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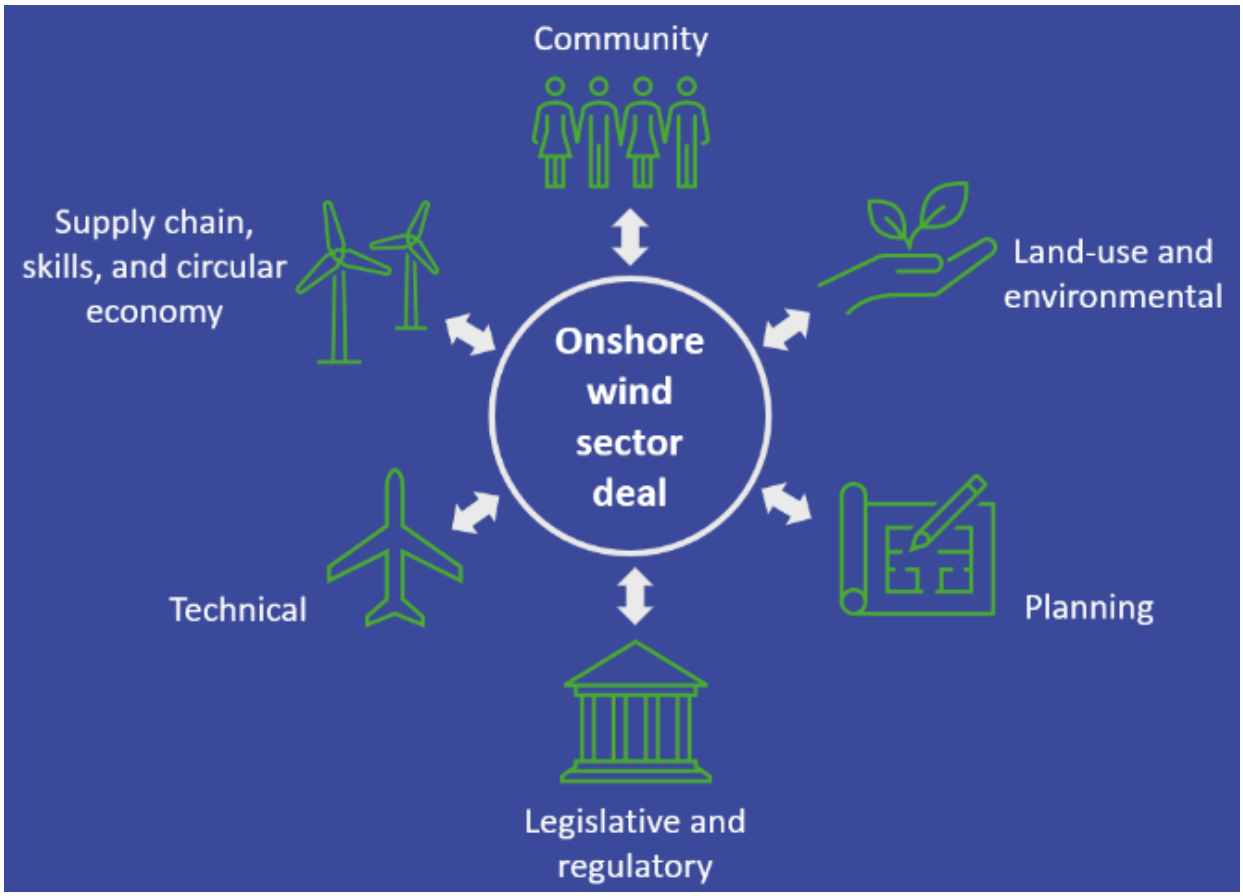

Client discretion

Scotland onshore wind pipeline analysis 2024-2030

November 2024 update

Document history

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Executive summary

This report provides the November 2024 update to the Scottish onshore wind pipeline analysis. The update includes the latest information from the rUK EnergyPulse Database (EPDB), reflecting changes to the development pipeline that have occurred in the intervening six months since the last update in April 2024. It incorporates updates gained from developer engagement, and a focussed analysis of three areas of particular interest: Eskdalemuir, the proposed Galloway National Park, and the Flow Country World Heritage Site.

Energy Pulse Database

Comparing with the previous April 2024 update, the key changes are:

- 1,364 active projects in the EPDB, a reduction of 33[i]
- 33 GW of capacity (+2 GW)[ii]
- 219 (+1) developers
- 235 (+4) owners

Developer engagement

This update includes feedback from developer engagement. We reached out to 19 developers, receiving nine responses. This feedback altered the EPDB-based timelines of 196 projects (14.9 GW) and reduced the total "future projects" from 112 projects (10.9 GW) to 90 projects (9.2 GW).[iii] The reduction in future projects is due to previous ones being:

- dropped from developer plans, or
- progressed sufficiently so that they are now in the public realm (and hence the EPDB).

Scenarios and KPIs in 2030

We consider the same three scenarios as in previous updates to represent a low, medium and high growth of onshore wind out to 2030. The differences between these scenarios are driven by altering the average project timelines (standard or accelerated) and whether or not future projects are included (that is, projects that are not yet listed in EPDB but which the developers have informed us about).

In each scenario we generate capacity timelines based on project stage. From these timelines we generate pipeline KPIs such as:

- Number of projects in the planning system and from this, the number of planning decisions required
- Number of abnormal loads expected, and
- Estimated community benefit generated.

[i] Reductions are due to projects being removed from the pipeline, this can be for several reasons such as cancellations, reaching the end of operational life, or refusal of planning permission without appeal.

[ii] Overall capacity increases even though project numbers have reduced as projects added to the database have much greater capacities than those removed from the pipeline.

[iii] "Future projects" are projects that developers have indicated are in their pipeline but which have not yet made it into the public realm (and hence are missing from the EPDB).

These are summarised in Table 1, with changes relative to our April 2024 update shown as arrows (point up indicated an increase, pointing down indicates a decrease).

Table 1 Key scenario results.

Scenario	2030 operational capacity (GW)	Average annual no. of planning decisions required, 2024-2028 inclusive*, **	Average annual no. of abnormal loads, 2024-2030 inclusive	Total community benefit contributions, 2024-2030 inclusive (£M)
Scenario 1 (low)	15.7 ⇧	ECU: 18-21 LPA: 6-22	2,320 ⇧	445 ⇧
Scenario 2 (medium)	19.8 ⇩	ECU: 32-34 ⇩ LPA: 11-26	4,060 ⇩	500 ⇩
Scenario 3 (high)	24.9 ⇧	ECU: 39-43 ⇧ LPA: 12-28	5,700 ⇩	585 ⇧

⇧ Increase from Apr 2024

⇩ Decrease from Apr 2024

* ECU for projects equal to and greater than 50 MW capacity, LPA for projects less than 50 MW capacity.

** Our analysis predicts that some projects which are currently in the planning system may be removed/re-submitted prior to a consent decision being made, hence we show the "number of consent decisions" as a range.

This update indicates two main effects:

- An addition in overall capacity in the pipeline, and
- A trend to increasing timelines.

Crucially, the "business as usual" timeline shown by Scenario 2 now falls below the ambition of 20 GW in operation by 2030 (now estimated to be 19.8 GW). With Scenario 3 still comfortably above 20 GW in 2030 (it has increased compared to the Apr 2024 update) this emphasises the importance of the SOWSD commitments which aim to reduce the development timelines.

Impact of resource limits

As in the previous update we provide narrative on some practical resourcing limits which may impact on Scotland's ability to deliver the 2030 ambitions:

- Energy Consents Unit (ECU) - planning decisions per year

  For Scenario 2, the average minimum no. of decisions required per year (2024-2028) is expected to be 32 (down from 35 in Apr 24 update), peaking at 40 in 2027 (down from 45 in 2028). The ECU has historically been able to deliver around 17 planning decisions per year. We have not revised this value for this update, but we acknowledge that the ECU is in the process of increasing its resource in this area. While ECU resources are increasing, planning decisions per year can only increase if there are proportionate increases in capacity amongst all statutory consultees.

- Police Scotland - abnormal loads per year

  For Scenario 2, the average no. of abnormal loads per year (2024-2030) is expected to be 4,060 (down from 4,774), peaking at 7,323 in 2029 (down from 8,118 in 2029). Scotland has historically been able to support around 2,700 abnormal loads per year – we have not revised this value for this update, but we acknowledge that work is underway to seek solutions to increase it.

- Contracts for difference (CfD) allocation rounds - allocated capacity per year

To fulfil the potential of Scenario 2, we estimate that annual CfD allocations in AR7 (2025) through AR9 (2027) inclusive need to be at least 2.4 GW, peaking at 2.8 GW in AR9. AR6 delivered just under 1 GW in Sep 2024.

- Grid connections – new capacity requiring grid connection, per year

  To fulfil the potential of Scenario 2, we estimate that the average annual connection rate (2024-2030) needs to be 1.6 GW (down from 1.8 GW), peaking at 2.8 GW in 2030 (was previously 2027).

These KPIs continue to show that Scotland's ability to deliver 20 GW by 2030 may be restricted by its current ability to resource these key services. This gap between current capabilities and future requirements becomes wider when considering the higher capacity delivered under Scenario 3.

Areas of interest

In this update we considered three areas of interest in which future development is at risk. Table 2 summarises the total capacity of projects in the pipeline database in these areas by project stage.

Table 2 Total capacity in areas of interest by project stage

Project stage	Eskdalemuir (MW)	Proposed Galloway National Park (MW)	Flow Country World Heritage Site (MW)
Development	1,017	753	325
In planning	2,062	167	333
Consented	264	403	406
Under construction	107	169	143
Operational	1,095	680	160

All projects pre-construction are considered at risk. Table 3 summarises the at risk capacity in each area.

Table 3 At risk capacity in areas of interest

Area of interest	At risk capacity (MW)
Eskdalemuir	3,343
Proposed Galloway National Park	1,323
Flow Country World Heritage Site	1,064

Table 4 summarises the impact on the 2030 capacity in each scenario if no further development took place in the areas of interest. These capacities have been subject to the models drop-out parameters and attrition rates.

Table 4 Reduction in 2030 operational capacity if no further development in areas of interest

Area of interest	Scenario 1 (MW)	Scenario 2 (MW)	Scenario 3 (MW)
Eskdalemuir	1,094	1,103	1,898
Proposed Galloway National Park	380	402	584
Flow Country World Heritage Site	63	393	486
Total	1,537	1,898	2,968

Contents

1. Introduction

In September 2023 the Scottish Government (SG), Scottish renewables (SR) and the onshore wind sector launched the Scottish Onshore Wind Sector Deal (SOWSD), outlining an ambition of 20 GW of operational onshore wind in Scotland by the end of 2030 and setting out the actions that Government and the sector will take to realise that ambition.

To help support the delivery of the 2030 ambition, and to address a specific commitment of the SOWSD itself, BVG Associates (BVGA) was commissioned by SR to build a database that facilitates a detailed analysis of the onshore wind pipeline in Scotland. The initial analysis of this pipeline was published in November 2023 and was updated in Apr 2024 (though published in June 2024). This report presents the November 2024 update which:

- Incorporates the latest information from rUK's Energy Pulse Database (EPDB) reflecting changes to the development pipeline that have occurred in the intervening six months[iv]
- Includes updated information supplied by developers, and
- Includes analysis of three key areas of interest: Eskdalemuir, the proposed Galloway National Park, and the Flow Country World Heritage Site.

[iv] https://www.renewableuk.com/page/EnergyPulse

2. EnergyPulse database

As of October 3rd 2024, the EPDB contained 1,364 projects in Scotland, totalling 33 GW. Twenty one of these projects did not have a nameplate capacity assigned to them, though all had a value for the number of turbines. Assuming these projects used 3 MW turbines we estimate these projects add an additional capacity of 402 MW.[v]

This represents a reduction of 33 projects, an increase in total capacity of 2 GW and a reduction of 128 MW of additional capacity compared to the EPDB dataset used in the previous update.

The spread of capacity (MW) across the stages of a project lifetime is shown in Figure 1.

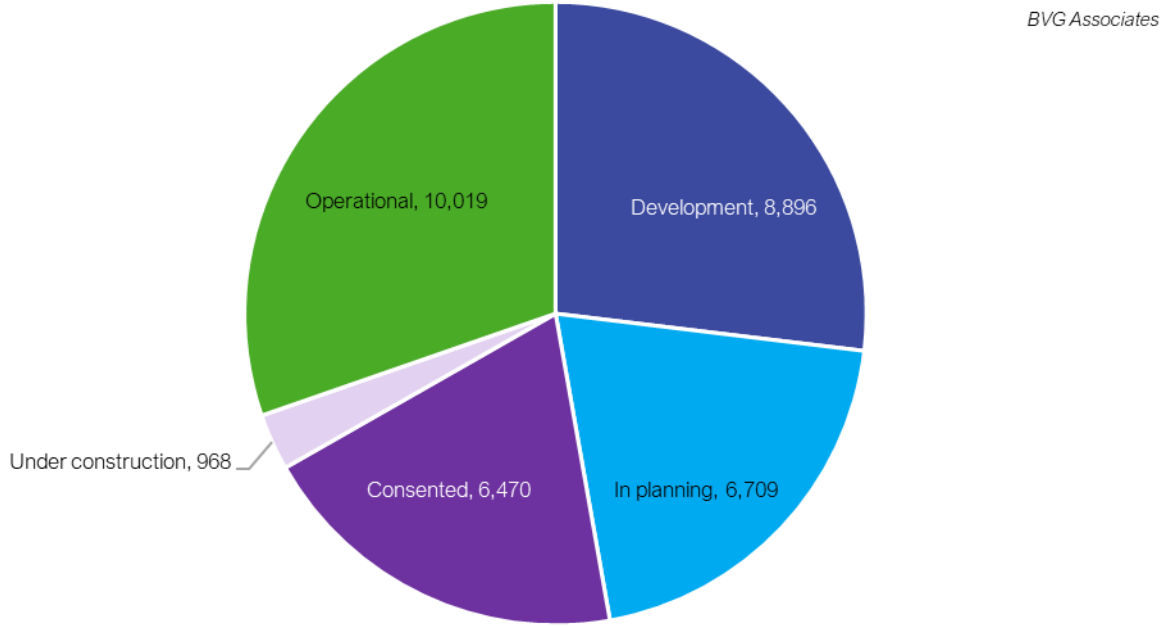

Figure 1 Summary of pipeline of Scottish projects (MW) in the EPDB October 2024.

These projects are being developed, constructed, and operated by 219 different developers and are currently owned by 235 different commercial entities. This is an increase of one developer and four owners from the April 2024 update.

[v] All were in the pre-submission phase and their average maximum tip height was 172 m, so this is likely a conservative estimation.

3. Developer engagement

In this report we engaged with developers to confirm details of projects within the rUK database and ask for details of future projects not yet in the public domain. Through this engagement process, we contacted 19 major developers and owners, including all members of the G12 group.[vi,vii] Where no response was received for this update, we relied on information provided in the preparation of the initial pipeline report in late 2023.This enabled us to review approximately 60% of all the capacity currently listed in the EPDB.

We received nine responses which resulted in:

- Updated timelines for 90 projects, representing a total 7.7 GW, and
- 35 future projects not yet in the public domain with a capacity of 3.3 GW, only 70 MW of which was repowering. Six of the 35 projects were supplied with no value for their capacity - we assumed these to have a capacity of 50 MW each, bringing the total to 3.6 GW.

We supplemented these nine new responses with eight from the initial pipeline report. These eight older responses provided:

- Expected timelines for 106 projects, representing 7.2 GW in the EPDB, and
- 55 future projects not yet in the public domain with a capacity of 5.6 GW, of which 2.2 GW is repower.

Combined, these responses give a total of:

- Expected timelines for 196 projects, representing 14.9 GW, and
- 90 future projects not yet in the public domain with a capacity of 9.2 GW of which 2.2 GW is repowering.

This is a reduction of 38 projects and 3.1 GW for which expected timelines were provided, and 2 GW and 22 future projects not yet in the public domain. The reasons for these changes are:

- Differences between developers' previous responses and their response for this update.
- The removal of projects which were considered developer advised future projects in the last update which are now in the public domain and therefore are included in rUK's EPDB. Developer advised dates for such future projects were included for the EPDB entry.
- We ignore developer-supplied expected timelines where these timelines can no longer be achieved. These projects remain in the pipeline but are subject to standard assumptions as outlined in 5.1.

[vi] The "G12" is a group of 13 major developers and owners formed as a key stakeholder group representing the interest of industry during the development of the SOWSD. The members are EDF Renewables, Energiekontor, ESB, Fred. Olsen, Muirhall, Nadara (formerly Renantis), OnPath Energy (formerly Banks Renewables) RES, RWE, ScottishPower Renewables, SSE Renewables, Statkraft, Vattenfall.

[vii] The other six developers and owners we reached out to were: Belltown Power, Brockwell Energy, Community Windpower, E Power, Galileo Green Energy, Invenergy.

4. Model overview

4.1. Project lifecycle milestones

The model develops project lifetimes, marking the milestones of when a project:

- Is submitted for planning consent
- Receives its final consent decision
- Starts construction
- Reaches commercial operation, and
- Reaches end of life.

For any of the above dates that are not yet known, the model allows user-defined values to determine how long on average projects take to transition from one state to the next as shown in Figure 2.

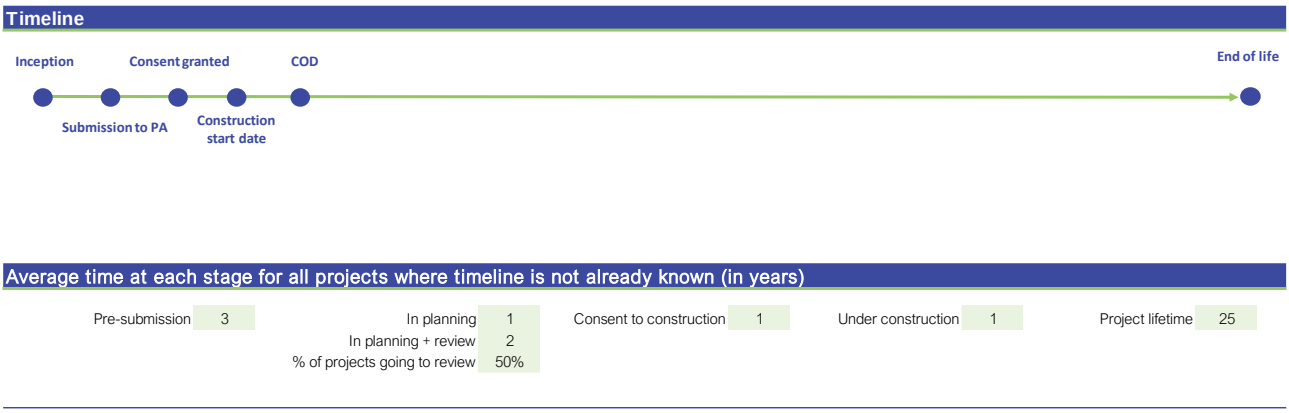

Figure 2 User interface Project lifecycle milestones

4.2. Pipeline projects which may not reach commercial operation

The model provides a series of options for the user to test thresholds which will stop some projects from progressing to the next stage. For any project where at least one of these thresholds are exceeded, the model will remove the project from the analysis. These options are shown in Figure 3 and consist of:

- Maximum length of time that a project can remain at a milestone without progressing further. If a project has not progressed after a reasonable amount of time we consider it dormant and unlikely to be progressed further by the developer.
- Technical attributes of the consented turbines that present a barrier to projects being built, such as the consented dimensions (specifically the turbine tip-height) and/or the proposed turbine no longer being available on the market.
- Overall progression rates for projects moving through the milestones. Specifically, we consider projects moving from general development to receiving a positive consent decision.

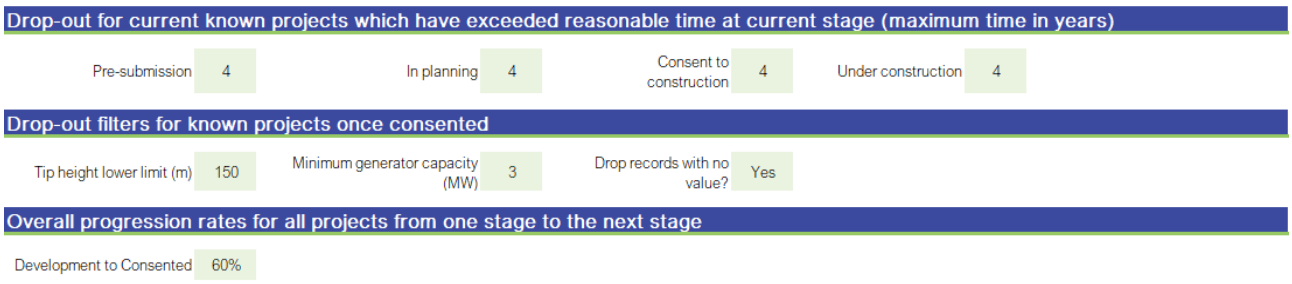

Figure 3 User interface: "Drop-out" parameters

4.3. Developer timelines

The user can override the standard durations between milestones with project specific dates provided by the developers as part of the engagement process. The user can also choose to include the future projects as provided by the developers.

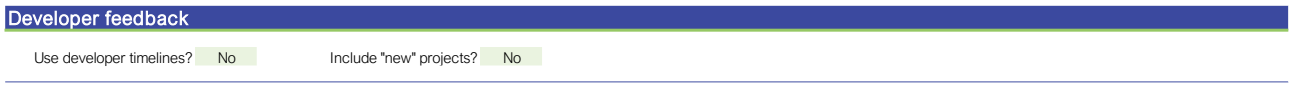

Figure 4 User interface: Developer feedback

4.4. Repowering and deficit backfill parameters

There are two scenarios where the model itself introduces new projects into the pipeline:

- When a current project reaches the end of its life, it may get repowered. The user can choose what percentage of projects are repowered, by how much repowering will increase the nameplate capacity of the site, and what size of turbines will be used on the repowered site.
- If the total operational capacity in 2030 is less than the target 20 GW, the model will calculate how much new capacity needs to be introduced into the timeline to address the deficit, and when. The user can specify the capacity of each additional backfill project that will be required, and the capacity of the turbines that will be used.

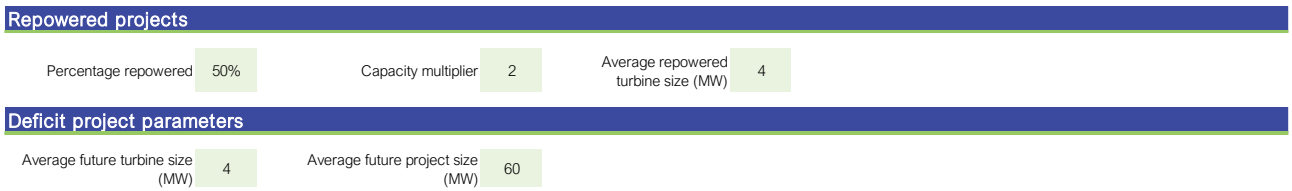

Figure 5 User interface: Backfill parameters

4.5. Output calculation parameters

The model outputs information on four key performance indicators (KPIs):

- The amount of community benefit created
- The amount of abnormal loads to be managed
- The amount of projects going through the planning process at any given time, and
- The amount of capacity that may be required to be allocated in future contract for difference (CfD) rounds.

The user has access to basic input parameters for these KPIs, as shown in Figure 6.

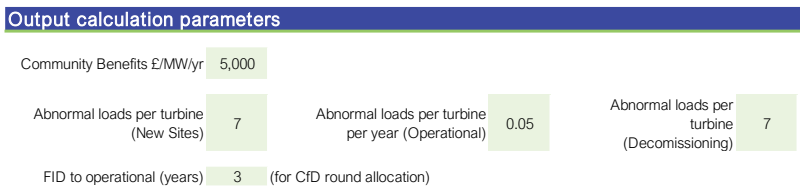

Figure 6 User interface: Output calculation parameters

5. Scenario generation

5.1. Timelines

One of the main factors which differentiates scenarios presented is altering the average project timeline. In the first iteration of this report, we focussed only on changing the time projects spent in the planning system under a standard timeline and an accelerated scenario in line with commitments in the SOWSD. In this update we followed the same assumptions as in the April 2024 update which are described below.

5.1.1 Standard timeline

This timeline uses analysis of projects in the current rUK EPDB which have reached commercial operation to predict the average timelines of projects yet to reach operation. This provides the following durations:

- Pre-submission: 2 years
- In planning: 2 years, extending to 4 years for projects undergoing judicial review (JR). Assuming 50% of projects are subject to JR, this results in an average time in planning of 3 years
- Consented: 3 years
- Construction: 2 years, and
- Operational: 25 years.

Our analysis which resulted in the above timeline can be seen in Appendix E.

5.1.2 Accelerated timeline

This timeline accelerates aspects of the standard timeline in line with commitments made in the SOWSD.

The SOWSD makes several commitments which are intended to have a positive impact (i.e. reduction) on project timelines. These include but are not limited to:

- Streamlining and standardising templates for consent applications. This has the potential to reduce the time taken for the planning authority to review applications, as well as reducing the number of applications refused.
- Engaging with grid and networks to better manage the connection queue to improve the connection process. This has the potential to reduce the time between consent being granted and the start of construction date as grid connection is a key factor in final investment decision (FID).
- Identifying gaps in the supply chain, addressing with appropriate training, and promoting opportunities to those not already involved in the industry. This has the potential to reduce time between consent being granted and the start of construction as available supply chain is a key factor in FID. Availability of skills and supply chain also has the potential to reduce construction timelines.

The anticipated combination of these commitments are expected to produce the following reduced durations which we use for the “accelerated” timeline:

- Pre-submission: 2 years
- In planning: 1 years, extending to 2 years for JR, with 20% of projects assumed to be subject to JR, thus resulting in an average time in planning of 1.2 years
- Consented: 1.5 years
- Construction: 1.5 years
- Operational: 25 years

5.2. Data

Another factor which differentiates scenarios is the data that is included. These are:

- rUK's EPDB only, which Includes only projects already in the public domain.
- Developer information included, which:
  - Adds projects learned of through developer engagement to rUK's EPDB, and
  - Adds developers expected dates to future projects and projects within rUK's EPDB.

5.3. Scenarios

To simplify the message of this report we have opted to focus on three scenarios as shown in Table 5.

Table 5 Scenarios modelled.

Scenarios	Timeline	Data source	Additions
Scenario 1	Standard	rUK EPDB only	None
Scenario 2	Standard	Developer information included	None
Scenario 3	Accelerated	Developer information included	Minimum of 50% of repowering at double original capacity[viii]

Further details regarding model parameters are provided in Appendix F.

[viii] At an aggregated level (i.e. not project specific) the model ensures that repowering is included for 50% of all projects decommissioned at double their original capacity. In this calculation the model considers actual repower projects coming online in a given year and only adds additional repower if the expected repower level is not met by existing projects.

6. Analysis

In the following section we analyse results from modelled scenarios. Full results, figures and tables can be found for scenarios 1 to 3 in Appendices A to C, respectively.

6.1. Pipeline analysis

Under Scenario 1, which only considers projects already in the public domain, the model shows that there are not enough projects in the pipeline to reach the 20 GW of onshore wind by 2030 target. This scenario achieves 15.7 GW in 2030, resulting in a deficit of 4.3 GW. This deficit is 0.5 GW less than shown in the April 2024 update.

Under both Scenario 2 and 3, the developer-advised future projects are included. The model shows that a small deficit remains under Scenario 2, however, Scenario 3 significantly surpasses the 20 GW by 2030 target and has increased compared to the April 2024 update.

- Scenario 2 which follows current average project timelines reaches 19.8 GW in 2030, resulting in a deficit of 0.2 GW. This is a reduction in 2030 capacity of 1.1 GW compared to the April 2024 update. This is due to projects suffering from lengthening timelines compared to what was expected in April 2024.
- Scenario 3 which follows accelerated timelines potentially achieved through SOWSD commitments reaches 24.9 GW in 2030. This is an increase in capacity of 0.3 GW compared to the April 2024 update. Scenario 3 demonstrates the positive impact of the accelerated timelines promised by the commitments in the SOWSD.

Figure 7, shows the operational capacity for each scenario in 2030.

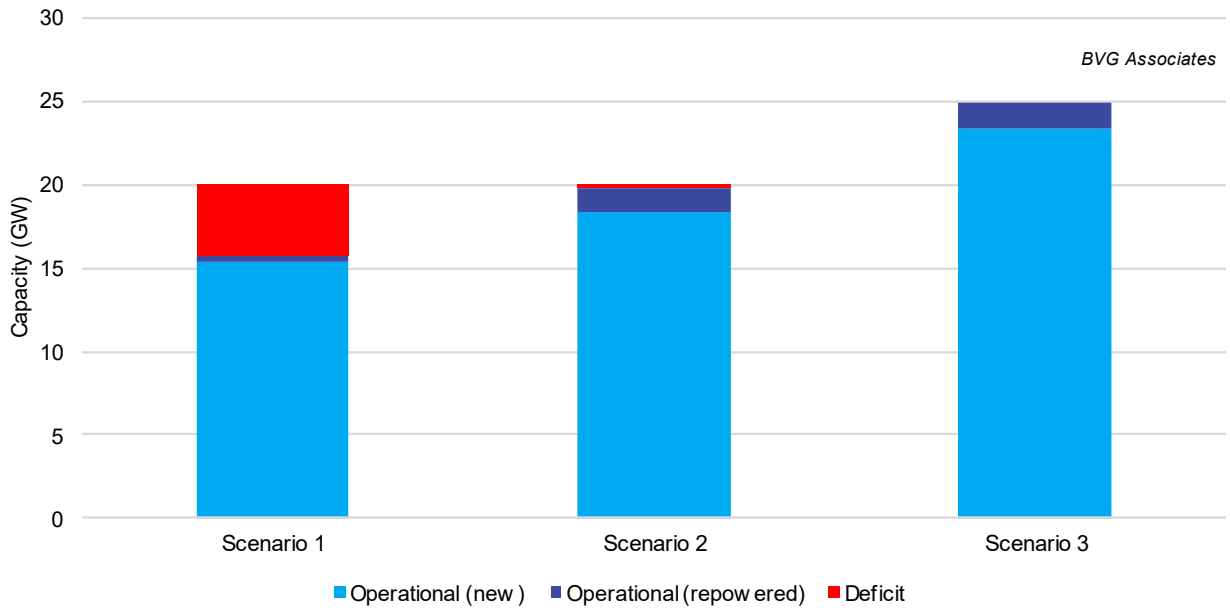

Figure 7 Comparison of operational capacity in 2030 for scenarios 1, 2 and 3.

6.2. Projects in planning

In terms of understanding the throughput of projects in the planning system and how this compares to current capabilities we must consider the number of consent decisions which need to be made each year. Figure 8 and Figure 9 present the range of consent decisions which are required in each year for Scenario 2. These figures are split by planning route, with:

- Figure 8 showing projects equal to or greater than 50 MW being consented at national level through the ECU, and

- Figure 9 showing projects less than 50 MW being consented at a local level through the local planning authority.

The minimum consent decisions required excludes projects which may "drop out" of the planning system before a consent decision is reached (see Section 4.2 and Appendix F) while the maximum value includes them.

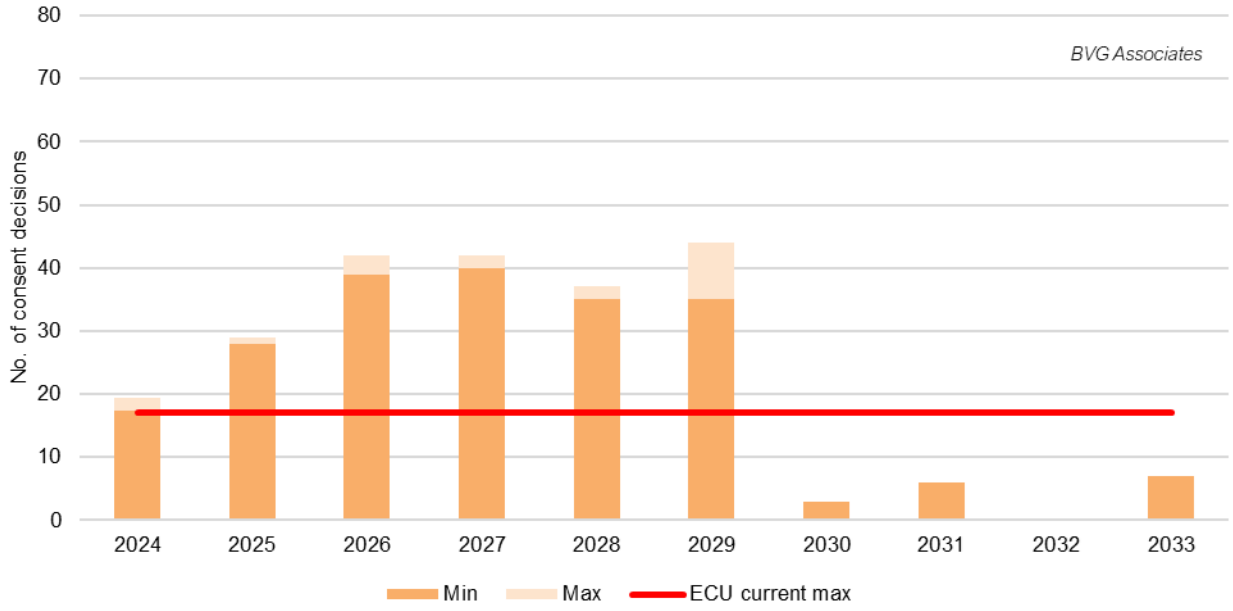

Figure 8 Minimum and maximum number of consent decisions required at ECU level for Scenario 2.

The maximum number of consent decisions which can be made in one year by the ECU is historically around 17.[ix] It can be seen in Figure 8 that this current maximum rate will need to increase significantly to achieve the minimum number of consent decisions expected for Scenario 2. Using the minimum number of consent decisions required as a benchmark, the ECU's max decision rate must increase from 17 to 28 in 2025, and 38 in 2026, and remain between 35 and 40 consent decisions until 2029. This peak of 40 consent decisions in 2027 represents a reduction of five in comparison to the April 2024 update, however the overall number of consent decisions have increased by 11 between 2024 and 2029.

Scenario 3 (shown on page 35 in Appendix C) presents a greater challenge, with a peak of 62 consent decisions required in 2027 and an average of 43 consent decisions required annually between now and 2027. This represents no change in the average number of consent decisions required in Scenario 3 compared to the April 2024 update.

In summary, it remains clear that a significant increase in consent decisions made each year at ECU level will be required to reach the 20 GW by 2030 target, and that the reduced development times promised by the SOWSD, and incorporated into Scenario 3, will be essential if Scotland is to achieve 20 GW operational onshore wind by 2030.

[ix] Informed by engagement with ECU on determinations made yearly between 2019 and April 2024.

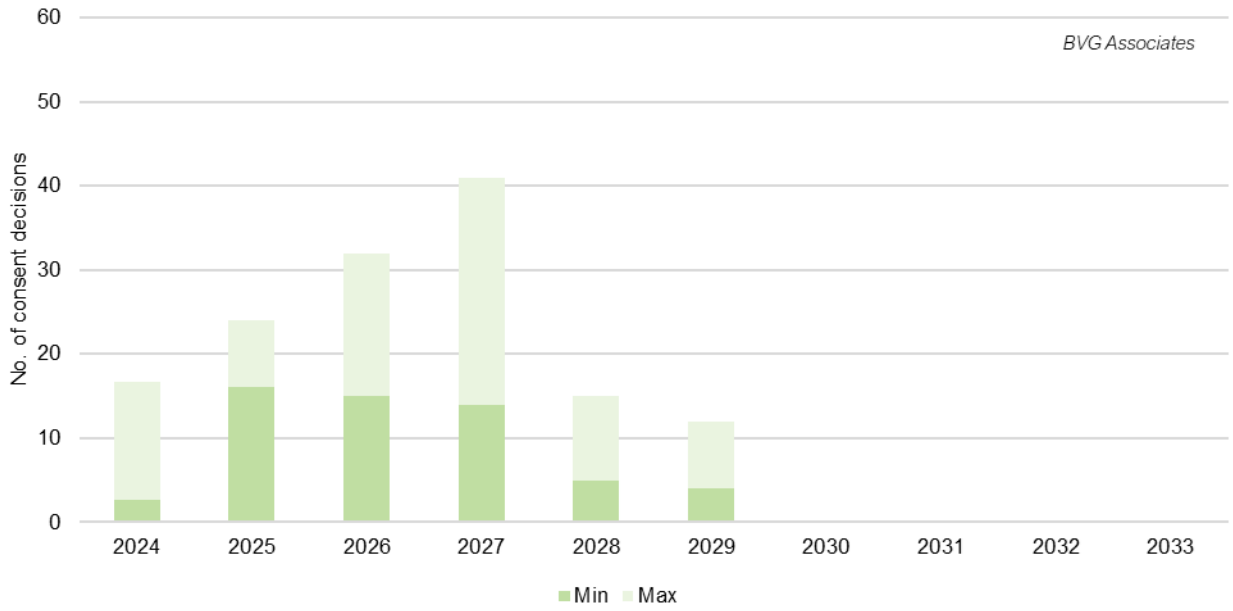

Figure 9 Minimum and maximum number of consent decisions required at LPA level for Scenario 2.

The large range of possible consent decisions required annually at LPA level (Figure 9) reflects the large number of projects under 50 MW which we predict have a significant chance of being withdrawn from the planning system prior to a consent decision being made. The number of consent decisions at LPA level has not changed significantly compared to the April 2024 update.

The "current maximum rate" is not shown as we have not established this at LPA level.

6.3. Abnormal loads

Based on conversations with hauliers, and previous BVGA work on failure rates and major component exchange during operations, our analysis assumed the following:

- 10 abnormal loads per turbine during construction: 3 blades, 4 tower sections, 1 nacelle, 1 hub and 1 drivetrain.
- 6 abnormal loads per turbine during decommissioning: 1 for blades, 2 tower sections, 1 nacelle, 1 hub and 1 drivetrain.
- 0.05 loads per turbine per year during operation: 1% of gearboxes, 1% of generators, 2% of transformers, 1% of blades.

Feedback from industry estimates that Police Scotland's capability to support abnormal loads limits abnormal load movements to a maximum of 800 MW per year. Assuming an average turbine size of 3 MW and 10 loads per turbine in construction, this equates to approximately 2,700 abnormal loads per year.[x]

This limit is based on individual component movements, convoys of multiple abnormal loads are not considered.

Figure 10 shows this maximum resource superimposed to the abnormal loads results for Scenario 2.

[x] Average turbine size of 3 MW is based on the average turbine size for all projects in the EPDB where capacity and number of turbines are known – this assumption has not been updated in this latest update and remains as in the April 2024 update.

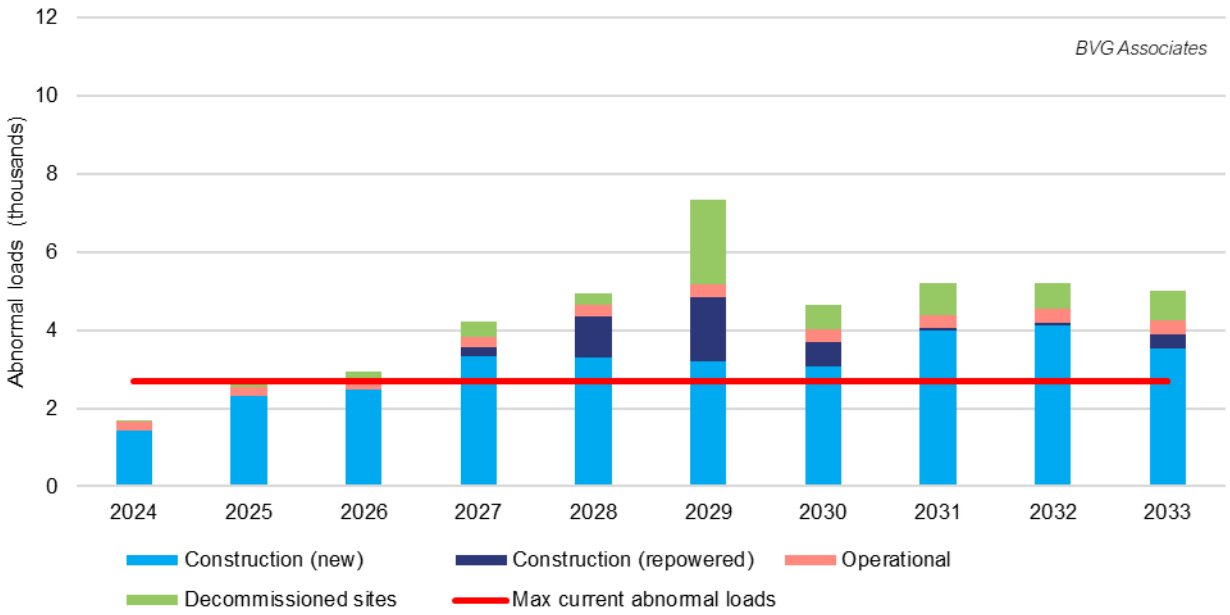

Figure 10 Number of abnormal loads required by project stage for Scenario 2, with available resource.

Based on Figure 10, the following key points can be noted:

- The current abnormal load maximum is exceeded from 2026 onwards.
- From 2027 the current yearly maximum is significantly exceeded annually out to 2033.
- A large number of decommissioned turbines and construction on repowered sites in 2029 results in over 7,000 abnormal loads being required (down from 8,000 in April 2024 update) – almost three times the current maximum.

For Scenario 3 (shown on page 36 in Appendix C), beyond 2025 a much more rapid increase is observed than that for Scenario 2, with an average of 5,700 abnormal loads between now and 2030 and a peak of almost 11,500 loads in 2029. An increase for the average of 115 loads and 400 loads in the peak.

To achieve the timelines required to reach 20 GW or more by 2030 it is clear that a significant increase in the current maximum number of abnormal loads which can be supported by Police Scotland will be required. We acknowledge that discussions between developers, hauliers and Police Scotland are being prioritised to identify potential solutions.

6.4. CfD allocation

Table 6 shows the capacity which should be targeted in future CfD Allocation Rounds (ARs) for Scenario 2. This assumes all projects in the pipeline are to be financed via future ARs and that ARs are run annually.

Each AR has a three year window for eligibility. The eligible capacity is made up of projects expected to enter operation in a three year period beginning two years after the AR date.[xi] The eligible capacity will therefore overlap between annual rounds. To avoid double counting in the overlap years we estimate a "target capacity" based on all projects entering operation in the calendar year that is three years after the AR (that is, we only look at the middle year of the three year eligibility period).

Table 6 Capacity eligible for and target capacity required for future CfD rounds for Scenario 2.

CfD Allocation round	CfD year	Eligible (GW)	Target allocation (GW)
6	2024	4.6	1.7
7	2025	6.3	2.2
8	2026	7.0	2.3
9	2027	6.8	2.8
10	2028	6.4	1.2
11	2029	5.8	2.5
12	2030	6.3	1.8

AR6 awarded CfD contracts to 0.9 GW of Scottish onshore wind projects. This was a shortfall of 0.8 GW in comparison to the target capacity of 1.7 GW for Scenario 2. ARs 7 through 9 will need to more than double this AR6 value and achieve an average of 2.4 GW per AR to achieve Scenario 2's target capacities.

Note that the target values for future allocation rounds shown in Table 6 do not incorporate the shortfall experienced in AR6, so will need to accommodate a further 0.8 GW between them if the expected 19.8 GW by 2030 is to be realised.

The target capacities for future allocation rounds are significantly more demanding for Scenario 3 - these can be viewed on page 37 in Appendix C.

The average target capacities for both Scenario 2 and Scenario 3 are similar to those reported in the April 2024 update.

The analysis shows that an increase in the historical allocation for onshore wind is required in all future allocation rounds to achieve 20 GW by 2030. If future rounds are to allocate less than around 2.5 GW each then an effective alternative route to market will be required to address the shortfall.

6.5. Grid connection

Figure 11 shows the capacity entering operation in each year and requiring a grid connection for Scenario 2. This has been included to show the vast increase in capacity coming online between 2026 and 2030.

[xi] This can change between auction rounds, for the purposes of this analysis we have assumed it will not change.

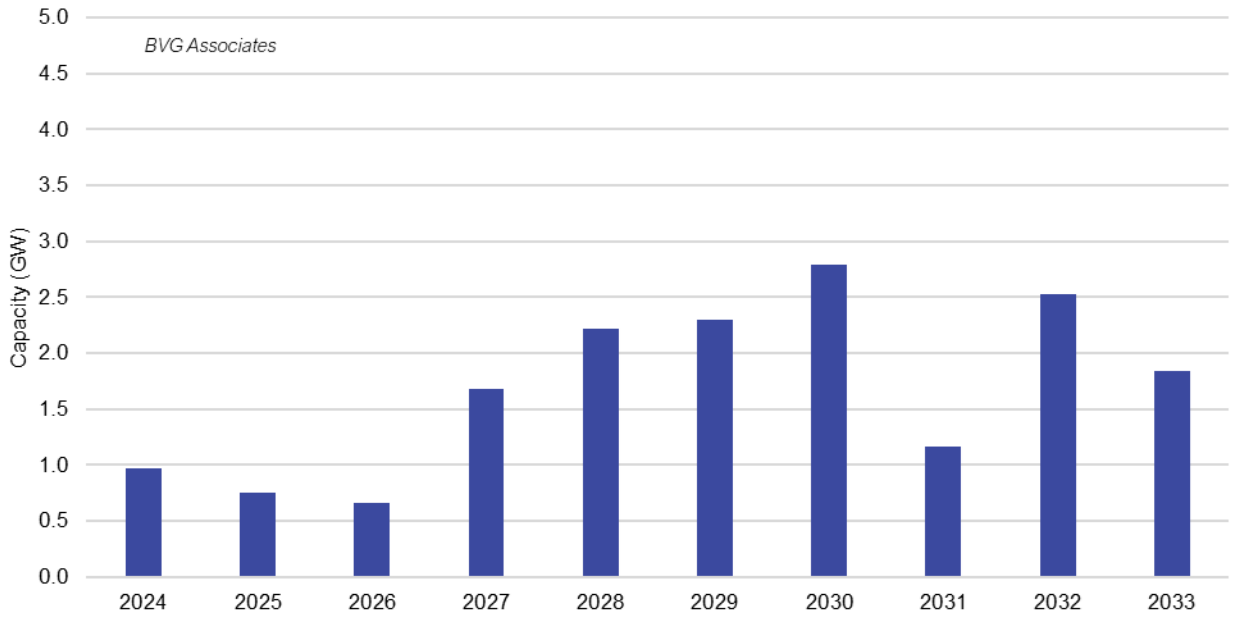

Figure 11 Capacity requiring grid connection per year for scenario 2.

Perhaps the best reference for "available grid capacity" through to 2030 is the Clean Power 2030 report by NESO.[xii] This report shows that for either future scenario of "New Dispatch" or "Further Flex and Renewables" NESO is planning for an additional 1.9 GW of onshore wind per year between 2025 and 2030 inclusive. While Figure 11 shows 2028 to 2030 exceeding this limit, the aggregate from Scenario 2 is 10.4 GW for 2025 to 2030 which compares favourably with the 11.7 GW suggested by NESO – noting that 11.7 GW is a UK figure and not just Scotland.

It is helpful to note that such a high-level comparison does not accommodate more detailed regional limits which may further impact on the ability to accommodate new capacity. It also highlights that the more ambitious timeline of Scenario 3 is likely to be limited by grid capacity.

6.6. Areas of interest

In this section, three areas of interest, and their potential impact on the pipeline, are analysed. These areas are:

- Eskdalemuir: Projects within a 50 km radius of the Eskdalemuir Seismic Array. [xiii]
- The proposed Galloway National Park: Projects within the boundary of the proposed national park.[xiv]
- The Flow Country World Heritage Site: projects within the boundary of the Flow Country World Heritage Site.[xv]

These areas are of interest due to concern that projects in the pipeline may be impacted by plans for, or ongoing issues within the area.

[xii] Clean Power 2030 | National Energy System Operator

[xiii] https://www.scottishrenewables.com/membership/policyupdates/policy-making-process/onshore-wind/eskdalemuir-working-group

[xiv] https://www.gallowaynationalpark.org/park-boundaries

[xv] https://theflowcountry.org.uk/world-heritage/about/

6.6.1 Eskdalemuir

The Eskdalemuir Seismic Array is a seismological monitoring station in the Scottish Borders which forms part of the UK's obligations under the Comprehensive Test Ban Treaty. The array's operation can be compromised by excessive seismic noise in the vicinity – this includes vibrations produced by wind turbines.

The current concern in this area is that an ongoing issue around management of the seismic budget, required to protect the Eskdalemuir Seismic Array, is holding up projects in the pipeline. A lack of resolution of this issue could lead to no further wind farm development within a 50 km radius of the Eskdalemuir Seismic Array.

Table 7 provides an overview of the projects in the pipeline within a 50 km radius of the Eskdalemuir Seismic Array as they currently stand.

Table 7 Eskdalemuir projects.

Project Stage	Capacity (MW)
Development	1,017
In planning	2,062
Consented	264
Under construction	107
Operational	1,095

Considering all projects pre-construction, 3.3 GW of projects in the Eskdalemuir area are at risk.

Assuming the worst case that all projects in this area that have yet to enter construction will not proceed, Table 8 shows the impact on operational capacity in 2030 under each of the pipeline scenarios.

Table 8 Impact on 2030 operational capacity of no development within a 50 km radius of Eskdalemuir.[xvi]

Scenario	Reduction in 2030 operational capacity (MW)
Scenario 1	1,094
Scenario 2	1,103
Scenario 3	1,898

6.6.2 Proposed Galloway National Park

In July 2024 the proposed Galloway National Park was chosen as the preferred site for Scotland's next national park. The concern for this area is that national park status may prevent future wind farm development in the area.

Table 9 provides an overview of the projects in the pipeline within the proposed Galloway National Park area as they currently stand.

Table 9 Proposed Galloway National Park projects.

Project Stage	Capacity (MW)
Development	753
In planning	167
Consented	403
Under construction	169
Operational	680

[xvi] All capacities in Table 8, Table 10 and Table 12 are subject to model drop-out parameters and attrition rates.

Considering all projects pre-construction, 1.3 GW of projects in the proposed Galloway National Park area are at risk.

Assuming the worst case that all projects in this area that have yet to enter construction will not proceed, Table 10 shows the impact on operational capacity in 2030 under each of the pipeline scenarios.

Table 10 Impact on 2030 operational capacity of no development within the proposed Galloway National Park area.

Scenario	Reduction in 2030 operational capacity (MW)
Scenario 1	380
Scenario 2	402
Scenario 3	584

6.6.3 Flow Country World Heritage Site

The Flow Country World Heritage Site is one of the largest and most intact areas of blanket blog in the world. It covers parts of Caithness and Sutherland and was awarded World Heritage Site status in July 2024. The concern for the area is that this status may prevent future wind farm development in the area.

Table 11 provides an overview of the projects in the pipeline within the Flow Country World Heritage Site area as they currently stand.

Table 11 Flow Country World Heritage Site projects.

Project Stage	Capacity (MW)
Development	325
In planning	333
Consented	406
Under construction	143
Operational	160

Considering all projects pre-construction, 1.1 GW of projects in the Flow Country World Heritage Site area are at risk.

Assuming the worst case that all projects in this area that have yet to enter construction will not proceed, Table 12 shows the impact on operational capacity in 2030 under each of the pipeline scenarios.

Table 12 Impact on 2030 operational capacity of no development within the Flow Country World Heritage Site.

Scenario	Reduction in 2030 operational capacity (MW)
Scenario 1	63
Scenario 2	393
Scenario 3	486

Of the three areas, Eskdalemuir has the largest potential impact, with 1.1 GW of operational capacity potentially being lost, resulting in Scenario 2 reaching a 2030 capacity of 18.7 GW.

The combined loss of potential operational capacity across all three areas is a major concern. If the worst case was realised, the 2030 operational capacity in Scenario 2 would be reduced to 17.9 GW.

7. Summary

The pipeline model enables us to look ahead to 2030 and beyond, examining the sensitivities of the future pipeline to a number of key parameters.

The first six monthly update of the pipeline further developed the analysis and refined the conclusions. This, the second six monthly update, included re-engaging with the developers that assisted the original work as well as reaching out to others not previously contacted. Combining the efforts of both engagements, our developer feedback covers approximately 60% of the available pipeline capacity. This feedback has enabled us to both adjust likely project timelines, including the important aspect of bringing repowering options forward in time, and to introduce to the pipeline potential projects that are not yet in the public domain.

In this update we are seeing the effect of project delays – these have led to a reduction of 1.1 GW of operational capacity in 2030 in Scenario 2 when compared with the April 2024 update.

It continues to be the case that new projects which are not yet in the public domain (and therefore recorded in rUK's EPDB) will be crucial in reaching 20 GW by 2030. With no new projects included (Scenario 1) we predict 15.7 GW operational onshore wind by 2030.

Scenario 3 shows that if timelines can be accelerated in line with sector deal commitments then 24.9 GW is potentially achievable by 2030 (an increase of 0.3 GW compared to the April 2024 update).

Deeper analysis shows that the ability to deliver 20 GW by 2030 is likely to be limited by current resource constraints. Our analysis predicts that:

- The number of current consent decisions in the ECU will at least need to double for at least three of the next five years.
- The current maximum number of abnormal loads which can be achieved annually must increase from 2025 in Scenario 3 and from 2026 in Scenario 2 onwards. The number of loads will peak at:
  - Almost three times the current maximum capacity of Police Scotland (in 2029) under Scenario 2, and
  - Over four times the current maximum capacity of Police Scotland (in 2029) under Scenario 3.
- If future projects are to use the CfD framework as their route to market, allocation for onshore wind in the next three ARs (AR 7 to AR 9), compared to AR 6's actual allocation of 0.9 GW, will need to:
  - More than double to at least 2.4 GW per year on average to achieve the Scenario 2, and
  - Almost quadruple to at least 3.5 GW per year on average to achieve Scenario 3.
- We note that the capacity which will require grid connection increases significantly from 2027 in both Scenario 2 and 3. At a high level, the new capacity suggested by Scenario 2 appears to be largely aligned with Clean Power 2030 report by NESO, but the higher capacities in Scenario 3 look to exceed NESO's assumptions.

We highlight these differences between current capabilities and the estimated future requirements so that all relevant stakeholders can begin the process of preparing for and enabling systems to deal with these increases.

Newly added in this update was an analysis of three key areas of interest. Namely Eskdalemuir, the proposed Galloway National Park and the Flow Country World Heritage Site. This analysis highlights the importance of resolving ongoing issues and ensuring that wind farm development can continue in these areas. Opposition to development in these areas could result in a loss of 1.9 GW and 3 GW of operational capacity in 2030 in Scenario 2 and 3 respectively.

Detailed results

Results at national level are presented in Appendix A to Appendix C.

Appendix D provides data at LPA level for the maximum number of projects in planning, the number of abnormal loads, and community benefit generated for Scenario 2. Pipeline information at LPA level is available, however in the interest of space has not been included in this report.

Appendix A Scenario 1

In Appendix A through C, the results for Scenario 1, 2 and 3 are presented respectively. These results include:

- Expected timeline to 2033.
- Projects in planning yearly to 2033:
  - Split by planning route – ECU (=> 50 MW) or LPA (< 50 MW), and
  - Split by project stage – "new" project or repowered project.
- Minimum and maximum number of consent decisions required yearly to 2033, at ECU and LPA level.
- Number of abnormal loads yearly to 2033.
- Community benefit yearly and cumulatively to 2033.
- Target allocation for onshore wind for future CFD allocation rounds.
- Capacity requiring grid connection yearly to 2033.

To allow for easier comparison of results between scenarios we have kept the y-axes consistent.

Pipeline

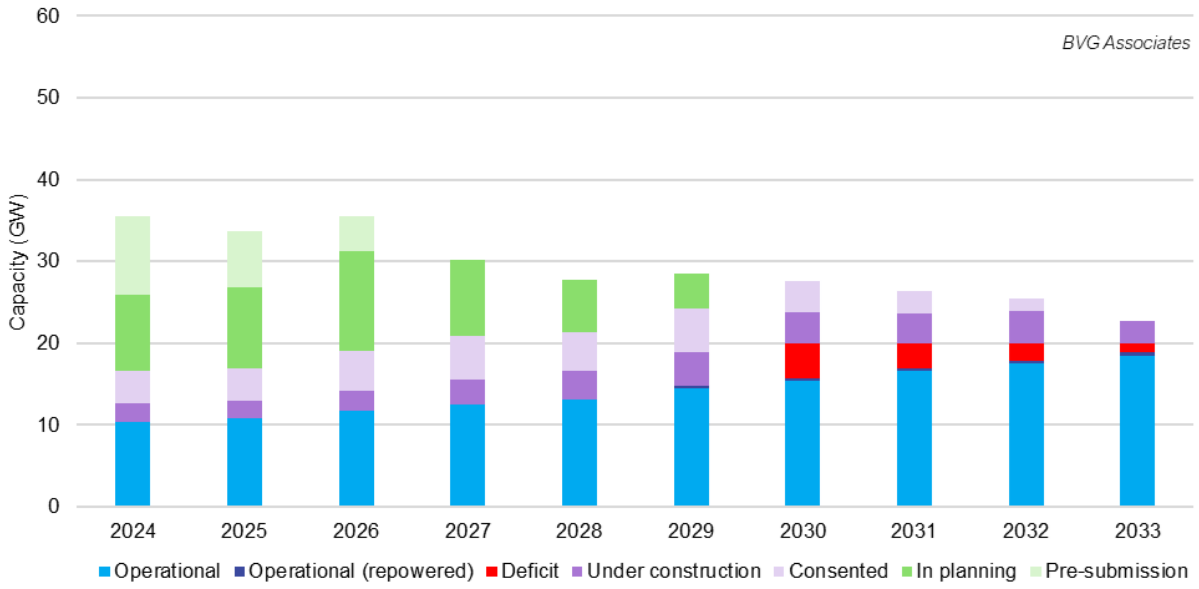

Figure 12 Expected timeline to 2033 for Scenario 1.

KPIs

Projects in planning

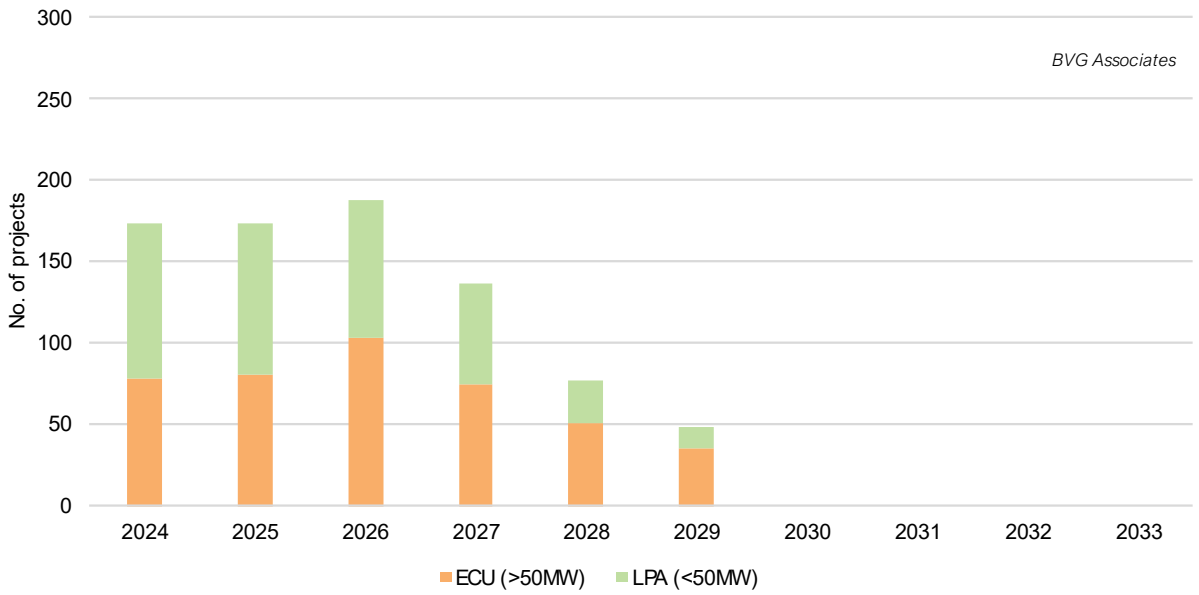

Figure 13 Number of projects in planning by planning route to 2033 for Scenario 1.

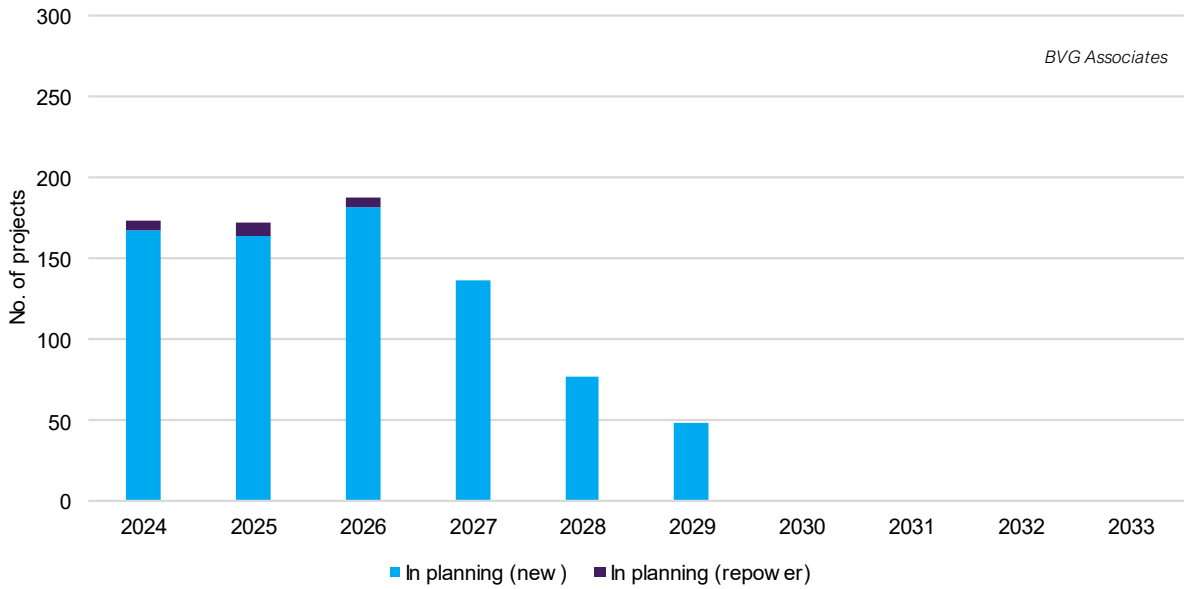

Figure 14 Number of projects in planning by project type to 2033 for Scenario 1.

Consent decisions

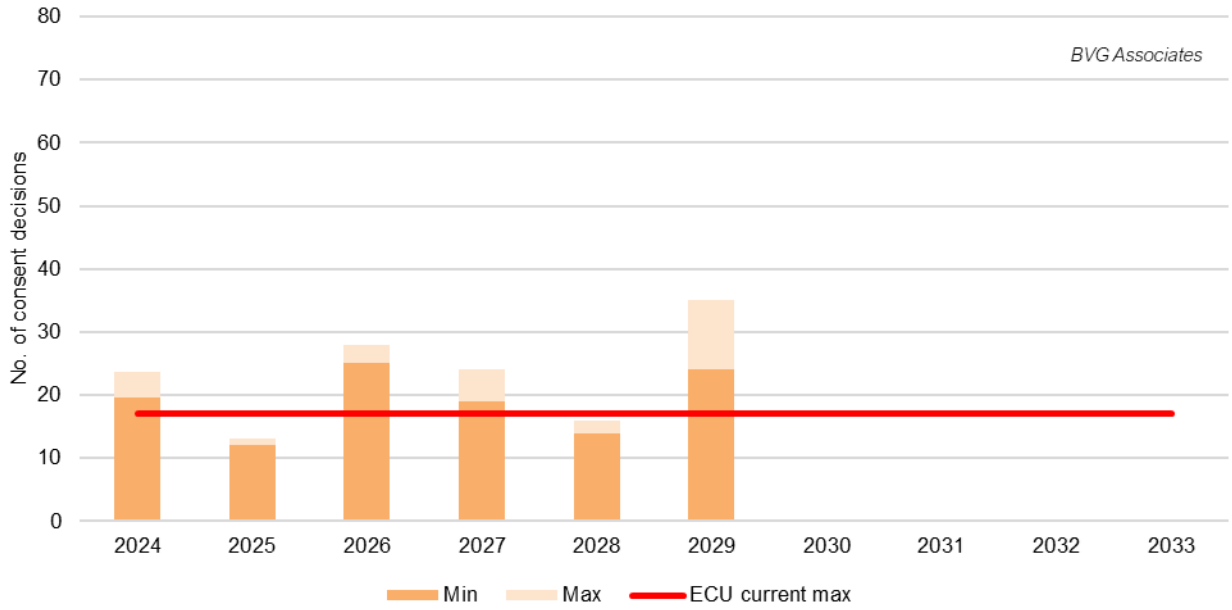

Figure 15 Minimum and maximum number of consent decisions required at ECU level for Scenario 1.

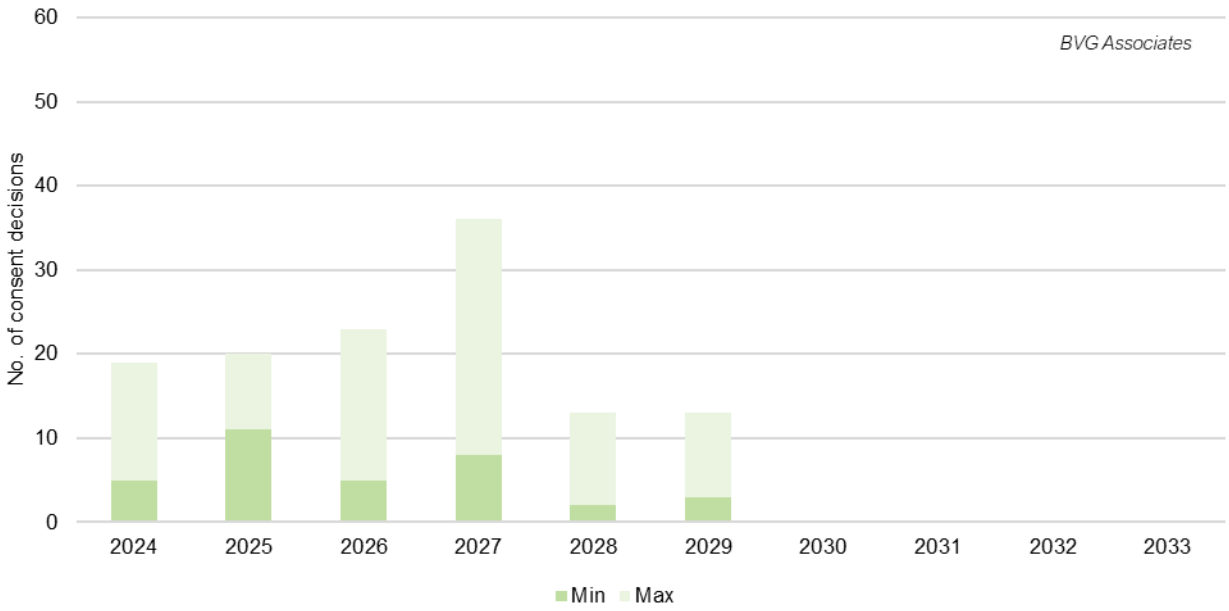

Figure 16 Minimum and maximum number of consent decisions required at LPA level for Scenario 1.

Abnormal loads

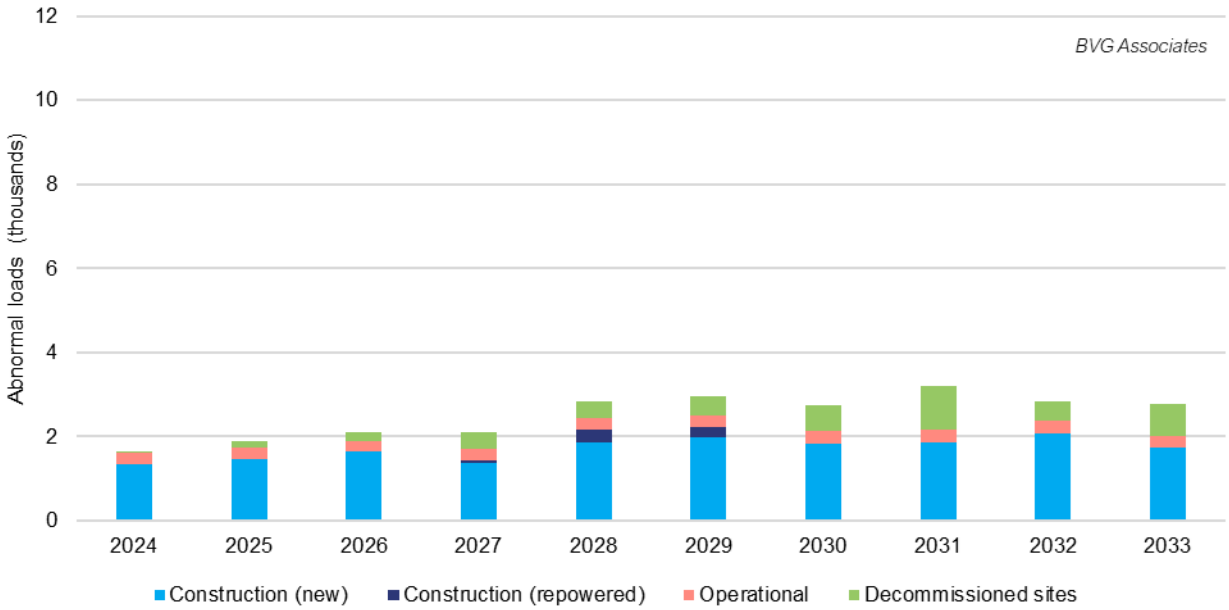

Figure 17 Number of abnormal loads required by project stage for Scenario 1.

Community benefit

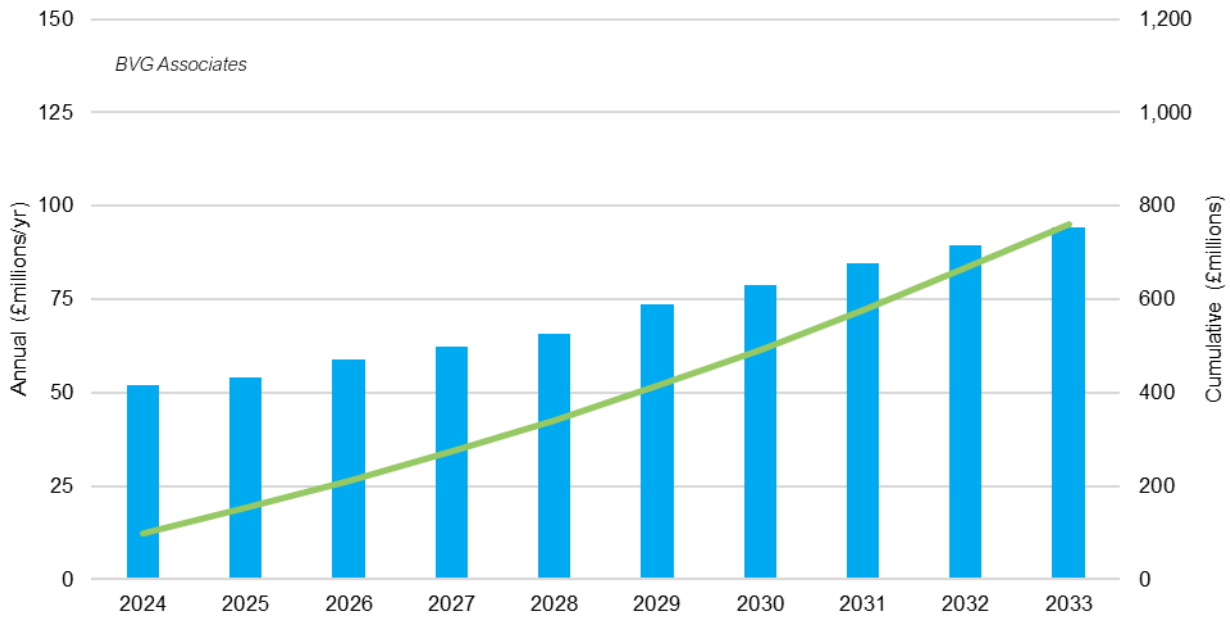

Figure 18 Community benefit achieved yearly and cumulatively for Scenario 1.

CfD allocation required

Table 13 Capacity eligible for and target capacity required for future CfD rounds for Scenario 1.

CfD Allocation round	CfD year	Eligible (GW)	Target allocation (GW)
6	2024	2.6	0.8
7	2025	3.6	0.7
8	2026	3.6	1.7
9	2027	4.2	1.1
10	2028	3.3	1.4
11	2029	4.0	1.2
12	2030	3.7	1.1

Grid connection

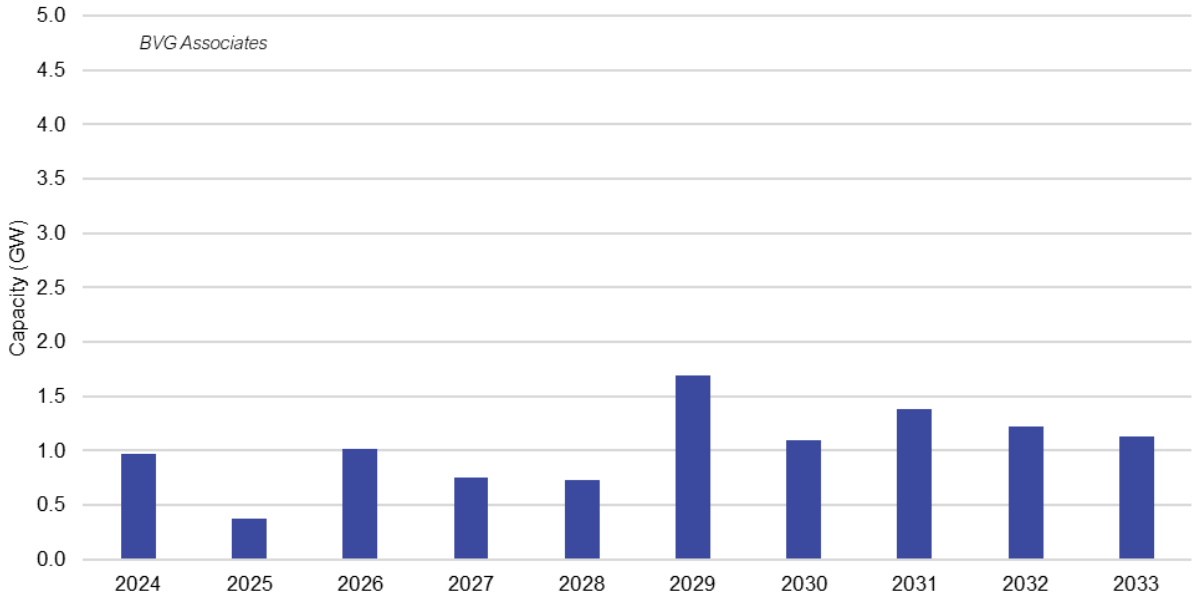

Figure 19 Capacity requiring grid connection per year for Scenario 1.

Appendix B Scenario 2

Pipeline

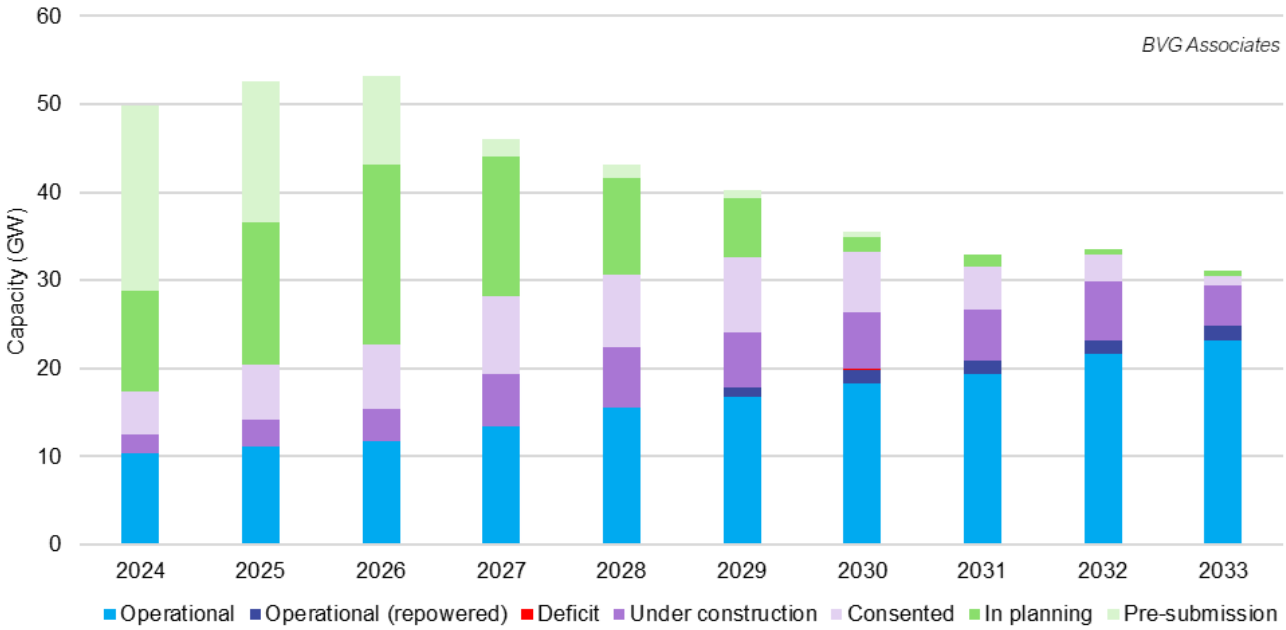

Figure 20 Expected timeline to 2033 for Scenario 2.

KPIs

Projects in planning

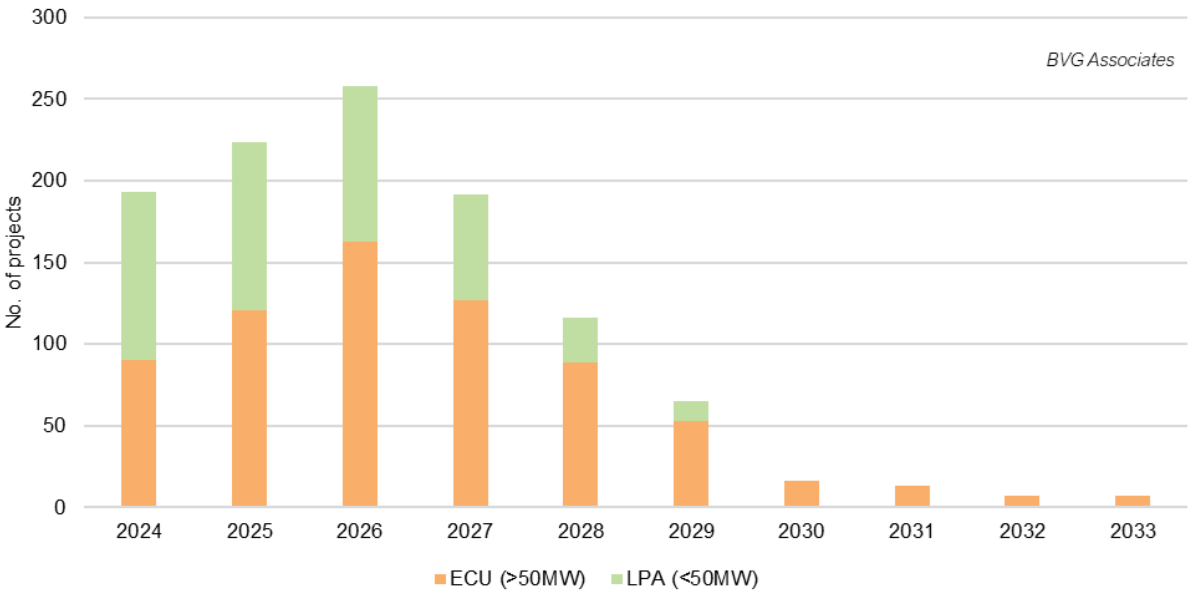

Figure 21 Number of projects in planning by planning route to 2033 for Scenario 2.

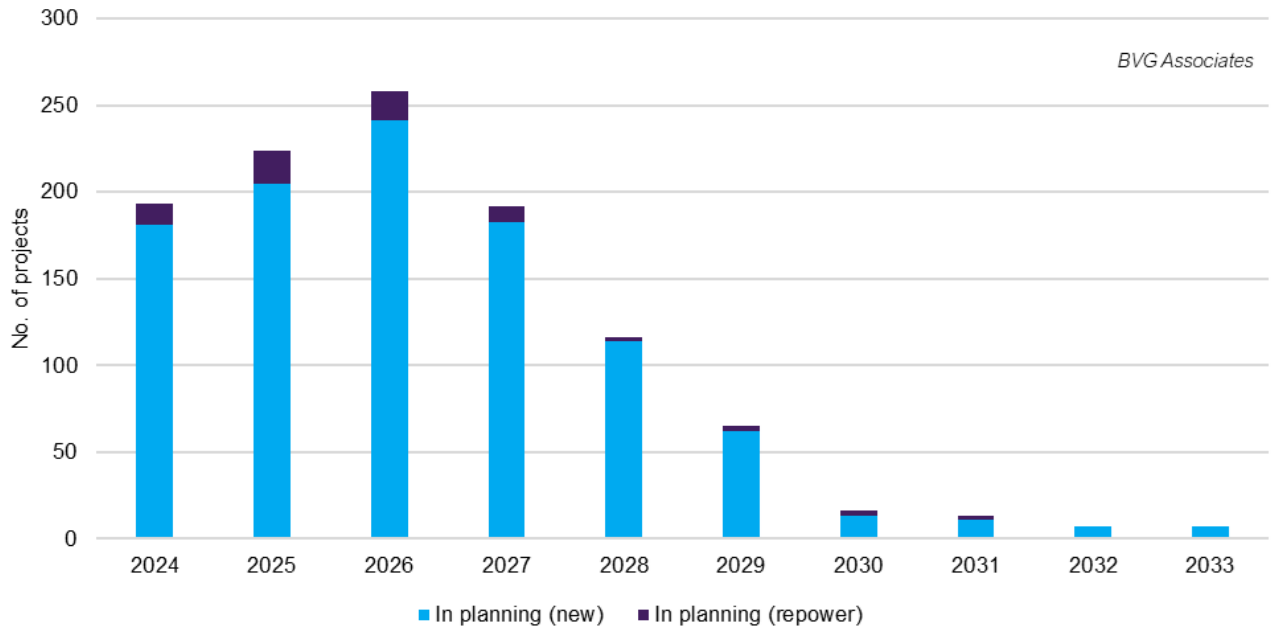

Figure 22 Number of projects in planning by project type to 2033 for Scenario 2.

Consent decisions

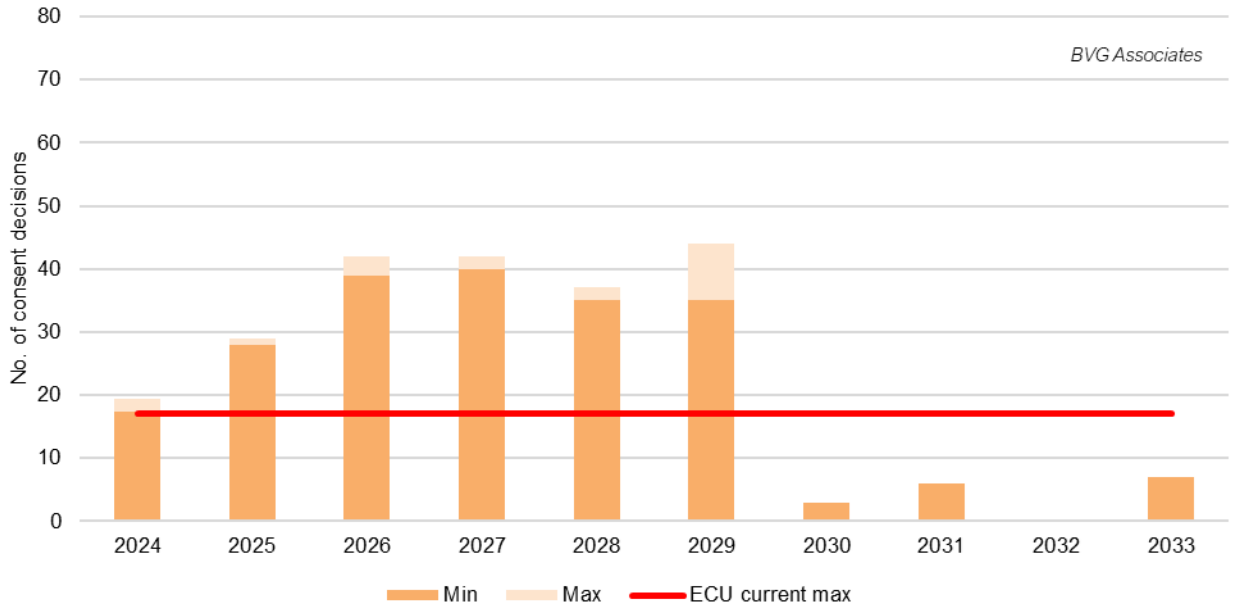

Figure 23 Minimum and maximum number of consent decisions required at ECU level for Scenario 2.

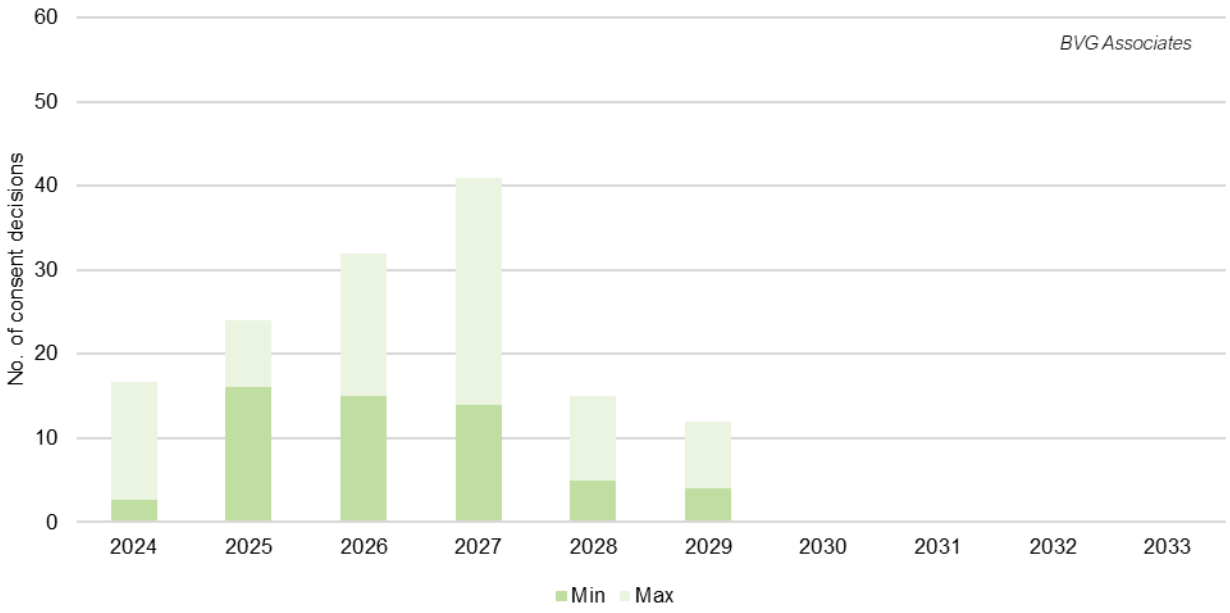

Figure 24 Minimum and maximum number of consent decisions required at ECU level for Scenario 2.

Abnormal loads

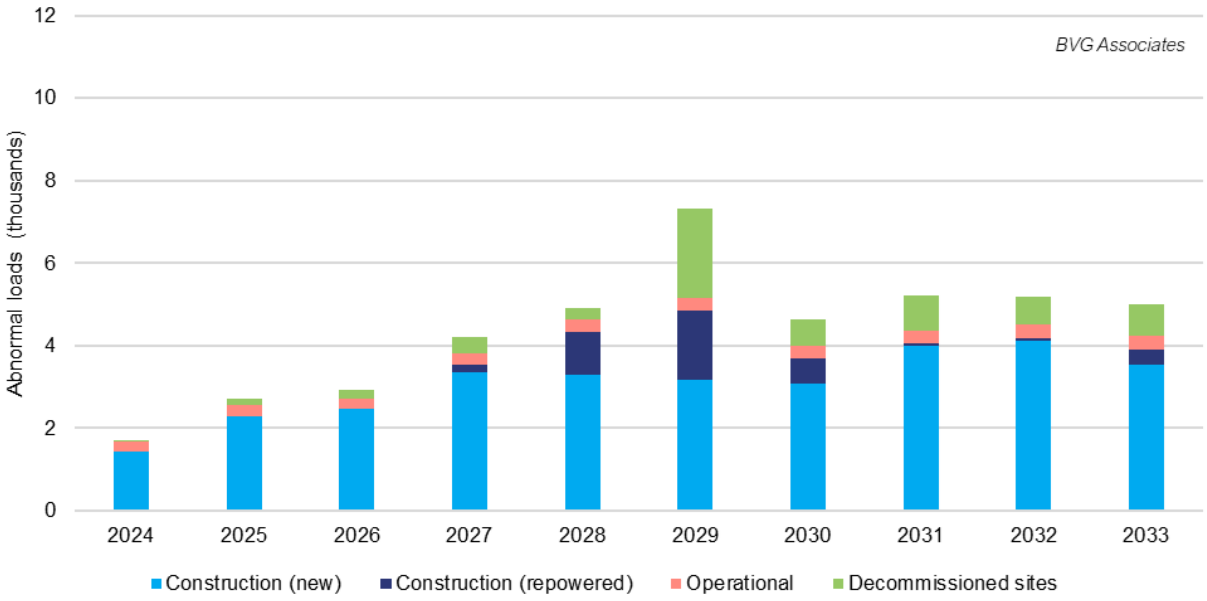

Figure 25 Number of abnormal loads required by project stage for Scenario 2.

Community benefit

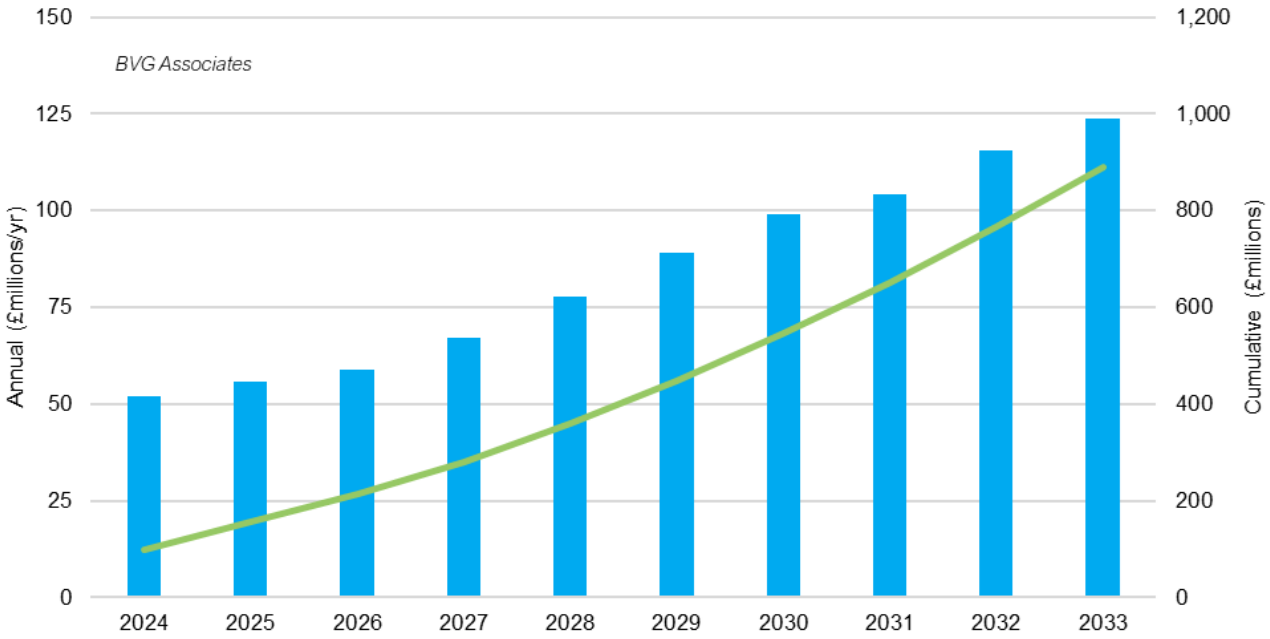

Figure 26 Community benefit achieved yearly and cumulatively for Scenario 2.

CfD allocation

Table 14 Capacity eligible for and target capacity required for future CfD rounds for Scenario 2.

CfD Allocation round	CfD year	Eligible (GW)	Target allocation (GW)
6	2024	4.6	1.7
7	2025	6.3	2.2
8	2026	7.0	2.3
9	2027	6.8	2.8
10	2028	6.4	1.2
11	2029	5.8	2.5
12	2030	6.3	1.8

Grid connections

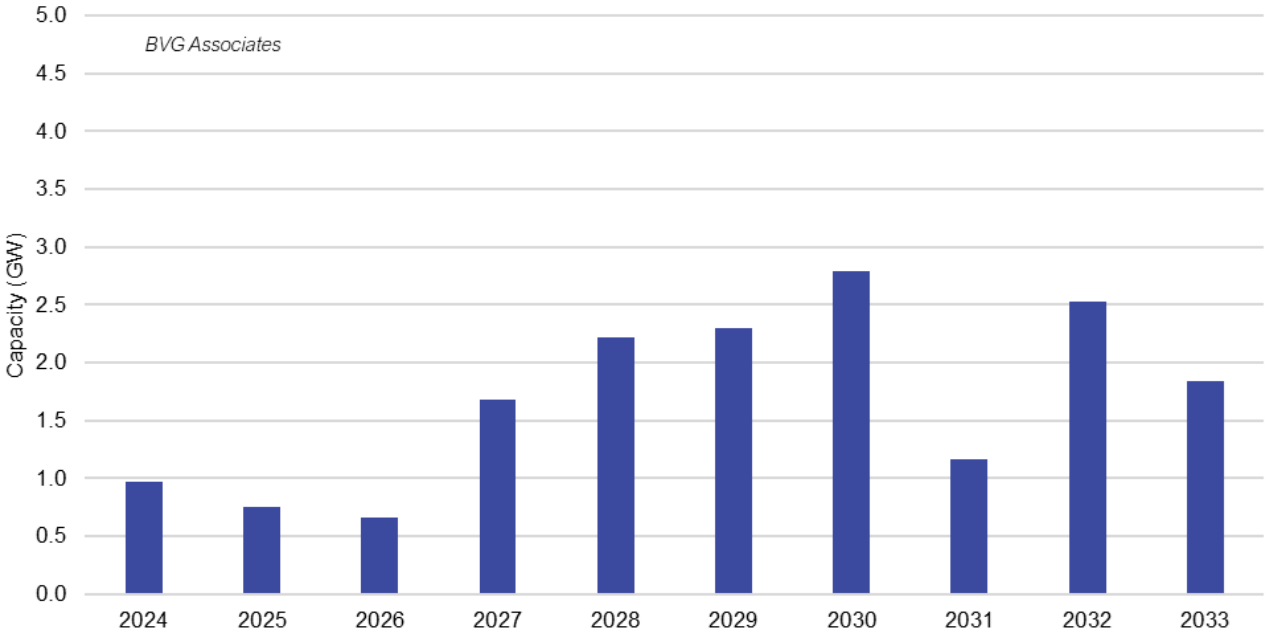

Figure 27 Capacity requiring grid connection per year for Scenario 2.

Appendix C Scenario 3

Pipeline

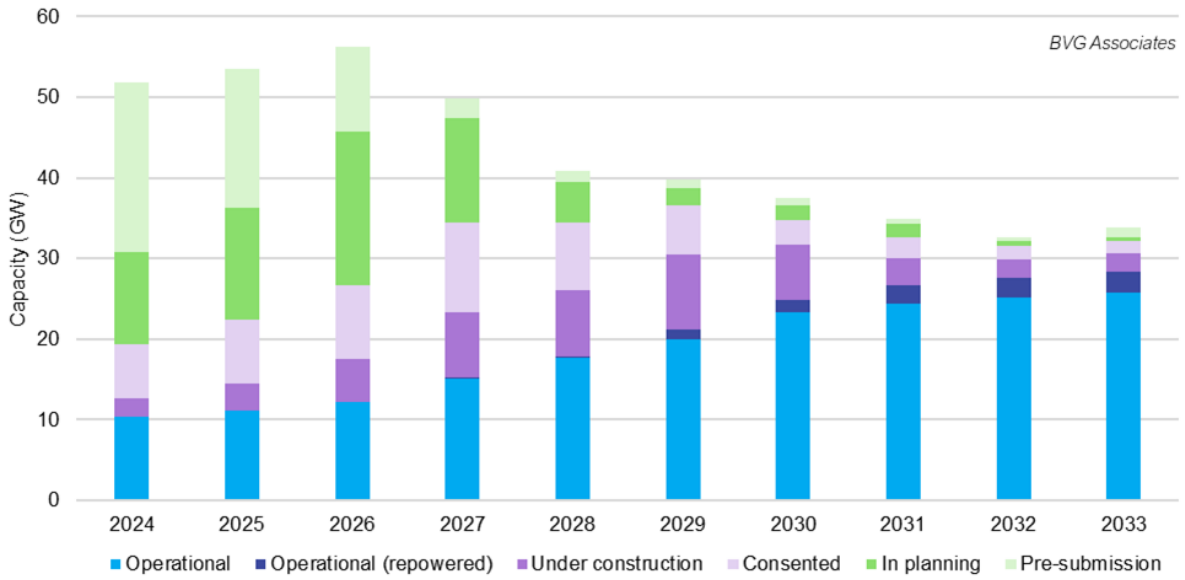

Figure 28 Expected timeline to 2033 for Scenario 3.

KPIs

Projects in planning

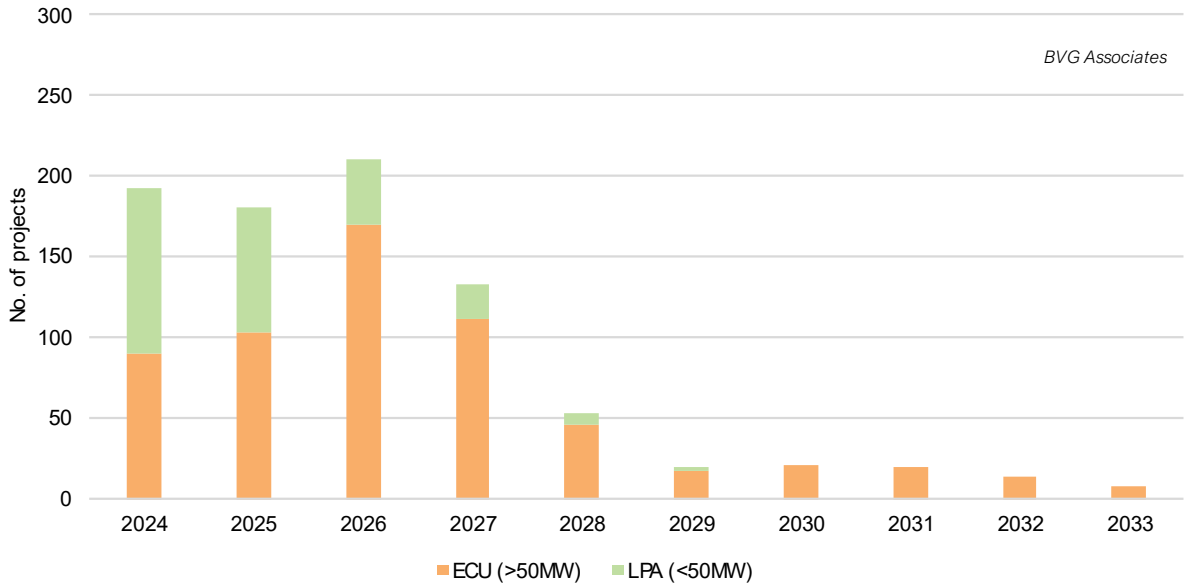

Figure 29 Number of projects in planning by planning route to 2033 for Scenario 3.

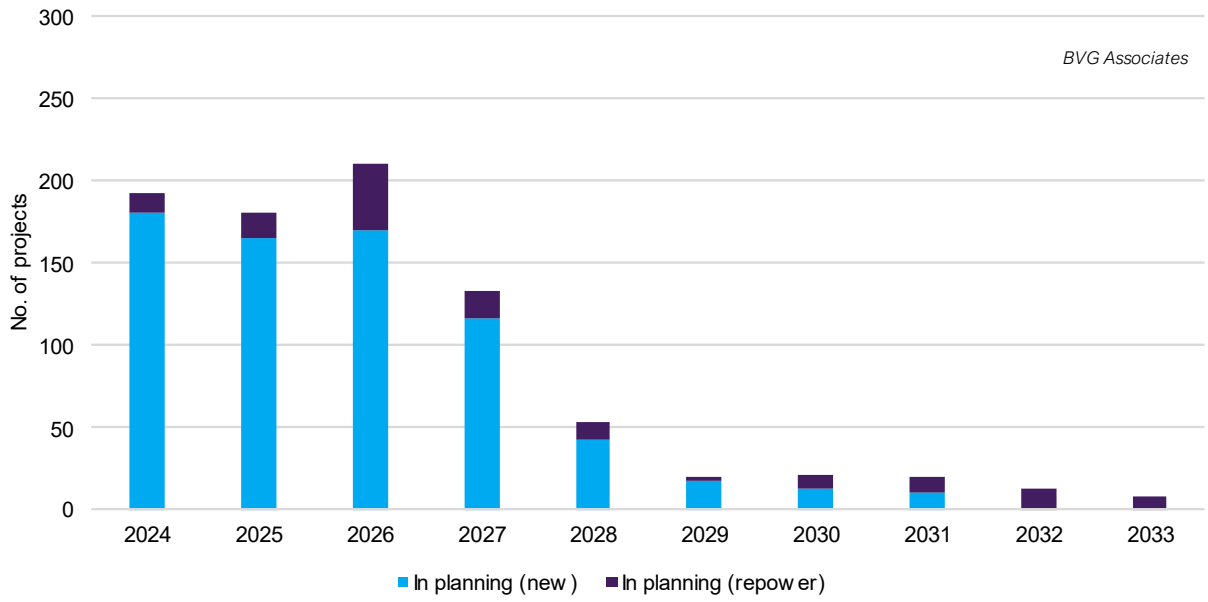

Figure 30 Number of projects in planning by project type to 2033 for Scenario 3.

Consent decisions

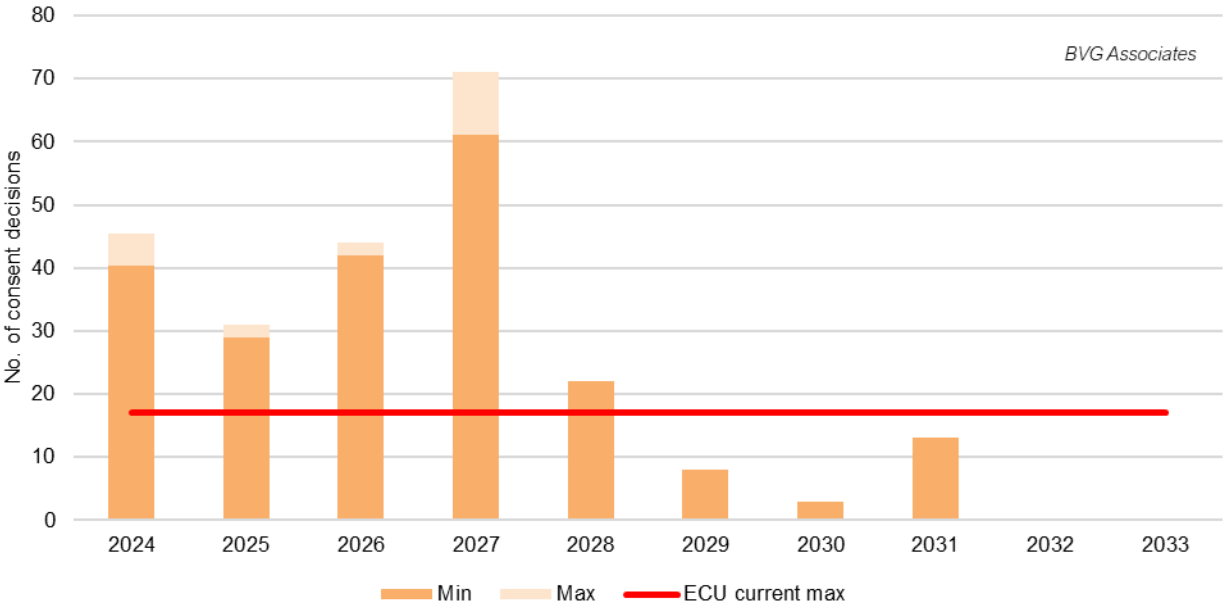

Figure 31 Minimum and maximum number of consent decisions required at ECU level for Scenario 3.

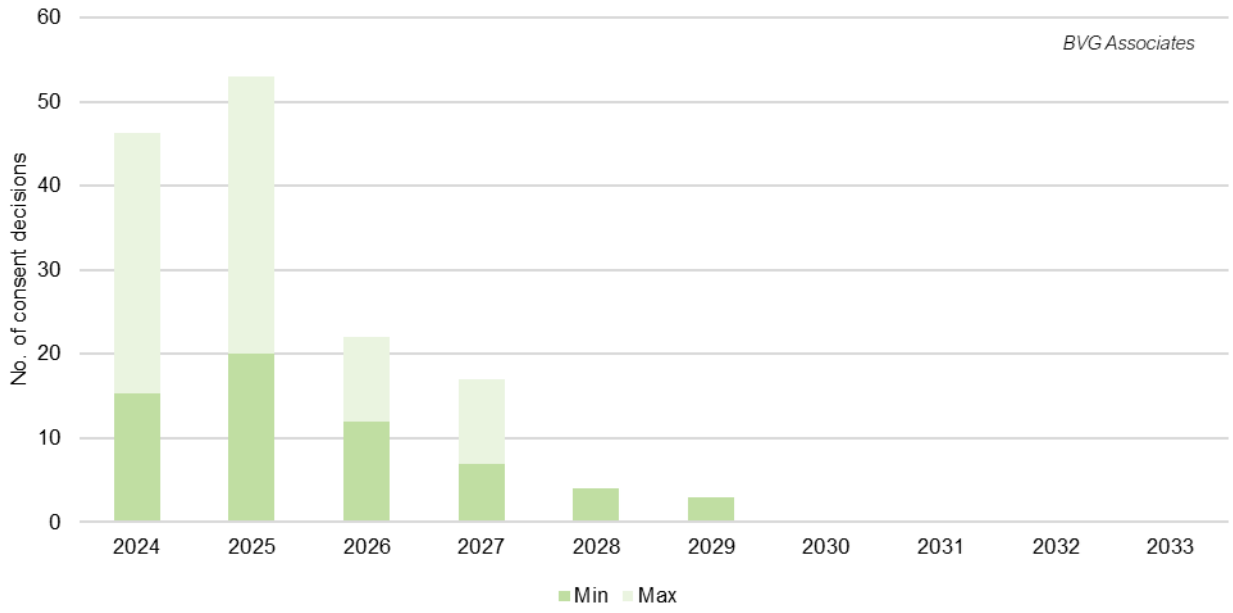

Figure 32 Minimum and maximum number of consent decisions required at LPA level for Scenario 3.

Abnormal loads

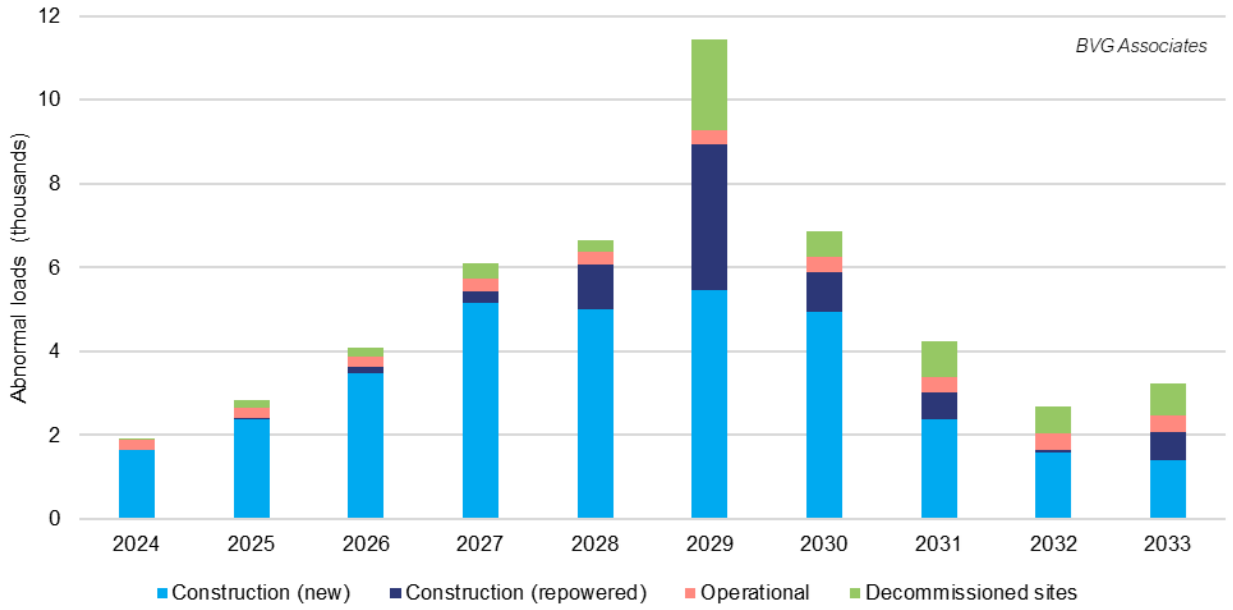

Figure 33 Number of abnormal loads required by project stage for Scenario 3.

Community benefit

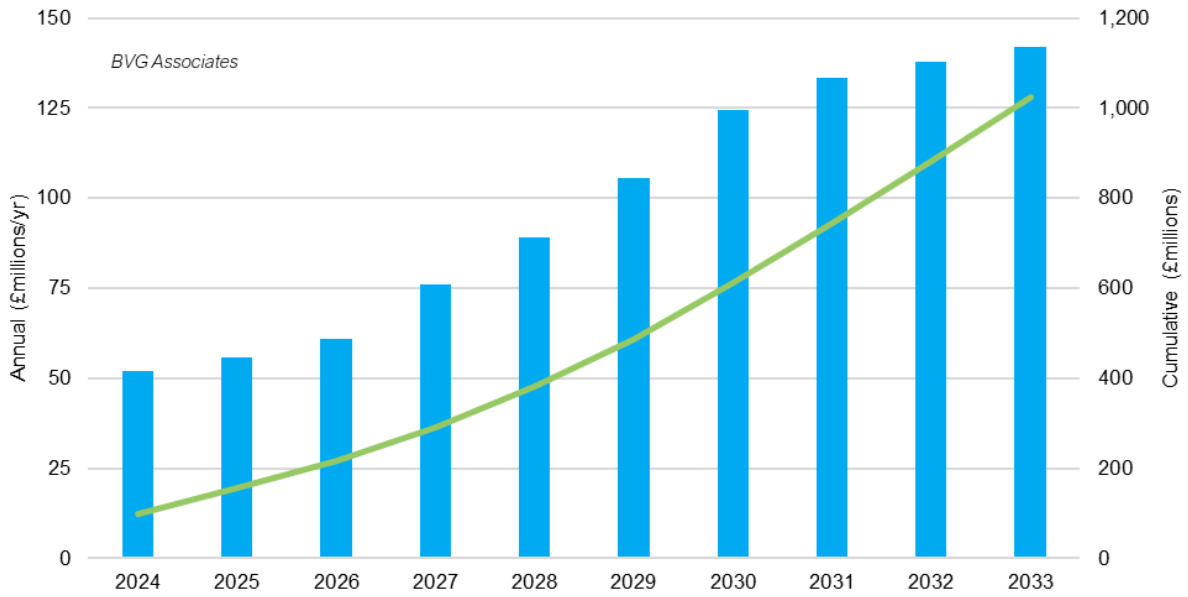

Figure 34 Community benefit achieved yearly and cumulatively for Scenario 3.

CfD allocation

Table 15 Capacity eligible for and target capacity required for future CfD rounds for Scenario 3.

CfD Allocation round	CfD year	Eligible (GW)	Target allocation (GW)
6	2024	7.3	3.1
7	2025	9.5	2.7
8	2026	10.1	3.4
9	2027	8.8	4.6
10	2028	6.2	1.2
11	2029	3.0	1.0
12	2030	2.6	0.8

Grid connection

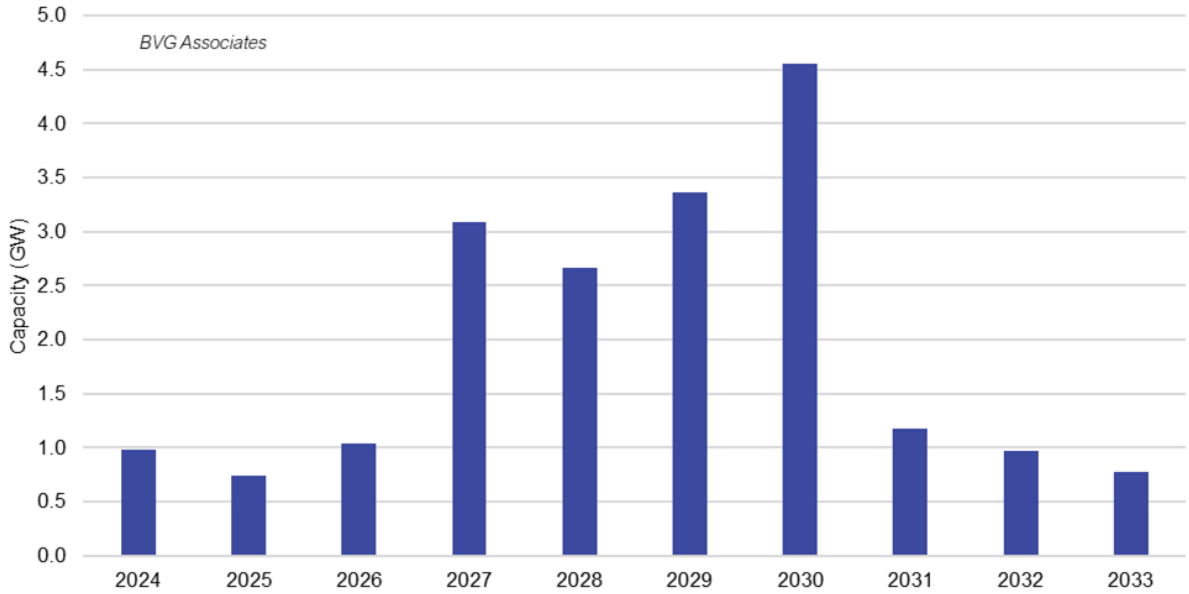

Figure 35 Capacity requiring grid connection per year for Scenario 3.

Appendix D Local authority data

Scenario 2

Table 16 Projects in planning (ECU) for Scenario 2.

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Aberdeen City Council	0	0	0	0	0	0	0	0	0	0	0
Aberdeenshire Council	3	2	4	2	1	0	0	0	0	0	12
Angus Council	0	0	0	0	0	0	0	0	0	0	0
Argyll and Bute Council	11	20	24	19	11	6	2	1	0	0	94
City of Edinburgh	0	0	0	0	0	0	0	0	0	0	0
Clackmannanshire Council	0	0	0	0	0	0	0	0	0	0	0
Dumfries & Galloway Council	13	16	25	17	15	6	1	1	0	0	94
Dundee City Council	0	0	0	0	0	0	0	0	0	0	0
East Ayrshire Council	8	7	5	1	1	1	0	0	0	0	23
East Dunbartonshire Council	0	0	0	0	0	0	0	0	0	0	0
East Lothian Council	1	1	0	0	0	0	0	0	0	0	2
East Renfrewshire Council	0	0	0	0	0	0	0	0	0	0	0
Falkirk Council	0	0	0	0	0	0	0	0	0	0	0
Fife Council	0	0	0	0	0	0	0	0	0	0	0
Glasgow City Council	0	0	0	0	0	0	0	0	0	0	0
Highland Council	25	37	50	38	28	17	1	0	0	0	196
Inverclyde Council	0	0	0	0	0	0	0	0	0	0	0
Midlothian Council	1	1	1	0	0	0	0	0	0	0	3
Moray Council	4	4	7	7	3	3	0	0	0	0	28
Western Isles Council / Comhairle nan Eilan Siar	0	0	2	2	2	2	2	2	0	0	12
North Ayrshire Council	0	1	2	2	2	1	0	0	0	0	8
North Lanarkshire Council	0	1	1	1	0	0	0	0	0	0	3
Orkney Islands Council	0	0	0	0	0	0	0	0	0	0	0
Perth & Kinross Council	2	3	4	4	3	3	2	1	0	0	22
Renfrewshire Council	0	0	0	0	0	0	0	0	0	0	0
Scottish Borders Council	9	15	18	14	8	1	0	0	0	0	65
Shetland Islands Council	0	0	0	0	0	0	0	0	0	0	0
South Ayrshire Council	5	4	1	1	1	1	1	1	0	0	15
South Lanarkshire Council	3	4	3	3	1	1	0	0	0	0	15
Stirling Council	1	1	1	0	0	0	0	0	0	0	3
West Dunbartonshire Council	1	1	1	0	0	0	0	0	0	0	3
West Lothian Council	0	0	0	0	0	0	0	0	0	0	0
Unknown	3	3	14	16	13	11	7	7	7	7	88
Total	90	121	163	127	89	53	16	13	7	7	

Table 17 Projects in planning (LPA) for Scenario 2.

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Aberdeen City Council	1	1	1	1	0	0	0	0	0	0	4
Aberdeenshire Council	18	16	17	7	1	1	0	0	0	0	60
Angus Council	1	0	0	0	0	0	0	0	0	0	1
Argyll and Bute Council	2	2	1	1	0	0	0	0	0	0	6
City of Edinburgh	0	0	0	0	0	0	0	0	0	0	0
Clackmannanshire Council	0	0	1	1	1	1	0	0	0	0	4
Dumfries & Galloway Council	10	9	7	3	2	0	0	0	0	0	31
Dundee City Council	0	0	0	0	0	0	0	0	0	0	0
East Ayrshire Council	5	7	6	4	1	1	0	0	0	0	24
East Dunbartonshire Council	0	0	0	0	0	0	0	0	0	0	0
East Lothian Council	0	0	0	0	0	0	0	0	0	0	0
East Renfrewshire Council	2	1	1	1	0	0	0	0	0	0	5
Falkirk Council	0	0	0	0	0	0	0	0	0	0	0
Fife Council	0	1	1	1	1	0	0	0	0	0	4
Glasgow City Council	0	0	0	0	0	0	0	0	0	0	0
Highland Council	14	13	14	11	6	3	0	0	0	0	61
Inverclyde Council	0	0	0	0	0	0	0	0	0	0	0
Midlothian Council	0	0	0	0	0	0	0	0	0	0	0
Moray Council	1	1	2	1	1	1	0	0	0	0	7
Western Isles Council / Comhairle nan Eilan Siar	1	1	1	1	0	0	0	0	0	0	4
North Ayrshire Council	1	1	3	2	2	2	0	0	0	0	11
North Lanarkshire Council	4	5	5	3	2	0	0	0	0	0	19
Orkney Islands Council	4	5	4	3	1	0	0	0	0	0	17
Perth & Kinross Council	4	5	5	4	1	0	0	0	0	0	19
Renfrewshire Council	0	0	0	0	0	0	0	0	0	0	0
Scottish Borders Council	5	5	4	3	1	0	0	0	0	0	18
Shetland Islands Council	3	3	2	1	0	0	0	0	0	0	9
South Ayrshire Council	3	3	2	2	1	0	0	0	0	0	11
South Lanarkshire Council	19	20	12	8	1	0	0	0	0	0	60
Stirling Council	1	1	1	1	0	0	0	0	0	0	4
West Dunbartonshire Council	0	0	0	0	0	0	0	0	0	0	0
West Lothian Council	4	3	2	1	0	0	0	0	0	0	10
Unknown	0	0	3	5	5	3	0	0	0	0	16
Total	103	103	95	65	27	12	0	0	0	0	

Table 18 Abnormal load movements for Scenario 2.

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Aberdeen City Council	0	0	0	0	0	0	0	0	0	0	3
Aberdeenshire Council	32	99	92	321	164	234	140	64	60	98	1,304
Angus Council	2	2	2	2	2	2	2	2	2	2	21
Argyll and Bute Council	22	22	183	499	801	811	268	332	741	570	4,249
City of Edinburgh	0	0	0	0	0	0	0	0	0	0	0
Clackmannanshire Council	1	1	1	1	1	1	1	1	1	1	12
Dumfries & Galloway Council	229	481	631	1,006	678	571	726	611	392	264	5,589
Dundee City Council	0	0	0	0	0	0	0	12	0	0	13
East Ayrshire Council	396	389	276	510	1,110	2,159	100	59	55	45	5,098
East Dunbartonshire Council	0	0	0	0	0	0	0	0	0	0	0
East Lothian Council	3	3	3	38	46	28	4	4	100	3	233
East Renfrewshire Council	1	1	13	1	1	1	1	1	1	1	23
Falkirk Council	11	11	2	2	2	2	2	2	2	2	35
Fife Council	4	4	4	4	4	4	4	4	4	4	39
Glasgow City Council	0	0	0	0	0	0	0	0	0	0	1
Highland Council	212	622	827	937	1,073	1,142	1,200	1,338	845	939	9,134
Inverclyde Council	1	1	1	1	1	1	1	1	1	1	9
Midlothian Council	0	0	0	9	34	34	32	1	1	1	114
Moray Council	10	121	356	425	145	132	318	337	90	77	2,010
Western Isles Council / Comhairle nan Eilan Siar	2	2	2	2	118	118	100	21	76	58	497
North Ayrshire Council	8	3	3	3	39	5	9	21	122	117	329
North Lanarkshire Council	7	3	3	8	13	341	309	8	18	12	719
Orkney Islands Council	8	8	2	8	12	68	19	25	34	1	184
Perth & Kinross Council	79	48	9	9	9	59	233	128	74	176	824
Renfrewshire Council	0	0	0	0	0	0	0	0	0	0	0
Scottish Borders Council	179	230	186	89	221	755	517	739	1,140	667	4,723
Shetland Islands Council	213	24	22	37	19	55	123	123	76	8	698
South Ayrshire Council	49	129	55	145	195	135	14	369	89	656	1,836
South Lanarkshire Council	209	448	226	143	189	473	212	113	71	156	2,239
Stirling Council	4	50	8	4	4	34	42	19	227	3	394
West Dunbartonshire Council	0	0	0	0	28	30	3	0	0	0	61
West Lothian Council	4	19	19	4	10	27	25	8	4	4	123
Unknown	0	0	0	0	8	100	229	872	964	1,144	3,316
Total	1,685	2,720	2,926	4,206	4,924	7,323	4,633	5,214	5,189	5,009	

Table 19 Community benefit (£M) for Scenario 2.

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Aberdeen City Council	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Aberdeenshire Council	2.6	2.6	3.0	3.0	3.9	4.1	4.6	4.6	4.6	4.7	37.4
Angus Council	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.9
Argyll and Bute Council	2.1	2.1	2.1	2.0	3.2	5.8	6.6	7.1	7.6	9.0	47.7
City of Edinburgh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Clackmannanshire Council	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.5
Dumfries & Galloway Council	6.0	6.7	7.2	9.6	12.3	13.9	15.2	16.7	17.6	18.2	123.5
Dundee City Council	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
East Ayrshire Council	4.5	5.6	6.0	7.0	8.2	11.8	9.4	9.6	9.7	9.7	81.4
East Dunbartonshire Council	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East Lothian Council	0.7	0.7	0.7	0.7	0.7	1.1	1.1	1.1	1.1	0.8	8.8
East Renfrewshire Council	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.8
Falkirk Council	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.4
Fife Council	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.5
Glasgow City Council	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Highland Council	10.8	11.0	12.2	15.1	18.2	19.6	22.9	25.1	28.3	29.1	192.3
Inverclyde Council	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.3
Midlothian Council	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	1.3
Moray Council	2.5	2.5	2.5	4.1	4.9	5.2	5.6	5.5	6.0	6.0	44.7
Western Isles Council / Comhairle nan Eilan Siar	0.2	0.2	0.2	0.2	0.2	0.2	1.2	1.2	1.2	1.2	6.2
North Ayrshire Council	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.9	6.4
North Lanarkshire Council	0.6	0.6	0.6	0.6	0.6	0.6	1.9	1.9	1.9	1.9	11.3
Orkney Islands Council	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	2.3
Perth & Kinross Council	1.5	1.7	1.7	1.7	1.7	1.7	1.9	1.7	2.5	2.5	18.7
Renfrewshire Council	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scottish Borders Council	4.3	4.5	4.4	4.3	4.7	4.9	6.5	6.9	8.4	12.9	61.7
Shetland Islands Council	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	3.4	3.4	25.3
South Ayrshire Council	2.3	2.6	2.6	2.6	3.1	4.1	4.1	4.1	3.6	3.9	32.9
South Lanarkshire Council	7.7	8.6	9.1	9.8	9.8	9.8	10.9	10.8	11.2	11.2	98.8
Stirling Council	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.1	1.2	0.9	9.3
West Dunbartonshire Council	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.8
West Lothian Council	0.9	0.9	1.0	1.0	1.0	1.0	1.1	1.2	1.2	1.2	10.4
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	3.3	4.2	8.3
Total	52.0	55.8	58.9	67.0	77.9	89.0	99.1	104.1	115.6	123.9	

Appendix E Timeline analysis of rUK EPDB[xvii]

In planning to COD

Operational projects over 20 MW were used to determine average time spent at each project stage.

Projects over 20 MW were selected as these represent a large proportion of the capacity in the pipeline while not considering a large number of projects with small capacity which have low impact on overall capacity. This is summarised in Table 20 which considers all projects in rUK's EPDB yet to reach commercial operation.

Table 20 Representation of pipeline projects in analysing only projects with > 20 MW capacity

	All projects	Projects > 20 MW
Number of projects	524	265
Percentage of all projects	N/A	51%
Overall capacity (GW)	21.5	20.6
Percentage of overall capacity	N/A	96%

In total there are 524 projects yet to reach commercial operation with an overall capacity of 21.5 GW in rUK's EPDB.[xviii] Projects with a capacity of over 20 MW comprise 96% of this overall capacity (20.6 GW) but only 51% of the number of projects. Analysing timelines for such projects means that average timelines for future projects are representative of future capacity in the pipeline and are not underestimated due to small scale projects which have shorter timelines due to their comparable simplicity.

Operational projects were selected as these have complete timelines. In total there are 837 projects which have reached commercial operation with an overall capacity of 9.5 GW in rUKs EPDB. A total of 137 of these projects have a capacity over 20 MW and these represent 83% of overall capacity (7.9 GW).

These 137 projects were used to generate the average time spent at each project stage in Table 22. The project stages analysed are:

- In planning: time between submission for planning consent and final consent decision.[xix]
- Consented: time between final consent decision and the start of construction.
- Construction: time between start of construction and start of commercial operation.

Additionally, the number of projects analysed and their average capacity is shown for each time period in Table 21.

[xvii] This section was not updated in this update, analysis was of rUK EPDB data as of 25 March 2024.

[xviii] Projects without nameplate capacity were not considered in this analysis.

[xix] As projects analysed are all operational, all were ultimately granted consent, this time period may include appeal and/or judicial review.

Table 21 Number of projects and average capacity of operational projects of over 20 MW capacity used for timeline analysis.

	Commissioned year				
	Pre 2006	2006-2010	2011-2015	2016-2020	2021-2025
Number of projects	10	28	33	46	20
Average project capacity (MW)	41	54	65	58	57

Table 22 Average time in years at project stages by year of commissioning.

	Commissioned year				
	Pre 2006	2006-2010	2011-2015	2016-2020	2021-2025
In planning	1.3	2.3	3.3	3.4	2.7
Consented	0.8	1.1	2.5	2.6	3.8
Construction	0.9	1.4	1.8	1.8	1.6

It can be observed in Table 22 that time at each project status analysed increased over time up to 2020. The data for 2021 to 2025 suggests that time in planning and construction have reduced in comparison to the previous two 5 year periods, however, this dataset is incomplete as data is only available up to March 2024.

Using the above data we arrived at the following average times at each project status:

- In planning: 2 years, extending to 4 years for "challenged" projects, 50% of projects assumed to be "challenged" resulting in an average time in planning of 3 years.
- Consented: 3 years.
- Construction: 2 years.[xx]

Other project stages

Considering the standard project timeline in Figure 2, two project statuses are missing from the above analysis, these are:

- Pre-submission: time between inception and submission for planning consent.
- Operational: time between the start of commercial operation and the projects end of life.

Pre-submission

rUK's EPDB has limited information available for pre-submission timings. Of 1,252 projects in EPDB which have surpassed the development stage, only 249 have datapoints which allow for calculation of time at this stage. If only operational projects with capacity greater than 20 MW were considered (as in the analysis above), this reduces to only 10 projects. All projects which have surpassed the development stage were therefore considered. This resulted in the following average time:

- Pre-submission: 2 years.

[xx] This is likely a conservative estimation based on data in Table 22.

Operational

As few projects have reached end of life in Scotland, data for project lifetime is limited. Our assumption below is based on BVGA's expectation and response to developer engagement.

- Operational: 25 years.

Appendix F Model parameters fixed across all scenarios

The following user-defined parameters as per Model overview were consistent across all scenarios.

Drop-out parameters

- Projects exceeding 4 years at their current stage as per rUK's EPDB were assumed to be dormant and drop-out of the analysis.
- Projects with a maximum tip height of lower than 150 m are assumed to be unlikely to be built and therefore drop-out.
- Projects with a generator capacity of less than 3 MW are assumed to be unlikely to be built and therefore drop-out.
- A general progression rate of 60% is applied to projects yet to be granted consent, meaning that 40% of projects pre-consent decision will drop-out.

Developer parameters

- Developer timelines are included where provided as per Table 5.
- Developer advised future projects are included as per Table 5.

Model introduced project parameters

Repowering

- In Scenarios 1 and 2 no additional repower is added to the timeline.

Deficit

Where a deficit is incurred, the following is assumed:

- The average size of future turbines will be 4 MW.
- The average size of future projects will be 50 MW.

KPI parameters

- Community benefit of £5000 per MW per year will be achieved.
- The number of abnormal loads in construction is 10 per turbine and in decommissioning is 6 per turbine, with an additional 0.05 per turbine per year during operation. [xxi]
- To estimate required capacity for onshore wind in future CFD rounds, it is assumed the time between FID and operation is 3 years.

[xxi] See Section 6.3 for explanation.