower from 2032 – have been identified.

Communities near existing sites receive advance notice and a protected period to explore ownership or partnership options under the Community Asset Transfer Scheme, supported by guidance and funding advice through CARES. Even where full community ownership does not proceed, the framework is designed to safeguard and improve existing local benefits. Developers selected to repower sites provide structured benefit payments, shared-ownership opportunities or local electricity discounts, ensuring the upgraded wind farms continue to deliver social and economic value to neighbouring communities while increasing potential revenue and local agency over these sites.

### 6.2.1. Potential for shared ownership during repowering

Repowering also offers developers and communities a chance to consider shared ownership.[35]

#### What is shared ownership?

An umbrella term for different business models that include a non-profit community organisation owning a part of a development. Models include:

- **Split ownership:** The community owns and operates a physical portion of the project. They assume the risks and rewards for their own portion of the project.
- **Shared revenue:** The community purchases a share of the project's future revenues. There is no ownership of physical assets, voting rights or control over the project.
- **Joint venture:** The community organisation and developer co-own a special purpose vehicle. The voting rights, risk and rewards are proportional to the community's ownership stake (they are often the minority partner).

Offering shared ownership can benefit both the developer looking to repower a project and the local community. These benefits include:

- Generating support for both the individual project and wider clean power strategy
- Giving communities a voice in project management, decision-making and/or control over their portion of the project's profits
- Greater financial returns to the community than traditional community benefit funds.

We suggest that developers should offer shared ownership as an option on all repowering projects. However, currently the ability of communities to raise the necessary finance for a project can be a key challenge in making it happen. Here we see a potential role of GB energy in helping communities be able to own a stake in repowering projects.

[35] Philpott, A and Windemer, R, 2022. Repower to the People: The scope for repowering to increase the scale of community shareholding in commercial onshore wind assets in Great Britain

### Shared ownership as part of the Ben Aketil onshore wind farm

The Ben Aketil Wind Farm on the Isle of Skye had been operating since 2007 and is notable for being one of Scotland's early examples of shared ownership in a commercial wind farm. Shared ownership at Ben Aketil is delivered through the Isle of Skye Renewables Co-operative, which was established to allow individuals to invest collectively in the wind farm. Through community share offers, the co-operative raised over £810,000, giving members a revenue-linked stake in the first phase of the wind farm in 2008. In 2010, members were given the opportunity to purchase a further stake in the two-turbine extension, with the project expected to deliver an average 10% return on investment to co-op members over its 20-year lifetime.

Since it was established in in 2008, the co-op has generated more than £1.5m in community benefits. Alongside member returns, the community ownership model has awarded grants to individuals, businesses and community organisations, supporting local environmental and sustainability projects across Skye and Lochalsh.

While the original shared ownership arrangements were established nearly two decades ago, the project remains one of Scotland's most-cited examples of community shared ownership in a commercial wind farm. The site is currently operated by Nadara, and proposals to repower the wind farm using fewer, larger turbines will not only extend its operational life and increase output, but allow Nadara to continue with the shared ownership scheme – a welcomed proposal by existing co-op members.

## Shared ownership: The potential role of GB energy

GB Energy could play a significant enabling role in helping communities secure a meaningful ownership stake in repowered wind farms, particularly where capacity, access to finance or risk appetite are barriers to participation.

GB Energy could establish no- or low-interest loan programmes to support communities entering into shared ownership agreements. Additionally, they could offer underwriting, guarantees, or bridge financing to help communities access commercial bank loans. This would reduce lenders' perceived risk and address one of the most common obstacles communities face when seeking to invest in large-scale energy assets. Where community capacity is limited, GB Energy could initially fund the involvement of an experienced delivery partner. Providing a grant or no/low-interest loan to cover professional support would enable communities to engage confidently in negotiations, structure ownership offers effectively and protect their long-term interests.

In cases where community interest exists but additional time is needed to raise finance or build governance capacity, GB Energy could explore taking a temporary ownership stake in a repowered project. Crucially, this approach should keep participation pathways open, allowing communities to buy into shared ownership at a later stage if their capacity or appetite increases. During the interim period, returns generated from this stake could be reinvested locally, for example, through community capacity-building programmes, local fuel poverty funds, or support for the development of fully community-owned energy projects.

Alongside financial interventions, GB Energy should develop and embed best-practice guidance for shared ownership during repowering, as well as on new sites. This should be done in collaboration with the Scottish and Welsh governments, building on and aligning with their existing shared ownership frameworks to ensure consistency, credibility and learning.

## 6.3. Key recommendations to improve community outcomes

### Recommendation 1: Strengthen support for community-led decision making

Provide greater practical and financial support for communities to identify priorities, build capacity and engage confidently in negotiations. Expand or replicate models such as CARES across the UK, ensuring communities can shape, not just receive, benefits.

### Recommendation 2: Encourage shared ownership as an option for repowering projects

Developers should offer shared ownership as part of all repowering proposals.

### Recommendation 3: Enable shared ownership through targeted intervention by GB Energy

GB Energy should become an enabler of community participation, particularly where finance, capacity or risk are barriers. It should:

- Provide no- or low-interest loans, underwriting or guarantees to support community investment
- Offer bridge financing or temporary ownership stakes, keeping pathways open for later community buy-in
- Fund professional and technical support so communities can engage on equal terms with developers.

Section 7:

# Decommissioning and circularity

Whether a site repowers or not, there is an opportunity to make the most of the decommissioning process. This can range from the reuse of materials in local community projects to building a circular wind economy.

As the onshore wind sector in Great Britain matures, it is essential to consider what happens to the materials from retired assets. How we manage older materials matters not just for environmental sustainability, but also for the perception and acceptance of wind energy in local communities. Demonstrating responsible end-of-life management can reinforce community trust and strengthen the sector's social licence to operate.

From a sustainability perspective, decommissioning presents both a challenge and an opportunity: by recovering, reusing and recycling materials, the industry can minimise waste, reduce demand for virgin resources and deliver a circular economy approach that aligns with the UK's wider climate ambitions and the incoming Circular Economy Strategy. However, both decommissioning and repowering need a solution for what to do with the materials that will no longer be used. This section explores the challenges, opportunities and emerging practices for ensuring that wind energy continues to provide benefits long after the turbines stop turning.

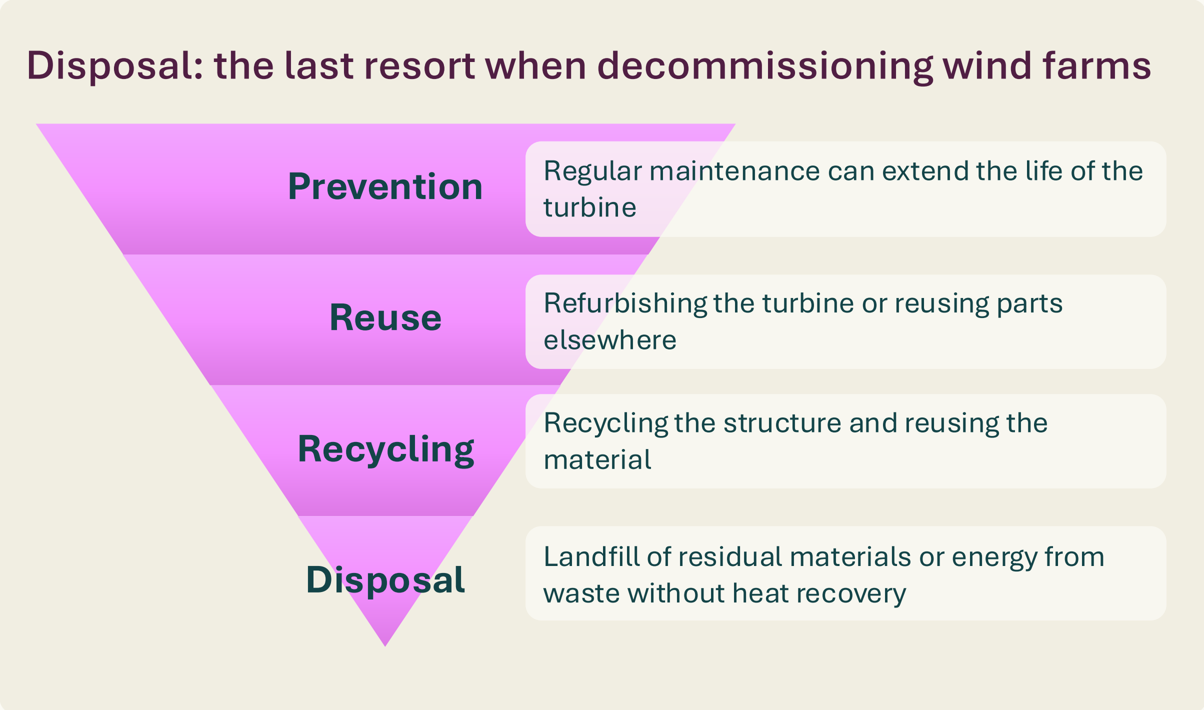
## 7.1. What are the options for older turbines?

Currently, wind turbines face four options when reaching end-of-life. If in a good enough condition, they can be sold to live a second life, although due to the high wind speeds in the UK, older British turbines face a lot of wear and tear and can be limited in their market options. Some possibilities for resale exist for younger assets if the turbine is in good condition. There is also a market for parts from older turbines, especially where the original equipment manufacturers (OEMs) have stopped manufacturing the model of turbine.

Turbines can also be refurbished – restoring and upgrading theme as a whole or individual parts to allow for further life (either life-extension or sale into the market).

If refurbishment is not an option due to either cost or condition, then turbines can be recycled. Historically, decommissioning efforts have focused on recycling the steel from components and towers, while other materials have received less attention. In the absence of legislation dictating otherwise, landfill has been an option for disposing of turbine blades and other composites such as the nose cone, although in recent years there has been a concerted industry effort to stop blades going to landfill in the UK.

Figure 9: The waste hierarchy for wind farms




## 7.2. What can be recycled?

Concrete and aggregate used in the foundations make up on average 83% of the mass of an onshore wind asset. Due to the cost of removal and the low value of these materials, they are usually not fully removed during decommissioning, but dug out to a certain depth to ensure that former or new uses of the site can continue.[36] This is typically at least one metre below ground level, but can vary by site, depending on consenting conditions.[37]

In addition to the structure itself, large quantities of aggregates are used for access tracks for construction, maintenance and decommissioning. These are often considered to be temporary, with large volume of materials transported and then disposed of.

[36] Scottish government, 2025. Waste Reprocessing Infrastructure in Scotland.

[37] Lumify Energy, 2025. Decommissioning a Wind Farm: A Landowner's Guide.

Steel, used in the foundations (as rebar), in the turbine tower and alloyed within the nacelle, comprises 14% of the mass of an onshore wind asset. Along with iron, it is also a major component in the gearbox, while copper is used in the generator and cabling. Rare earth metals such as neodymium and dysprosium, which are becoming more common in the generators of offshore wind turbines, are rarely used for onshore. The blades are typically made from lightweight composite materials including balsa wood, fibreglass, aluminium and, more recently, carbon fibre.

**Around 85-90% of the total mass of a wind turbine above ground can be recycled.**[38] However, while steel and iron have evolved processes for this, the composite nature of the blades is more challenging to recycle. Various technologies do exist, but are not yet widely available or cost competitive.

### The missing business case

A further complication is that the blades only represent 10% of the total estimated thermoset composite waste, which makes it challenging to build a recycling business based solely on wind turbine waste stream.[39] As such, there is currently limited capacity to recycle them, and with a lack of clarity from the sector about volumes, timelines and locations for decommissioned blades going forwards, there is not yet enough of a business case to invest in the recycling supply chain.

This leaves the potential for serious bottlenecks after 2027, when many wind farms will look to either decommission or repower after the end of the RO subsidy. Our research suggests that more than 500 turbines will be decommissioned by 2035 – current capacity for whole-turbine recycling is vastly below this number.

## 7.3. Refurbishing

Restoring and upgrading older turbines can extend their life, often for up to another 15 years.[40] This involves disassembling the turbine and inspecting and restoring all parts before reassembly and performance tests. As the technology has grown and the market has moved towards bigger turbines, refurbishment offers an opportunity for developers looking to life-extend, especially in areas where additional grid capacity may be hard to procure or bigger turbines may not be suitable.

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[38] WindEurope, 2020. Accelerating Wind Turbine Blade Circularity.
[39] WindEurope, 2020. Accelerating Wind Turbine Blade Circularity.
[40] Vestas, 2025. Vestas Refurbished Turbines.

This route achieves favourable circularity and sustainability outcomes and eliminates the need to procure new turbines, as well as potential streamlining of planning processes, given the site has not materially changed.

Refurbished turbines risk falling outside manufacturer warranties, which can raise concerns for investors. Insurance solutions for refurbished wind turbines can be equivalent to those for new components and help mitigate this risk, although coverage will likely be assessed on a case by case basis.

## 7.4. The opportunity posed by a circular economy

Unlike the traditional linear 'take–make–dispose' economic model, a circular economy aims to close material and energy loops through intentional product design, lifecycle management and systemic collaboration across value chains. By prioritising resource efficiency, durability, reuse, repair, remanufacturing and high-quality recycling, it aims to minimise waste, maintain the value of products, materials and resources for as long as possible and reduce the extraction of virgin inputs.

Creating a local circular economy supply chain for onshore wind offers three major opportunities:

**Economic impact:** The creation and sale of products from materials that may currently be sent to landfill or sold abroad keeps materials in valuable use for longer, retains value in the local area, generates additional revenues for the economy and creates jobs. This is also significant in the current context of a challenging manufacturing environment for steel in the UK. A 2023 report by BVG Associates estimated the potential market from the refurbishment of UK wind turbines between 2025 and 2035 at £1.6 billion in gross value added, of which £876 million was direct. It found the industry could also support up to 3,581 full-time equivalent jobs in 2035.[41]

**Landfill:** Reduces waste going to landfill and the associated costs for businesses. As sustainability becomes a bigger business priority and public attention turns to the disposal of end-of-life turbines, refurbishment and recycling will be the focus.

**Carbon impact:** By recycling materials that are currently disposed of in landfill – and displacing virgin materials that require energy intensive processes – the circular economy can reduce the carbon impact of onshore wind.

There is an additional opportunity for the local community to benefit from repurposed turbine materials, with the blades in particular having a second life as benches, pedestrian bridges,

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[41] BVG Associates, 2023. Circularity market analysis.

playgrounds and bike or car shelters. Non-turbine parts removed from a site might include aggregate, which could be used to improve existing path networks, coarse and fencing, of use for skateparks and games areas, and sustainable drainage systems, which could be used to support cycle paths.

### Reusing wind farm materials: Douglas Dale onshore wind farm

The Douglasdale REAL Group bought the Douglas Dale West Woodland in 2021 using community funds from SSE's Clyde Wind Farm Fund. They have since reused materials from wind farm developers to improve accessibility in the woodland, with concrete pipes used for drainage culverts and aggregate used for footpath foundations.

Outcomes such as these rely firstly on an awareness of the opportunities from the wind farm owner when starting to think about decommissioning. There is currently a lack of industry conversation around this. And they will also need to have good relationships and open communication channels with the local community, ideally built over the lifetime of the wind farm.

Figure 10: Accessibility path has been upgraded as part of the Paths Network Project

### 7.4.1. Supply chain constraints

Realising the circular economy potential of onshore wind repowering will depend on early and coordinated supply-chain development. While decommissioning activity has increased gradually through the 2020s, a sharp acceleration is expected as large volumes of RO-supported projects reach end-of-life. Without clear visibility, this could create bottlenecks in waste handling, recycling and logistics capacity.

Investment in specialist recycling facilities, particularly for composite materials, requires confidence in long-term feedstock volumes and delivery schedules. Trade bodies can facilitate engagement between developers, original equipment manufacturers (OEMs) and waste management companies, aggregating indicative forecasts of decommissioning tonnages and timings to guide early investment decisions.

To support this, developers should be as clear as possible with decommissioning intentions from the outset, ensuring supply chains are engaged and sufficient resources allocated. They should also recognise the opportunity to engage with the local community to explore re-use of materials and development of the supply chain. The draft NPPF states that "applications should be accompanied by proposals for decommissions and site restoration"; this should not be treated as a tick-box exercise, but rather an opportunity to maximise circularity outcomes. Nadara's Sustainable Decommissioning Strategy provides an early best practice guide and developers should seek to develop equivalent strategies.[42]

OEMs also have a critical role in aligning turbine design, dismantling practices and recycling technologies with downstream processing capacity, in line with wider circular economy strategies. Where recycling capacity cannot be developed at pace, interim storage solutions should be identified to avoid supply-chain constraints delaying repowering projects.

### 7.4.2. A strategic approach to decommissioning

Smaller developers or site owners often face significant constraints when it comes to implementing circular approaches to wind turbine decommissioning. Limited financial resources, technical expertise or logistical capacity can result in turbines being decommissioned with minimal recovery of materials, representing a lost opportunity for both the environment and the wider economy. By assuming ownership of smaller, ageing sites, GB Energy could help bridge this gap, ensuring that end-of-life turbines are recycled efficiently and systematically. This proactive approach would create a foundation for a more strategic, coordinated decommissioning process, enabling the industry to maximise material recovery while supporting the growth of a domestic circular supply chain.

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[42] Nadara, 2025. Beinn Ghlas Wind Farm Outline Circular Decommissioning Strategy.

Beyond material recovery, this approach also presents broader economic and social benefits. As a public entity, GB Energy is uniquely positioned to appreciate and act upon the wider advantages of a circular wind economy. Recycling turbines not only reduces raw material costs for future projects, but also supports local jobs in recycling, refurbishment and logistics. Moreover, the knowledge gained from strategically decommissioning these sites can inform best practices that extend beyond onshore wind, potentially benefiting offshore projects and other sectors where circular principles are applicable.

A practical starting point to operationalise this strategy could involve the government establishing a comprehensive register of smaller sites not currently captured in the Renewable Energy Planning Database (REPD) or other official records. Such a register would allow stakeholders to identify sites with the highest potential for circular value recovery and prioritise interventions where they will have the greatest impact.

### 7.4.3. Innovation in a circular economy

The wind industry as a whole is at a critical juncture for circularity. Many developers remain cautious about adopting new recycling technologies due to perceived technical or financial risks, while others may simply be unaware of the opportunities for material recovery, cost savings or positive reputational impact. By taking a leadership role, sharing solutions and learning from projects with demonstrable success, industry players can accelerate the adoption of circular practices. Benchmarking processes, data sharing and collaborative initiatives can further reduce uncertainty, allowing lessons learned from one project to be applied across multiple sites and sectors.

## 7.5. Key recommendations for a circular economy

**Recommendation 1: Support the build-out of the waste management supply chain through targeted investment and strategic, long-term visibility of the decommissioning pipeline**

Trade bodies should facilitate conversations between developers and waste management companies, and OEMs should engage with both the wind and waste management industries to ensure the appropriate recycling technologies and techniques will be used. Where specific supply chain investment cannot be developed at the required pace, interim storage spaces should be earmarked to avoid bottle necks.

### Recommendation 2: GB Energy should coordinate a more strategic decommissioning and recycling strategy through acquiring smaller projects

GB Energy could assume ownership of smaller, ageing sites approaching the end of their operational life to coordinate a strategic decommissioning and recycling pipeline. This would provide certainty of demand for the supply chain, support circularity and generate learnings that could inform practices across the wider energy sector.

### Recommendation 3: Developers should engage with the community from the outset on decommissioning opportunities

Developers should be as clear as possible with the local community on the timelines and intention from the outset, recognising that this provides a good basis from which to engage them during the planning process. Opportunities for local re-use of materials should be explored with nearby communities during the decommissioning phase and not treated like a tick-box exercise.

### Recommendation 4: Industry should share lessons, test solutions and benchmark best practices

Industry should take a proactive role in driving the conversation around decommissioning, sharing lessons from successful projects, promoting innovative solutions and, where appropriate, developing benchmarking processes to address emerging challenges that are likely to be seen across other renewable technologies.

**Section 8:**

# Call to action

Our analysis highlights a set of interconnected challenges and opportunities facing repowering in the UK, from regulatory and planning barriers to the significant potential for increasing clean power capacity and delivering local economic and benefits.
In response to these, we outline targeted recommendations that should be addressed urgently if we are to make the most of the opportunity ahead. The recommendations are presented below, grouped by delivery body.

## 8.1. **Cross-cutting recommendations**

### 1. Use consistent terminology for end-of-life options

There is significant variation in understanding of end-of-life terminology; consistency in definitions will help across the sector. See our terminology in section 1.1.

### 2: Address resourcing challenges facing local planning authorities

There is a need to address the under resourcing of local authority planners to respond to the expected increase in end-of-life applications. One approach to addressing this could be through the introduction of specialist renewable energy planners working across local authorities (e.g. regionally) to focus on renewable applications. Alongside resourcing, additional training and guidance should be provided for planners that are making end-of-life decisions.

**3. Establish clear and predictable timelines for both repowering and decommissioning**

Providing certainty, wherever possible, around when existing sites can be upgraded or removed will help manage project costs, minimise prolonged disruption to local communities and support continuous progress towards energy security, while avoiding unnecessary gaps that leave sites idle.

## 8.2. DESNZ

**1. Strengthen support for community-led decision-making regarding the benefits of repowering**

Provide greater practical and financial support to help communities identify priorities, build their capacity and engage confidently in negotiations regarding repowering. Expand or replicate models such as Scotland's Community and Renewable Energy Scheme across the UK, ensuring communities can shape, rather than simply receive, benefits.

**2. Encourage shared ownership as an option for repowering projects**

Enable more communities to have the option to own part of a scheme.

**3. Introduce a programme to support small-scale generators though repowering**

Small-scale onshore wind farms will face challenges to repowering or continued operation when FiT contracts expire, mostly between 2030 and 2036. Neither CfDs nor CPPAs are currently applicable or well suited to these generators and operation on a merchant basis may not be viable for some sites. GB Energy could have a role in supporting these projects through repowering. In doing so, 770 MW of low-carbon generation can be maintained, or repowered for additional benefit.

### 4. Lower CfD forward bidding rules to better align with commercial realities

The CfD forward bidding framework should be refined to better reflect repowering timelines and asset conditions. In particular, the rigid assumption of a 25-year operating life should be revisited to allow projects that are technically and commercially ready to repower earlier to access CfD support, reducing periods of merchant exposure, avoiding lost generation and enabling more efficient use of existing sites.

### 5. Change the bidding process for public land to incentivise socio-economic benefits at a set market rate

Public landowners should adopt standardised or capped lease terms for repowering projects and encourage developers to compete on delivering wider socio-economic and environmental benefits. By providing transparent benchmarks for land agreements, they can help lower overall project costs, expand access for smaller-scale and community-led projects and incentivise developers to provide wider benefits.

## 8.3. MHCLG and devolved nations planning

### 1. Introduce a repowering-specific environmental assessment process

Introduce a proportionate, repowering-specific environmental assessment process that formally allows long-term operational monitoring data to be used as the baseline, focusing assessment on materially changed impacts rather than duplicating greenfield environmental impact assessments.

### 2. Introduce a presumption in favour of repowering

Policy should provide a clear presumption in favour of repowering, recognising its strategic importance for maintaining and increasing renewable energy output as older sites reach the end of their operational lives. Improved policy should emphasise the benefits of repowering, including efficiency gains and opportunities for environmental enhancements. Consistent definitions for ‘repowering’, ‘life extension’ and ‘replacement turbines’ would help developers and planning authorities apply policies.

## 8.4. NESO

### 1: NESO and DESNZ should ensure the SSEP reviews the limits on the capacity of onshore wind in Scotland that will be granted grid connection agreements by 2035

Repowering onshore wind in Scotland is constrained by the CP30 allocation, preventing projects progressing. The SSEP should review the opportunity offered by repowering of proven and successful sites and consider increasing the allocation of grid connections, providing early visibility to enable decisions around repowering.

### 2. Delivery of the SSEP and TNUoS reform should continue at pace and repowering should be integrated into SSEP economic modelling

TNUoS charges must not rise to levels incompatible with developing projects and delivering Clean Power 2030. Certainty on the future of network charges should be reached as early as possible. In its economic modelling, the SSEP should include repowering. This assessment should consider the whole-system benefit of maintaining existing connected capacity and the further whole-system efficiencies in using that opportunity to deliver additional capacity. Furthermore, the SSEP should draw upon post-G2tWQ capacity realities – future capacities should account for any attrition that has occurred from the CP30 ranges.

## 8.5. GB Energy

### 1. GB Energy should help to facilitate community shared ownership during repowering

It could achieve this through providing no or low-interest loans, underwriting, or guarantees to support community investment and /or offering bridge financing or temporary ownership stakes, keeping pathways open for later community buy-in.

**2. GB Energy should support a more strategic decommissioning strategy through acquiring smaller projects**

GB Energy could assume ownership of smaller, ageing sites approaching the end of their operational life to coordinate a strategic decommissioning and recycling pipeline. This would provide certainty of demand for the supply chain, support circularity and generate learnings that could inform practices across the wider energy sector.

## 8.6. Network operators and developers

**1. Plan earlier for decommissioning**

The earlier engagement with the waste management supply chain and O the better circularity outcomes are likely to be. This also provides the opportunity to engage with local communities about decommissioning, reassuring sustainability concerns and also identifying opportunities for material reuse locally.

**2. Network operators, in tandem with NESO, should publish clear guidance on approaches to repowering as well as resume pre-application communication with developers with immediate effect**

Consistency in approach to repowering projects should be sought across all TO and DNOs, with clear guidance published. This would simplify the decision making process for sites approaching end-of-life. Open and effective communication in the pre-application phase of repowering projects is important to ensure all available options are understood. As such, the current hiatus in preapplication communication should cease immediately.

## 8.7. The onshore wind industry

**1: Industry should share lessons, test solutions and benchmark best practices**

Industry should take a proactive role in driving the conversation around decommissioning, sharing lessons from successful projects, promoting innovative solutions and, where appropriate, developing benchmarking processes to address emerging challenges that are likely to be seen across other renewable technologies.

# Appendices

## Appendix 1: Repowered onshore wind farms

Table 3: Renewable UK EnergyPulse project data for repowered sites

| Project | Original installed capacity (MW) | Repowered installed capacity (MW) |
|---|---|---|
| **BDCR II Community Turbine** | 0.6 | 0.5 |
| **Blood Hill – Repower** | 2.25 | 0.8 |
| **Camas Nan Gail – Repower (Resubmission)** | 0.1 | 0.45 |
| **Carland Cross – Repower** | 6 | 20 |
| **Castle Pill Farm – Repower** | 0.5 | 2.7 |
| **Caton Moor – Repower** | 3 | 16 |
| **Cemmaes – Repower** | 7.2 | 15.3 |
| **Coal Clough – Repower** | 9.6 | 16 |
| **Delabole – Repower** | 4 | 9.2 |
| **Faccombe Estates – Repower** | 0.3 | 0.5 |
| **Goonhilly Downs – Repower** | 5.6 | 12 |
| **Great Eppleton – Repower** | 3 | 8.2 |
| **Great Orton II – Repower** | 3 | 3.96 |
| **Hafoty Ucha 1 – Repower** | 0.6 | 0.8 |
| **Hafoty Ucha 2 – Repower** | 1.7 | 1.6 |
| **Hafoty Ucha 3 – Repower** | 0.85 | 0.8 |
| **Hagshaw Hill – Repower** | 15.6 | 79.8 |

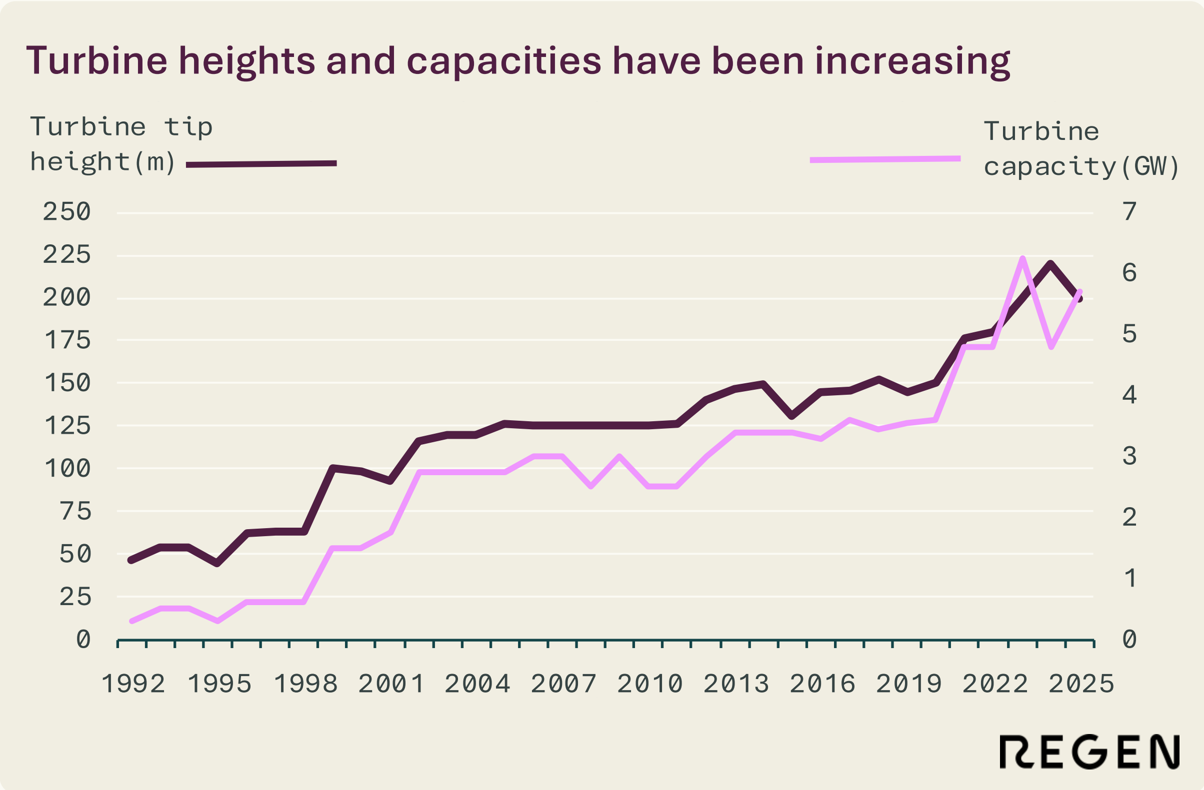
| | | |
|---|---|---|
| **Harlock Hill (Furness Repower) (Community Share)** | 2.5 | 4.6 |
| **Haverigg III – Repower** | 1.125 | 3.4 |
| **Knocknain Farm – Repower** | 0.33 | 0.33 |
| **Llangwyryfon – Repower** | 6 | 9.35 |
| **Mean Moor** | 2.5 | 6.9 |
| **Ovenden Moor – Repower (Resubmission)** | 9.2 | 18 |
| **Ramsey – Repower** | 0.225 | 1.8 |
| **Spurness – Repower** | 8.25 | 10 |
| **St Breock – Repower (Resubmission)** | 4.95 | 10 |
| **Wansbeck Blyth Harbour – Repower** | 2.7 | 3.4 |
| **Boythorpe Farm (Replacement)** | 0.45 | 0.45 |
| **Glaick Farm (Replacement)** | 0.25 | 0.75 |
| **Greenhouse (Replacement)** | 0.1 | 0.5 |
| **Penysgwarn (Replacement)** | 0.1 | 0.225 |
| **Rufford Forest Farm (Replacement)** | 0.28 | 0.5 |

# Appendix 2: Modelling methods and results

## Site-level repowering factors

Early commercial onshore wind sites would typically feature turbines up to 50 metres tall, generating between 0.3-0.5 MW individually. A typical large-scale site built today features turbines over 100 metres in height and capable of generating 4-6 MW individually.

Figure 11: Maximum turbine tip height and capacity installed annually. Data from RUK EnergyPulse.




These large, modern turbines enable wind farms to produce significantly more electricity on a given area of land, relative to old sites. Across Great Britain 32 sites have already repowered to greater capacities. In 2025, the 15 MW Hagshaw Hill wind farm became the largest site to repower, with 80 MW now installed on site. Larger scale projects are now planning to repower, in analysing these sites, repowering factor is defined as:

$$Repowering\ factor\ (\%) = \frac{New\ installed\ capacity}{Original\ installed\ capacity}$$

Figure 12: Operational sites have already repowered. Data from RUK EnergyPulse.

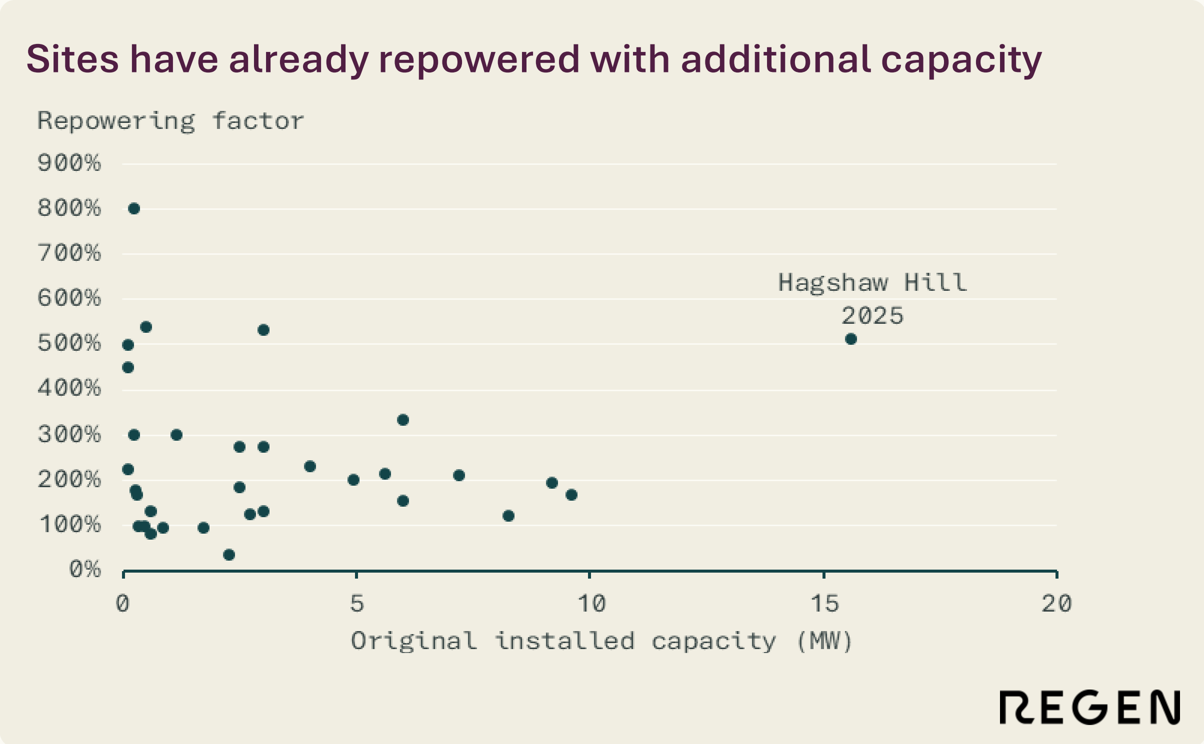
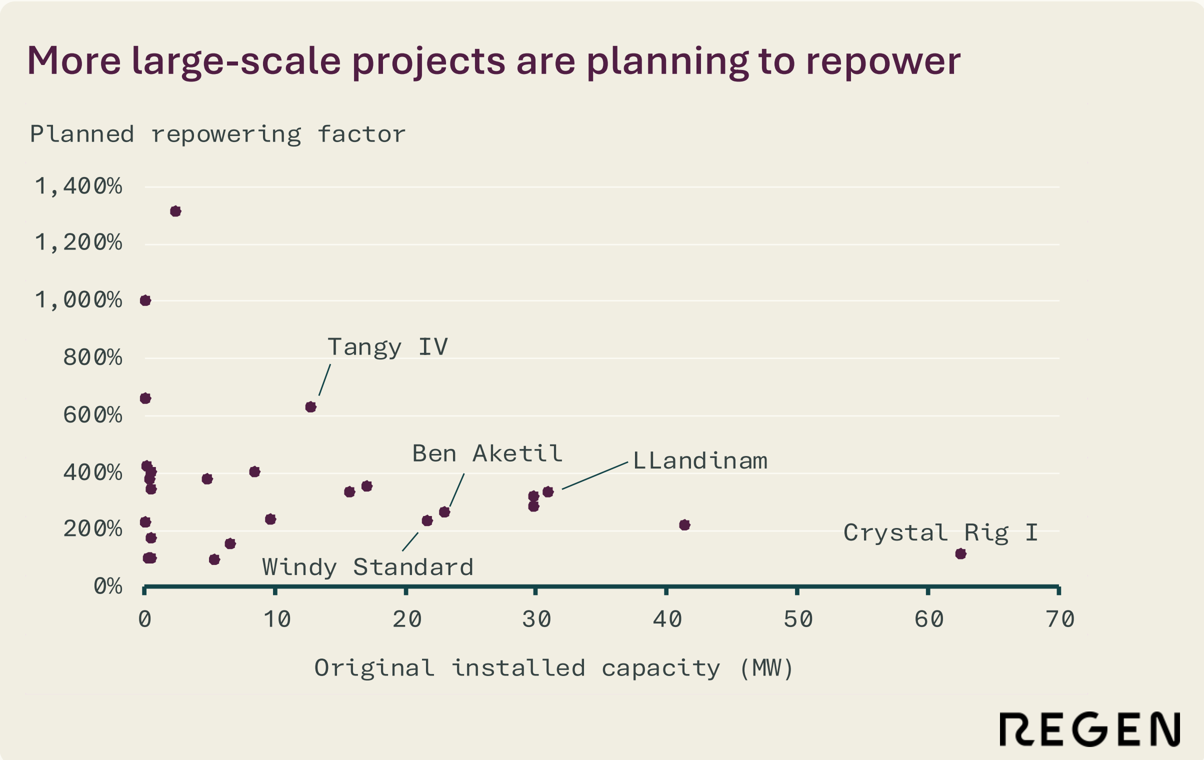


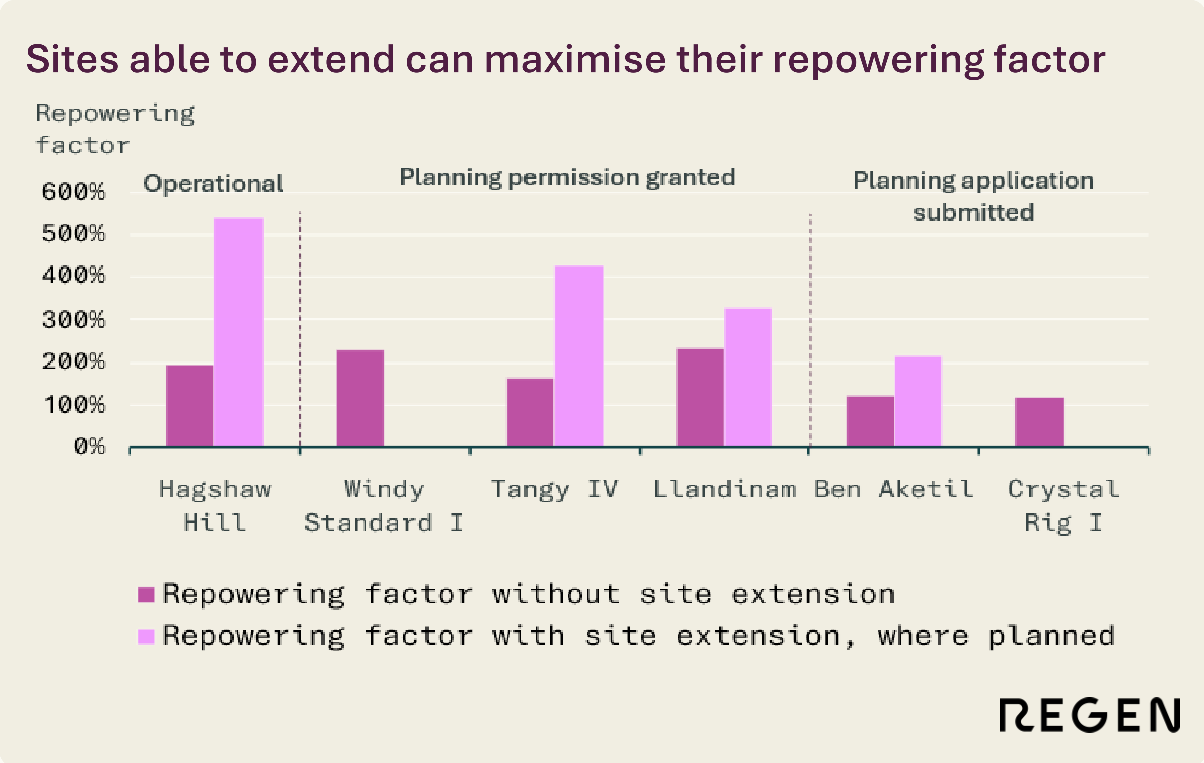

Figure 13: Projects planning to repower. Data from RUK EnergyPulse.



### What variables impact repowering factor?

Sites that are able to expand beyond their existing boundaries are naturally able to achieve higher repowering factors. Indicative analysis of site layouts for six large-scale projects shows that while repowering factors of 200-530% are viable when sites are able to construct new access tracks and/or expand the site boundary, this decreases to 115-230% when the site is limited to the existing boundaries and access tracks.

Figure 14: The impact of site extension on repowering factors. Data from RUK EnergyPulse.




When site extension is removed from the equation, the existing scale and number of turbines onsite become key drivers of repowering capability. Typically, older sites deploying high numbers of sub-1 MW turbines are those with the highest repowering potential. It can be assumed that the scale of onshore wind turbines able to be deployed in the UK will not continue to grow as it has over the past 25 years, and some 2-3 MW turbines deployed post-2000 may already be near the maximum feasible size for the given site.

Figure 15: Regen analysis of repowered sites. Data from RUK EnergyPulse.

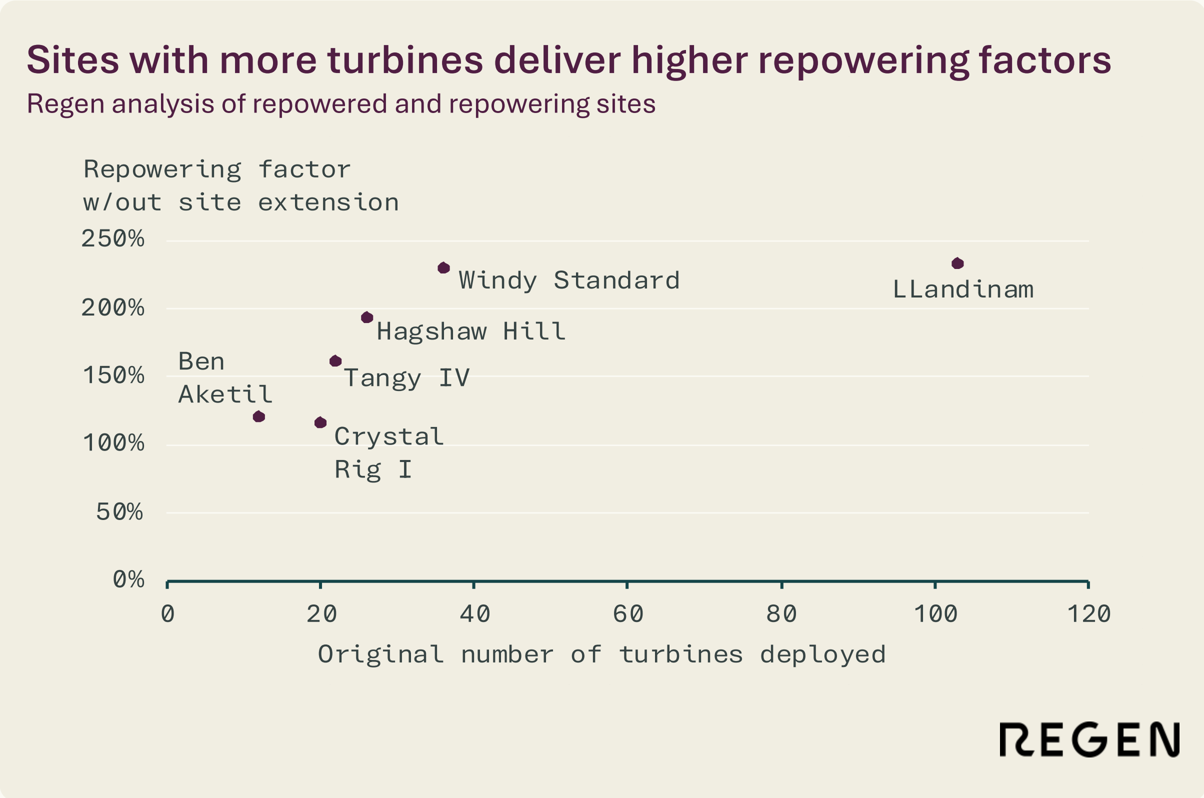
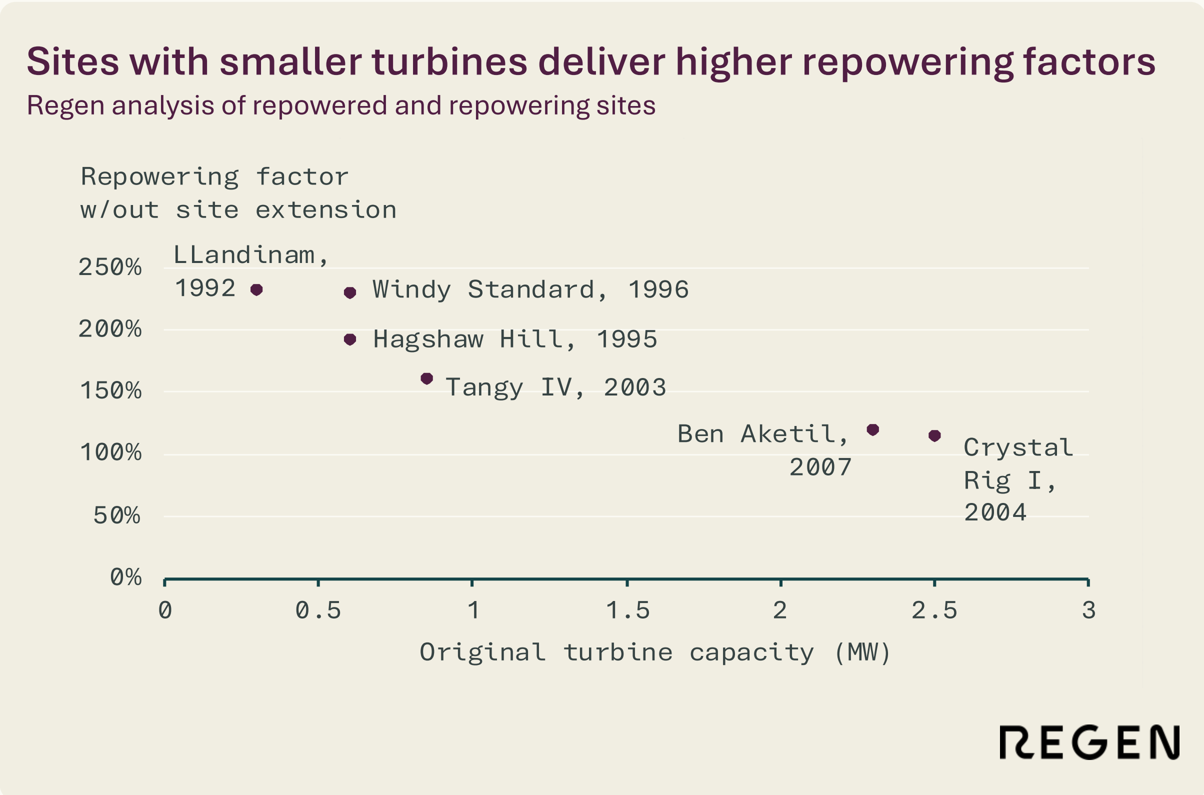



Figure 16: Regen analysis of repowering sites. Data from RUK EnergyPulse.



## Modelling repowering potential across GB

### Decommissioning, life-extension or repowering:

Not all sites will be suited to repowering, and a number will instead decommission. There are also sites where additional capacity cannot be deployed, and extended operation of the existing capacity, through new equipment or otherwise, is the outcome. A detailed study of which sites are likely to fall into these categories has not been completed. Instead, the data available on past and present repowering is used to estimate appropriate average repowering factors which can be assumed across the onshore wind fleet. These average repowering factors must account for survivor bias within the existing sample of repowered sites, and capture the likelihood that some sites, especially those which can extend beyond existing site boundaries, will be capable of significantly higher repowering factors, while others will be unable to repower at all.

**Modelling method:**

- All sites are modelled to repower, but average repowering factors are selected to account for sites which will be able to achieve high repowering factors through site extension, and sites which will be unable to repower at all
- Sites with more existing turbines have higher average repowering factors than those with fewer turbines
- Sites with smaller capacity turbines have higher average repowering factors than sites with higher capacity turbines
- Sites with turbine capacities of over 3 MW are assumed to repower with little or no additional capacity.

### When are sites modelled to repower?

Renewable UK EnergyPulse data evidences 1.2 GW of repowered capacity with planning approval, planning applications submitted or scoping documents submitted. It is assumed that these sites have been, or will be, successful in securing a Gate 2 connection offer for connection before 2035. They are modelled to repower by 2035 based on their current planning stage and this forms the near-term projection of repowering capacity.

For the remaining majority of sites without evidence of repowering in planning, the end dates of their current planning permission or original commissioning dates are used to estimate the repowering year. An ‘Early’ scenario assumes repowering at the planning consent end date, or where this is not available, 25 years from commissioning. A ‘Late’ scenario assumes repowering at two years after the planning consent end date, or 27 years from commissioning.

Sites in Scotland without planning evidence are modelled to repower only after 2035. This reflects the likelihood that they will not receive a Gate 2 offer to connect before 2035 under the current connections reform process.

For the 74 sites and 1 GW of existing capacity which has already been granted an extension to their planning permissions, the extended end date is reflected under both scenarios. Though it is likely that more sites will be seeking life-extension, this is not explicitly modelled. It is assumed that the impact of this is captured within the scenario envelope.

## Scenario summary

### High & early

1. Repowering factor for majority of sites: 130-180%
2. Repowering factor maximum: 250%
3. Repower on consent end date or after 25 years of operation

### High & late

1. Repowering factor for majority of sites: 130-180%
2. Repowering factor maximum: 250%
3. Repower two years after consent end date or after 27 years of operation

### Low & early

1. Repowering factor for majority of sites: 105-150%
2. Repowering factor maximum: 200%
3. Repower on consent end date or after 25 years of operation

### Low & late

1. Repowering factor for majority of sites: 105-150%
2. Repowering factor maximum: 200%
3. Repower two years after consent end date or after 27 years of operation

## Additional modelling constraints

It is assumed that onshore wind sites cannot repower to greater than 70 MW within England and Wales. This is to reflect land and planning constraints that are assumed more likely in these highly populated regions.

Sites on the 33kV distribution network in Scotland are capped at 70 MW. This is the approximate upper bound for sites to connect at this voltage level.

## Factors not captured in the modelling

Beyond the ability of a site to extend into neighbouring land, and its existing number of turbines and capacity, there are a number of factors which will impact the repowering potential of onshore wind sites. The factors below are not considered explicitly in the current modelling:

- Project economics, yield assessments
- Site access for large turbine components
- Visual impact of larger turbines
- Cumulative visual impact
- Biodiversity; habitat maintenance issues
- Local grid capacity.

## Results

- By 2035, the existing pipeline of repowering projects will deliver up to 710 MW of additional onshore wind capacity. In doing so, c. 500 ageing onshore wind turbines will be individually decommissioned
- Due to NESO's overallocated pot for onshore wind in Scotland, 113 sites and 1.9 GW of existing capacity could be constrained to life-extension, with additional capacity not able to connect before 2035
- By 2040, 1-2.5 GW of additional capacity could be delivered by repowering
- By 2050, 2.5-6 GW of additional capacity could be delivered by repowering.

Figure 17: Regen scenario development for repowered capacities

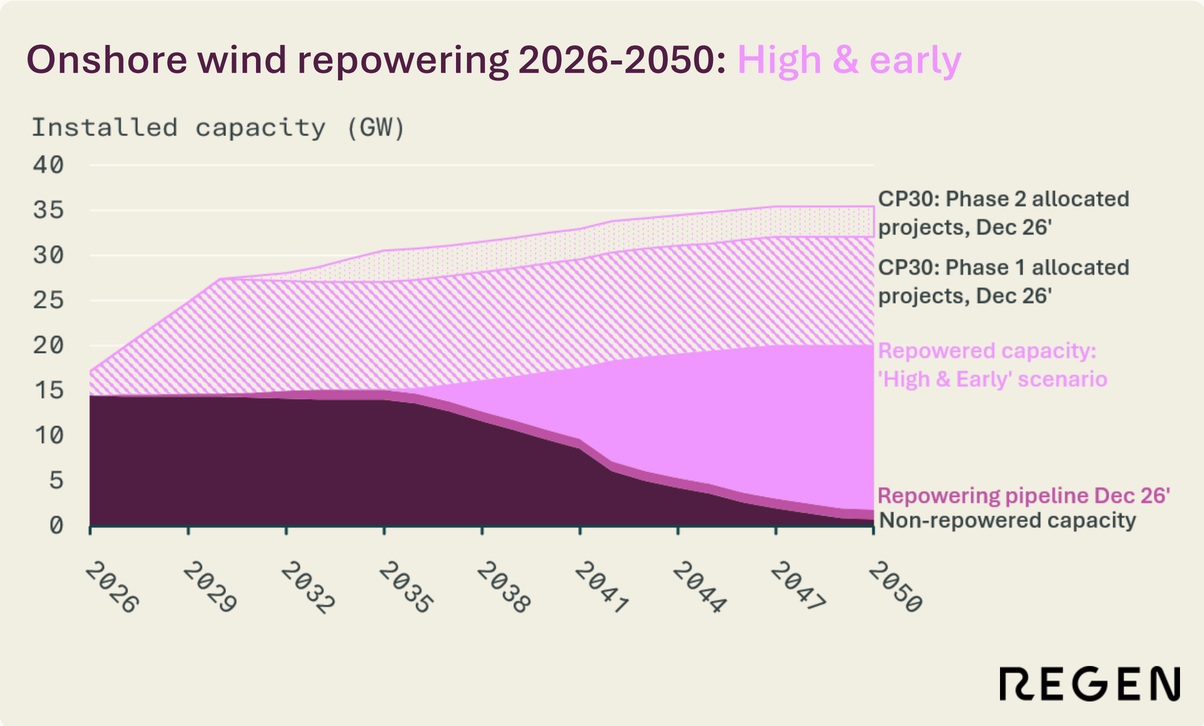
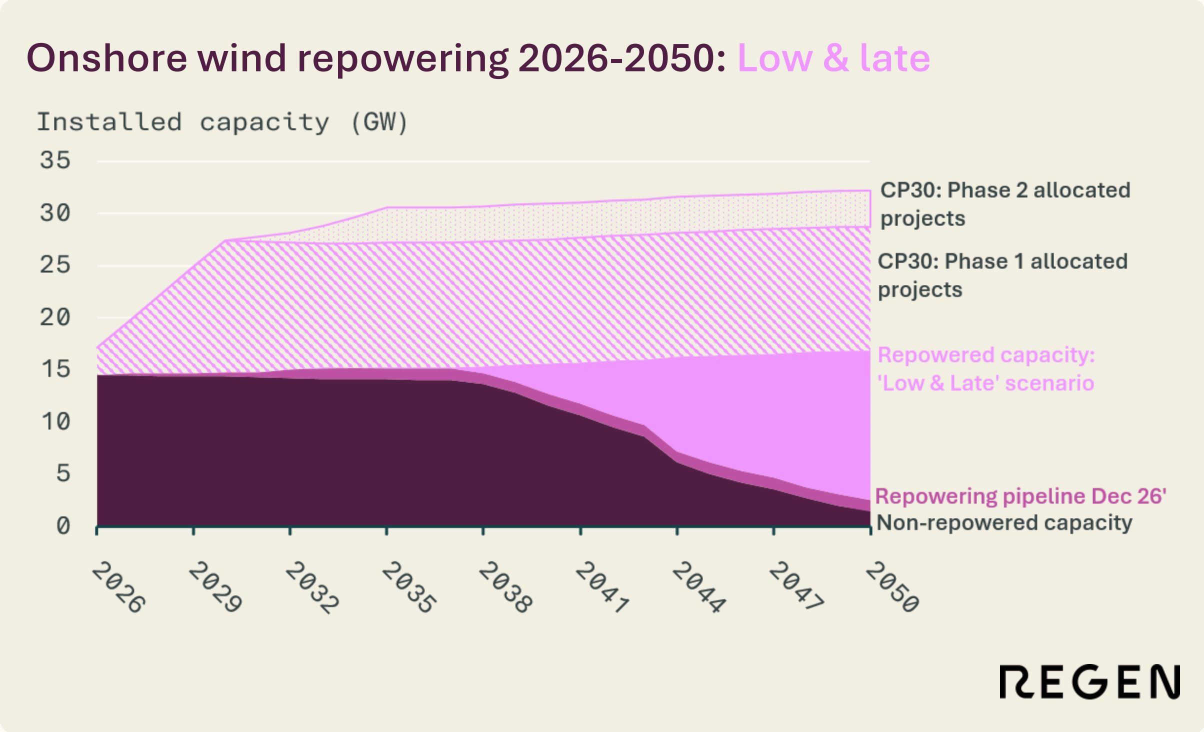


Figure 18: Regen scenario development for repowered capacities



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**February 2026**

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