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Integrating Greenhouse Gas Removals in the UK Emissions Trading Scheme: Main Response

A joint response of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland.

July 2025

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Executive Summary

Background

The primary purpose of the UK Emissions Trading Scheme (ETS) is to continue to drive cost-effective emissions reductions fully aligned with our net zero targets. In addition to emissions reductions, Greenhouse Gas Removals (GGRs) are needed to balance residual emissions from hard-to-abate sectors if we are to reach net zero. We need to significantly scale up removals deployment, at the same time as continuing with steep emissions reductions. The integration of removals into the UK ETS represents a significant opportunity to advance towards our climate goals. The UK ETS could drive both emission reductions and carbon removal in one efficient market. In the long-term the UK ETS could become a framework within which businesses make efficient decisions between further decarbonisation or removing their residual emissions using GGRs.

In July 2023 the UK ETS Authority committed to integrating engineered GGRs into the UK ETS.[1] In May 2024 the Authority published a consultation setting out proposals for how that integration could be achieved, and also whether high-quality nature-based removals could be integrated into the UK ETS.[2] We had substantial interest in the consultation, with c. 160 consultation responses from across current UK ETS sectors, GGR developers, the finance sector, voluntary carbon market sectors, non-governmental organisations, and the land-use sector. There is very broad support for GGR integration into the UK ETS, including from the Climate Change Committee, with views differing largely only on the details of how to do it.[3] This Government Response summarises stakeholder responses to the consultation and outlines the Authority's policy decisions.

The Authority recognises that integrating GGRs is likely to mean significant reform for the UK ETS. However, we have taken a cautious and phased approach, prioritising market stability in the UK ETS and ensuring it continues to fulfil its primary purpose – incentivising cost-effective emissions reductions. We therefore propose significant safeguards in all major areas of market design, including on the cap, the design of removal allowances, the supply of removal allowances that can enter the market, and on the permanence of carbon removals.

The Authority has made decisions, based on the views and evidence it has received, related to the cap, allowance design, permanence, and pathways for integration.

ETS Cap

Cap adjustment is key to maintaining environmental integrity and market stability in the UK ETS. The Authority has made the following decisions.

- The Authority will maintain the gross cap, i.e. the total number of allowances that can be created, for initial integration of removals into the UK ETS.

[1] Developing the UK Emissions Trading Scheme: main response (2023).
[2] Integrating greenhouse gas removals in the UK Emissions Trading Scheme (2024).
[3] Climate Change Committee (2025) and Climate Change Committee (2022).

- The Authority will do this by replacing emissions allowances with GGR allowances on a one-for-one basis. The total number of allowances in the system will remain at the level it would have been without GGR integration. This will maintain the same cap trajectory, maintain the incentive to decarbonise, and preserve market stability.
- In the longer term, the Authority recognises the potential benefits of moving to a new net cap, i.e. capping only the number of emissions allowances and not removal allowances. We would only do this once removals deployment is more established (giving us a better understanding of future deployment) and once we have made significantly greater progress towards residual emissions (e.g. when the remaining emissions are largely those that are hard to abate, for example due to technical or economic constraints). This could be the long-run future direction of the scheme, as it would underpin an economically efficient approach to net zero.

Allowance Design

The Authority will prioritise robust verification, strong environmental integrity, and maintaining market stability when introducing a new source of allowances. The Authority has made the following decisions.

- The Authority intends to align standards and methodologies including monitoring, reporting and verification (MRV) for engineered GGR operators under the UK ETS with the UK GGR Standard that is currently being developed.
- UK removal allowances will be awarded to GGR operators ex-post (i.e. only once carbon sequestration has taken place and been verified).
- The Authority is minded to differentiate between greenhouse gas removal allowances and existing UK emissions allowances (UKAs) subject to further work on technical implementation.
- The Authority intends to provide auctions to facilitate a route to market for GGR operators.
- Only removals that have taken place in the UK will be eligible to receive UK ETS allowances for initial integration.

Permanence:

The Authority considers the permanence of carbon storage to be one of the key aspects of environmental integrity that must be prioritised when integrating removals. Therefore, the Authority is proposing a permanence framework that enables only highly-permanent removals to integrate into the UK ETS.

- The permanence framework will consist of a minimum storage period for removals, liability measures and fungibility measures.
- The Authority will require projects to demonstrate a minimum carbon storage period for carbon of 200 years before they are eligible for entry into the UK ETS.
- The Authority will apply liability measures to the operator (or entity responsible for the stored carbon) obligating them to take corrective action for any carbon released from storage.

- The Authority will implement buffer-pools as a fungibility measure. These act as an upfront insurance mechanism for carbon reversal events and help assign a relative value between different removal technologies which have different risks of reversal.

Woodland:

The Authority has not yet made a decision on whether high-quality UK Woodland removals should be included in the UK ETS. This is because:

- Stakeholders have raised concerns on issues around permanence, cost and other wider impacts.
- The Authority has listened to these concerns and has assessed new evidence and explored additional safeguards. Taken together, we believe the evidence suggests there is a strong case for integrating woodland.
- The Authority is publishing this evidence (in the Woodland Evidence Annex) and welcomes further engagement with stakeholders ahead of aiming to make a decision later this year.
- The Authority will only include nature-based carbon removals in the UK ETS where there is a strong evidence base demonstrating their environmental integrity, and where the ETS Authority is satisfied that adverse market impacts will be avoided.
- The Authority is not considering peatland restoration for inclusion in the UK ETS.

Pathways for Integration:

The Authority recognises the need to include removals in the UK ETS as soon as practicable, but that this must be combined with safeguards in order to ensure the market stability and environmental integrity of the scheme. The Authority has made the following decisions.

- The Authority will aim to legislate to integrate removals in the UK ETS by the end of 2028, aiming for integration to be operational by the end of 2029 subject to consideration of appropriate legislative powers, regulatory assessments and further consultation.
- The Authority will not implement controls on the way removals are used for compliance, e.g. limits on the proportion of surrendered allowances than can be removal allowances.
- The Authority will adopt transitional supply controls consistent with the net zero pathway for GGRs.

Next steps:

The Authority will consult further on the technical and implementation options for integration of removals in the UK ETS in due course.

Principles for policy design

Summary of proposal

The Authority outlined several guiding principles for policy design for integrating removals into the UK ETS. These principles aim to balance objectives set out by the Authority and ensure that the integration process maintains market effectiveness and aligns with climate goals. These principles were:

1. Maintain the incentive to decarbonise
2. Maintain market integrity
3. Efficient long-term deployment of GGRs
4. Environmental integrity
5. Deliverability
6. Simplicity
7. Futureproofing and flexibility
8. Fiscal impacts

Questions

1. Do you agree with the Authority's principles for policy design?

Summary of Stakeholder Responses

There were 126 responses to question 1. 113 respondents (90%) agreed with the Authority's principles for policy design as set out in the consultation. 8 of these 126 respondents raised 'transparency' or 'accountability' in their response, suggesting the need for a principle to ensure decisions are openly communicated and that the Authority is held accountable for these decisions. Others (14 of 126) mentioned the 'Environmental Integrity' principle in their response, including a suggestion to amend the principle to incorporate sustainability, thereby capturing impacts on our natural environment.

Government Response

The Authority believes that these principles provide the right framework for policy development. They balance trade-offs and guide policy design to meet the Authority's objectives, as well as the needs of scheme participants and removal developers.

Cap

The Authority will maintain the gross cap, i.e. the total number of allowances that can be created, for initial integration of removals into the UK ETS.

We will do this by replacing emissions allowances with GGR allowances on a one-for-one basis. The total number of allowances in the system will remain at the level it would have been without GGR integration. This will maintain the same cap trajectory, the incentive to decarbonise, and preserve market stability.

In the longer term, we recognise the potential benefits of moving to a new net cap, i.e. capping only the number of emissions allowances and not removal allowances. We would only do this once removals deployment is more established (giving us a better understanding of future deployment) and once we have made significantly greater progress towards residual emissions (e.g. when the remaining emissions are largely those that are hard to abate, for example due to technical or economic constraints). This could be the long-run future direction of the scheme, as it would underpin an economically efficient approach to net zero.

Summary of Proposal

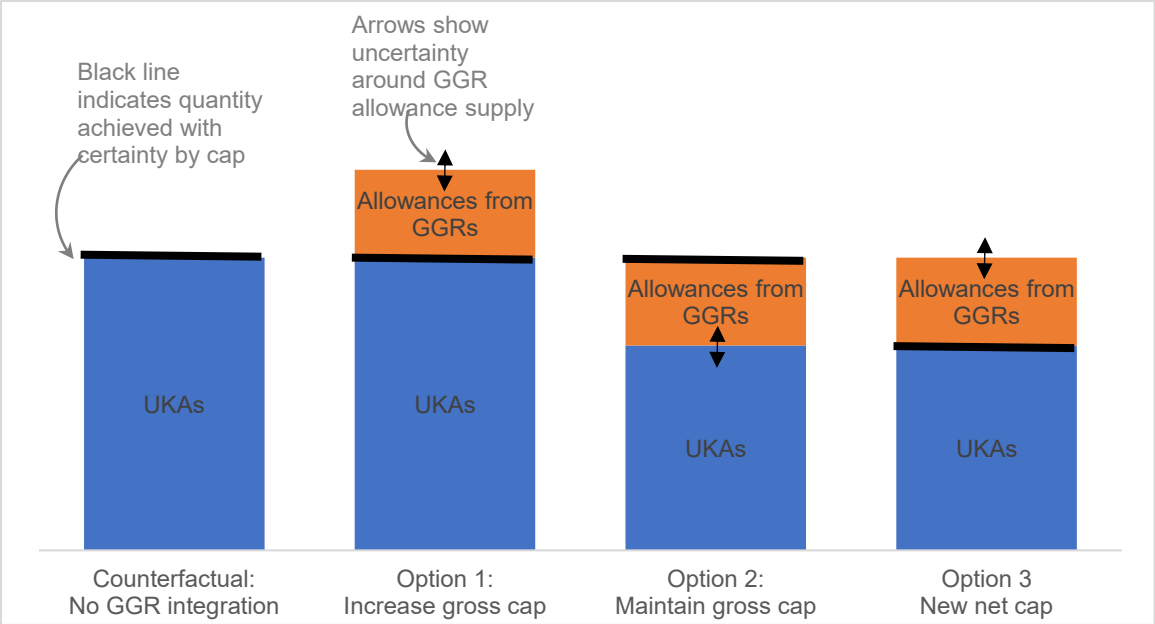
The Authority outlined three options for the cap as GGRs are integrated into the UK ETS:

- **Option 1: Increase the gross cap.**[4] This would allow removal allowances to enter above the current cap on UKAs in the scheme. The total number of allowances would increase relative to no GGR integration.
- **Option 2: Maintain the gross cap.** Auctioned emissions allowances are swapped out 1-for-1 as removal allowances enter the system. The total number of allowances stays the same as it would have been with no GGR integration.
- **Option 3: New net cap.**[5] This involves setting a new, lower cap on the number of UKAs, set in line with expectations on the number of removal allowances entering the scheme. Removal allowances then enter above this new, lower cap. The total number of allowances could go up or down relative to no GGR integration, depending on GGR supply.

In the consultation, the Authority was minded to adopt Option 2: Maintain the gross cap for initial integration.[6]

[4] The 'gross cap' was defined in the consultation as the total number of allowances that can be created in any given period. The number of allowances that are created and supplied to the market is slightly lower than this level, for example due to components of the cap being allocated to Hospital and Small Emitters scheme.
[5] The 'net cap' was defined in the consultation as the number of emissions allowances (UKAs), and would not include any removal allowances. This is because an emissions allowance corresponds to 1 net emission, whereas a removal allowance corresponds to 0 net emissions since the positive emission from the compliance entity is balanced by a negative emission from the removal operator awarded the allowance.
[6] La Hoz Theuer et al (2024) provides a further discussion of the options (Section 3.2.3).

Figure 1. Cap options for GGR integration.



Notes. This is an illustrative representation of options – the bars are not drawn to scale. Components of the cap other than UKAs and removal allowances (such as allowances from the New Entrant Reserve which are not issued) are ignored for simplicity.

Questions

2. Do you agree the Authority should maintain the gross cap for initial integration of GGRs in the UK ETS (Option 2)? Please explain your answer.

3. How can the UK ETS sustain demand for GGRs in the long-term, taking into account the consideration of setting a new cap (Option 3)?

Summary of Stakeholder Responses

There were 121 responses to question 2. 103 (85%) agreed that we should maintain the gross cap for initial integration and 18 (15%) disagreed. 50 responses (41%) cited maintaining the incentive to decarbonise even as removals are added to the system, i.e. avoiding mitigation deterrence, as a consideration. 39 responses (32%) cited maintaining market stability or the continuing functioning of the market as a consideration. The Climate Change Committee supports maintaining the gross cap.[7]

There were 121 responses to question 3. 46 responses (38%) supported moving to a net cap in the long run, including 17 responses (14%) suggesting the net cap could eventually be negative. 20 responses (18%) proposed introducing a sub-mandate as a means of sustaining GGR demand, i.e. introducing a requirement for ETS firms to meet their compliance obligations

[7] The CCC advised on integrating engineered GGRs into the UK ETS in 2022, suggesting 'Any inclusion of greenhouse gas removals in the UK ETS would need to be accompanied by an appropriate tightening of the ETS cap, so that they do not substitute for the necessary emissions reductions in other sectors.' See Climate Change Committee (2022).

using at least a minimum proportion of allowances from removals. 17 responses (15%) raised the need for ETS scope expansion as a way of sustaining demand in the long run.

Government Response

Proposal: For initial integration of removals into the UK ETS, the Authority will maintain the gross cap. We will do this by reducing the number of auctioned UKAs one-for-one as removal allowances enter the system. Further detail on specific options for delivering this in a way that provides certainty to the market over allowance supply will follow in a future consultation.

This approach to the cap will maintain the incentive to decarbonise and eliminate mitigation deterrence. It will also maintain market stability while GGRs are integrated into the scheme. Neither alternative option outlined in the consultation achieves these outcomes. Increasing the gross cap (option 1) would reduce the incentive to decarbonise and risk market instability. Introducing a new net cap (option 3) for initial integration risks destabilising the market while integrating GGRs is a novel activity and supply is uncertain, as we would be proactively decreasing the ETS cap on the basis of expected future GGR supply.

The Authority recognises the potential benefits of moving to a new net cap in the longer term. This would involve setting a lower, more ambitious cap, but then allowing removals to enter above the cap. This could maximise the economic efficiency of the market, allowing ETS compliance entities to cover their residual emissions by purchasing removal allowances in an unconstrained way. The cap could ultimately be set at net zero or net negative.[8]

While the Authority recognises the potential benefits, we note that we would need to see two significant developments across ETS and GGR markets before changing the cap in this way. First, we would need to be confident that ETS sectors had made significantly greater progress towards residual emissions (i.e. the outcome where the only remaining emissions are those that are hard-to-abate, for example due to technical or economic constraints). This would ensure we are maintaining the environmental integrity of the UK ETS, with the primary purpose of the scheme to drive emission reductions across ETS sectors. Second, we would need the GGR market to have matured, so that removals could provide a stable and dependable source of allowances into the ETS, minimising the risk of market instability.

Scope expansion of the ETS, including to high-emitting sectors[9] would in the long run be needed if the ETS is to support economy-wide quantities of GGRs.

[8] This approach is consistent with the recommendations in Sultani et al (2024) *Sequencing Carbon Dioxide Removal into the EU ETS*, which concludes GGR integration into an ETS with a net cap is 'a first-best vision for removals in the form of an economically desirable, long-term regulatory framework to work towards.'

[9] As set out in UK Emissions Trading Scheme: long-term pathway (2024), the Authority intends to continue exploring expanding the UK ETS to more sectors of the economy, including to high-emitting sectors.

Allowance Design

The Authority intends to align standards and methodologies including monitoring, reporting and verification (MRV) for engineered GGR operators under the UK ETS with the UK GGR Standard that is currently being developed.

UK removal allowances will be awarded to GGR operators ex-post (once carbon sequestration has taken place and been verified).

The Authority is minded to differentiate between greenhouse gas removal allowances and existing UK emissions allowances (UKAs) subject to further work on technical implementation.

The Authority intends to provide auctions to facilitate a route to market for GGR operators should they wish to use it.

Only removals that have taken place in the UK will be eligible to receive UK ETS allowances for initial integration.

Standards and Methodologies

The Authority intends to align standards and methodologies for monitoring, reporting and verification (MRV) for engineered GGR operators under the UK ETS with the UK GGR Standard that is currently being developed.[10]

The Authority recognises the importance of robust standards for integrating removals into the UK ETS, ensuring these removals are of the highest quality and maintain market confidence.

Allowance Distribution

Summary of Proposal

The consultation proposed that GGR allowances should be awarded ex-post, meaning GGR operators would only receive them after the removal has taken place and been verified. The Authority acknowledged that ex-post issuance of ETS allowances does not prevent GGR operators from arranging offtake agreements.[11] The consultation sought input from operators on whether any specific measures are needed within the UK ETS to facilitate these offtake agreements and secure necessary financing.

The Authority recognises that awarding allowances ex-post may have impacts on smaller scale operators. We sought feedback on whether specific measures should be considered to mitigate any adverse impacts on these smaller scale operators. There is also a need to determine which actor in the removal value chain should be awarded the allowance. This question is especially relevant where there are multiple stakeholders in the value chain.

[10] British Standards Institution (BSI) to standardise bio-energy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS) methodologies.
[11] A contractual commitment for a buyer to acquire carbon removal from a GGR operator at a predetermined price upon its delivery in the future.

Questions

4. Do you agree that GGR allowances in the UK ETS should be issued ex-post (i.e. after the removal has taken place and been verified)? Please explain in your answer.

5. Does the Authority need to consider any additional measures for the UK ETS to ensure GGR operators are able to arrange offtake agreements? If yes, please provide specific details of which measures should be considered.

6. Does the Authority need to consider any specific measures for smaller scale GGR operators, including smaller scale landowners if woodland is included in the scheme? If yes, please provide specific details of which measures should be considered.

7. Who should receive the GGR allowance? Please consider whether this would also apply for GGRs that involve multiple actors in the value chain and provide examples.

Summary of Stakeholder Responses

There were 121 responses to question 4. 112 respondents (93%) supported ex-post issuance of removal allowances to GGR operators. 68 respondents (56%) referenced environmental integrity as a key reason for this policy decision, referencing the need to safeguard against non-delivery of removals and ensure genuine climate impact and therefore to protect the overall integrity of the ETS. 43 (36%) respondents raised the benefit of additional transparency in ex-post distribution of allowances, stating it would “build confidence in the market and provide transparency to consumers”.

There was a total of 91 responses to question 5. 77 respondents (85%) said the Authority should consider additional measures to enable removals operators to arrange offtake agreements. 14 respondents (15%) answered no to the same question. The most common rationale, raised by 32 respondents (35%), was providing policy certainty for market participants.

There were 67 responses to question 6. 58 respondents (87%) believed that the Authority should consider additional measures for small-scale operators. Many of these responses raised the trade-off between sufficient eligibility criteria and MRV costs acting as a potential barrier as a key factor to consider.

There were 125 responses to question 7. 63 respondents (50%) believed that the GGR operator (i.e. the actor in the value chain that sequestered the carbon) should be awarded the removal allowance. 18 (14%) respondents said the allowance should be awarded to storage providers. 12 responses (10%) recognised that in the case of woodland it should be the landowner that is awarded the allowance.

Government Response

Proposal: UK removal allowances will be awarded to GGR operators ex-post, i.e. once the removal has taken place and been verified.

Issuing allowances ex-post ensures that all allowances created by removals represent genuine and verified carbon removal. This maximises market confidence in the integrity of the removal allowances being traded. While ex-ante allowances could provide upfront revenue for GGR operators before the removal has taken place, they introduce complexity and risk. Awarding allowances ex-post ensures that the allowance design for GGRs maximises environmental integrity, market confidence, and the participation of all types of GGR operators in the UK ETS.

The Authority believes that the ability for GGR operators to negotiate offtake agreements should contribute to providing revenue certainty. We will continue to assess the potential impacts of ex-post distribution on smaller scale operators and consult on any specific measures, if necessary, in due course.

The Authority notes the benefits of awarding the removal allowance to the operator who removes emissions and whose activity will be verified. We will seek to align this decision with the UK GGR Standard currently being developed.

Allowance Differentiation

Summary of Proposal

The Authority outlined three options for the potential differentiation of removal allowances as GGRs are integrated into the UK ETS:

- **No new type of allowance is created** – GGR operators are issued with UKAs.
- **Generic removal allowance** – GGR operators are issued with a "removal allowance", that signifies that it has been awarded for carbon removal. This allowance would not provide details of the technology that has generated the removal.
- **Technology-specific removal allowance** – GGR operators are issued with a "removal allowance from technology X", which provides detail on the method of removal used to generate the allowance.

In all these options, all allowance types would have the same compliance value. Differentiation would provide the market with increased information on how the allowance was generated. This information on the removal may be of value to the buyer, which could lead to a preference for the removal allowance and subsequently additional demand, meaning removal allowances could be traded differently to UKAs in the market, (see Price Discovery section of the Analytical Annex for further analysis).

The policy decision in this section refers only to engineered greenhouse gas removals. The Authority has not made a decision on whether high quality UK Woodland removals should be included in the UK ETS.

Questions

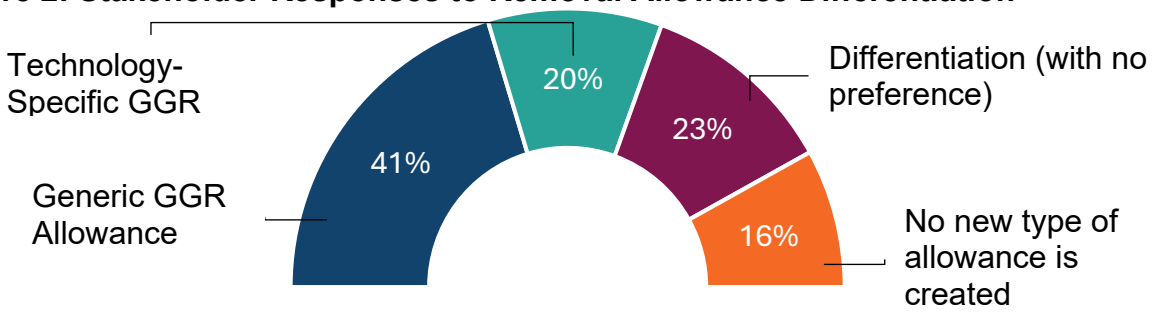
8. Should allowances from GGRs be differentiated from UKAs and, if so, how?

9. Do you think that differentiated GGR allowances would attract a higher price than existing emissions allowances and why? To what extent does this depend on the degree of differentiation (e.g. a generic GGR allowance versus a technology specific GGR allowance)?

10. Will differentiated GGR allowances encourage non-compliance or non-trading entities to purchase these allowances?

Summary of Stakeholder Responses

Figure 2: Stakeholder Responses to Removal Allowance Differentiation



Based on 118 responses to question 8, with 99 (84%) replies supporting the differentiation of removal allowances from UKAs. 19 (16%) of respondents did not support the differentiation of removal allowances.

As shown in **Figure 2**, 41% of respondents (48) supported generic differentiation as the most appropriate for removal allowances. 24 respondents (20%) believed that further information on removal technology types which generated the allowance should be provided. The remaining 27 respondents (23%) supporting differentiation of removal allowances did not explicitly state a preference between the two proposed options for differentiation.

41 respondents (35%) reported allowance differentiation would lead to price discovery. There was also broad recognition that this would increase with higher levels of differentiation. 35 respondents (30%) raised liquidity as a key factor in determining whether removals should be differentiated. Of which, 14 respondents (40%) suggested differentiation would have a negative impact on liquidity, 6 respondents (17%) suggested it would have a positive effect, and 15 respondents (43%) did not state whether the impact would be positive or negative. Transparency was another key theme raised by respondents to the consultation. 34 respondents (29%) raised transparency, of which 32 respondents (94%) of the view that differentiation would make the UK ETS more transparent. Finally, a total of 27 respondents (23%) to question 8 raised that differentiation of removal allowances would have an impact on GGR deployment. 25 of these respondents (93%) felt differentiating allowances would have a positive impact on GGR deployment.

There was a total of 80 responses to question 9. 61 respondents (76%) expect to see a higher price for differentiated removal allowances compared with existing emissions allowances. 48 respondents (60%) believed this would be because of increased price discovery and increased voluntary demand for removals.

For question 10, 40 out of the total 61 respondents (66%) answered they would expect that differentiating allowances would attract non-compliance entities to participate in the UK ETS market. 26 respondents (43%) thought the this would be due to the additional value of removal allowances, and 24 respondents (39%) thought it would be due to the validation of high-quality removal allowances which ETS integration would provide.

Government Response

Proposal: The Authority thinks there could be significant benefits to differentiating between greenhouse gas removal allowances and existing UK emissions allowances (UKAs). However, there are technical implementation issues, including interactions with other policies, which need to be worked through further before a final decision can be made. The Authority will work on resolving these technical issues and is minded to differentiate allowances if this proves feasible.

The Authority has concluded that there are benefits to differentiating allowances, in the form of increased transparency and the potential for price discovery. This must be carefully balanced against safeguarding UK ETS liquidity and ensuring further risks are not introduced into the scheme.

Transparency

In general, greater transparency is widely understood to improve the functioning of financial markets. In this context, we define market transparency as the level of information disclosed by the Authority regarding the verified removal activity that led to an allowance being created. Increased transparency should lead to a more credible and trusted market, as participants will know exactly what they are buying and selling. This should ultimately create a more stable and predictable market environment. Transparency is also valuable from a regulatory perspective and could support potential future linking agreements, as linking partners can easily identify the types of allowances in the market they are linking to. It could also allow linking partners to treat specific kinds of allowances differently, if they wished to. Removal allowances are often differentiated in other compliance schemes, including linked schemes such as the ETSs in California and Quebec.[12]

Price Discovery

Differentiating allowances will enable price discovery, which we define as allowing the market to find an accurate, efficient price when buying or selling removal allowances.[13] By providing the market with more information, differentiation would allow market participants to determine the value of a removal allowance. This value would be made up of two parts: compliance value (the same as a UKA) and additional removal value (see below). The Authority notes most stakeholders (76%) believe buyers could voluntarily value removals, driving a price premium for removal allowances above UKAs.[14] Higher prices for removal allowances in the long run

[12] California's Cap-and-Trade Program link with Québec's Cap-and-Trade System began on 1 January 2014, allowing mutual acceptance of compliance instruments between the two systems.
[13] This definition is an adapted version of the definition of price discovery given in UK ETS Evaluation: Phase 1 report (2023).
[14] New Zealand ETS differentiates between emissions allowances and different types of removals. Permanent forestry units trade at a premium to standard emissions allowances. Source: Carbon Price NZ - MyNativeForest.

could support investment into the UK removals sector. See the cost and benefits of policy decisions section of the Analytical Annex for further analysis.

Demand for removal allowances over standard emissions allowances could come from ETS participants looking to meet corporate net zero commitments through the purchase of high-integrity removals. Any claims involving ETS removal allowances would need to meet best practice in making corporate net zero claims. In the recent UK Government consultation on voluntary carbon and nature markets, the government proposed endorsing the Voluntary Carbon Market Initiative code of best practice for corporate net zero claims.

Liquidity

The Authority believes differentiating removal allowances by technology type at this stage potentially poses a risk to ETS liquidity.[15] The decision to pursue generic differentiation offers a balanced approach in achieving the benefits of price discovery and transparency, while limiting potential liquidity impacts. The Authority acknowledges potential liquidity impacts from differentiation but also notes that a differentiated market can be structured to maintain liquidity. In many commodity markets, differentiated products with lower trading volumes are often hedged using a more liquid benchmark, such as Brent crude in the oil market. This trading practise preserves market liquidity in the core market while contributing to price discovery for the differentiated product. If the structure of these commodity markets were applied to a differentiated UK ETS market, UKA futures contracts could be used to hedge against removal allowances, preserving market liquidity, despite differentiation. See the Analytical Annex for further analysis.

As previously mentioned, the Authority believes that solutions exist to manage potential liquidity impacts. However, the introduction of removal allowances should not significantly complicate the scheme. In line with our guiding principles, the Authority maintains that differentiating only between removal allowances and UKAs preserves simplicity. This approach also offers a balanced method of increasing price discovery and transparency while minimising potential liquidity impacts.

Route to Market

The consultation outlined the following options for the Authority's role in facilitating the route to market for GGR allowances:

- The Authority plays no role in supporting GGR operators to sell allowances that they have been awarded. Removal allowances are issued to GGR operators that meet the UK ETS market participation requirements, and these allowances can then be sold to buyers, for example on the secondary market, without any further Authority intervention.
- The Authority supports GGR operators by facilitating auctions on their behalf, with the revenue received being distributed back to those operators. There are three possible iterations of this option:

[15] In the context of this response, liquidity refers to whether transactions in the secondary markets for all allowances types (both emissions and removals), can be executed promptly without generating significant or enduring price impacts (UK ETS Evaluation: Phase 1 report, 2023).

- **Combined auctions** – removal allowances are combined with the fortnightly UKA auctions.
- **Separate auctions** – removal allowances are auctioned separately to UKAs, in a "GGR auction" that includes allowances from all removal types.
- **Separate auctions by removal type** – removal allowances are distributed into separate auctions by different removal types e.g. Direct Air Capture and Storage (DACS), Bioenergy with Carbon capture and storage (BECCS).

Questions

11. What should the Authority's role be in facilitating a route to market for allowances from GGRs?

Summary of Stakeholder Responses

There were 98 responses to question 11. 63 respondents (64%) believed that the Authority should facilitate auctions for removal allowances to enter the UK ETS. 36 respondents (37%) suggested this would foster market integrity and 27 respondents (28%) said this would maintain market stability.

6 respondents (6%) suggested removals could enter the ETS through combined auctions. 26 responses (27%) believed that separate auctions should be the chosen auction type. One of the key reasons for this is that facilitating auctions for removals would enhance price discovery (11 responses). While many highlighted the benefits of separate auctions, there was also recognition that splitting auctions by differentiated allowance types could increase the risk of auction failure. Dr Elizabeth Baldwin and Prof Paul Klemperer's response stated: *"Greater differentiation risks thin markets. But these markets can be made thick by bringing all participants together at one instant: the regular auctions for ETS allowances. The key is to use an auction for differentiated goods: a product-mix auction."*

Government Response

Proposal: The Authority intends to provide auctions to facilitate a route to market for GGR operators.

The Authority believes that facilitating auctions for removals will allow operators to most effectively participate in the market. This will support the deployment of high-quality removals by providing demand certainty to operators through an established route to market to ETS participants. Operators of all sizes and technology types can participate, potentially reducing transaction costs to smaller participants.

The Authority recognises the need to minimise disruption to existing UKA auctions while integrating removals, specifically implementing removal allowance auctions and adjusting the number of auctioned UKAs in order to maintain the cap. Current ETS auction practices and scheduling will be considered as these changes to the system are introduced, to maintain the smooth functioning of the market for existing participants.

If allowances are differentiated, then there will be two different types of allowance to auction. The Authority notes concern that separate auctions may not provide the assumed benefits and create potential risks to the market. Combined auctions could be more effective, as they channel all demand into one auction, while offering bidder choice between allowance types.

Product Mix Auctions are an established type of combined auction used by the Bank of England. These auctions are designed to mitigate the risk of auction failure and associated inefficient outcomes, while enabling the auctioning of multiple differentiated products, as described in the Box below. We remain open to exploring all auction formats, such as product mix auctions, and will consult further on this in due course.

Product Mix Auctions

Product Mix Auctions (PMAs), developed by Professor Paul Klemperer, allow participants to bid on various products in one single auction.[16] Buyers can bid, according to their preferences, for just one product type or multiple products if they prefer. The combined auction considers all these bids simultaneously, reducing the risk of auction failure. The Bank of England has used PMAs effectively for many years, selling differentiated loans at auction.[17] In the future, auction methods such as PMAs could be used in the UK ETS, enabling bidders interested in UKAs, removal allowances, or both to compete in one auction. This minimises risk of auction failure and enhances the efficiency of the outcome.

Location of eligible GGRs

The integration of removals into the UK ETS requires determining the eligibility criteria for GGR projects. In the consultation, the Authority proposed that only UK-based removals should be eligible for the removal allowances for initial integration.

Questions

12. Do you agree that allowances should only be awarded to UK-based GGRs? We welcome views from all stakeholders including sector-specific considerations. Please explain your answer.

Summary of Stakeholder Responses

90 of the total 106 responses (85%) agreed that only UK based GGRs should be eligible for UK ETS allowances. A total of 70 respondents (66%) raised maintaining the integrity of the ETS and ensuring genuine climate impact as the key reason for allowing only UK removals in the scheme.

17 respondents (16%) answered no to this question. 10 of these respondents raised the need to tackle global emissions and alignment with other international schemes and climate targets

[16] Klemperer (2010).
[17] Bank of England (2023) evaluations the Bank of England's Indexed Long-Term Repo (ILTR) operations, finding that the product-mix auction mechanism increased welfare by approximately 50%.

as their reasoning. 5 of these responses were from the aviation sector, and raised the industry's global nature.

Government Response

Proposal: Only removals that have taken place in the UK will be eligible to receive UK ETS removal allowances for initial integration. Adjustments may be made in future to accommodate market and policy developments.

This approach ensures that carbon removals contribute directly to the UK's statutory carbon budgets and net zero targets in a manner which is consistent with UK policy. Integration of removals into the UK ETS is an important part of the UK's strategy to achieve net zero by 2050.

This will also encourage the development of a thriving GGR industry within the UK, driving growth and investment in the long run. Additionally, it simplifies the monitoring, reporting and verification of removals, enhancing confidence among market participants that removal allowances represent one tonne of removed carbon.

The decision to only allow removals that have taken place in the UK is made on the current structure and regulatory framework of the scheme. It is important to note that as the scheme evolves, future adjustments may be made to accommodate market and policy developments or opportunities to link to other emissions trading schemes.

The aviation sector is committed to net zero by 2050, using GGRs to balance its residual emissions. Aviation is therefore likely to be a significant source of demand for GGRs within the UK ETS, with the CCC estimating that by 2050 60% of total UK GGR demand could be from aviation.[18] As the scheme develops, the Authority will continue to take into account the specific needs and perspectives of different GGR buyers, including the aviation sector.

[18] CCC Advice on the Seventh Carbon Budget (2025).

Permanence

Ensuring the long-term durability and quality of removals is paramount; to achieve this the Authority will adopt a permanence framework. The framework will consist of a minimum storage period for removals, liability measures and fungibility measures.

The permanence framework will be sufficiently rigorous to ensure only high integrity removal technologies which offer durable carbon storage are allowed to enter the UK ETS. This will guarantee that one removal allowance represents one tCO2e in durable storage.

The Authority will require projects to demonstrate they can store carbon for a minimum of 200 years before they are eligible for entry into the UK ETS.

The Authority will apply liability measures to the operator (or entity responsible for the stored carbon) obligating them to take corrective action for any carbon released from storage.

The Authority will implement buffer-pools as a fungibility measure. These act as an upfront insurance mechanism for carbon reversal events and help assign a relative value between different removal technologies which have different risks of reversal.

Permanence Framework

Summary of Proposal

For inclusion into the ETS, the removal technology must be of a high quality and integrity. To ensure this the Authority proposed a permanence framework built of three components:

1. **Minimum Storage Period –** a minimum timespan that the removal technology must be able to store carbon for to be eligible for participation in the UK ETS.

2. **Liability measures** – mechanisms which obligate the operator to make good any loss of carbon post-capture.

3. **Fungibility measures** – an upfront insurance mechanism for carbon reversals which may occur through the project. These act to assign a relative value to each removal technology based on the durability of the carbon storage.

Further detail on each of these measures is in the supplementary information box below, and how they will be implemented within the ETS is expanded upon throughout this section. Removal technologies will have to meet all three requirements of the permanence framework to be part of the UK ETS.

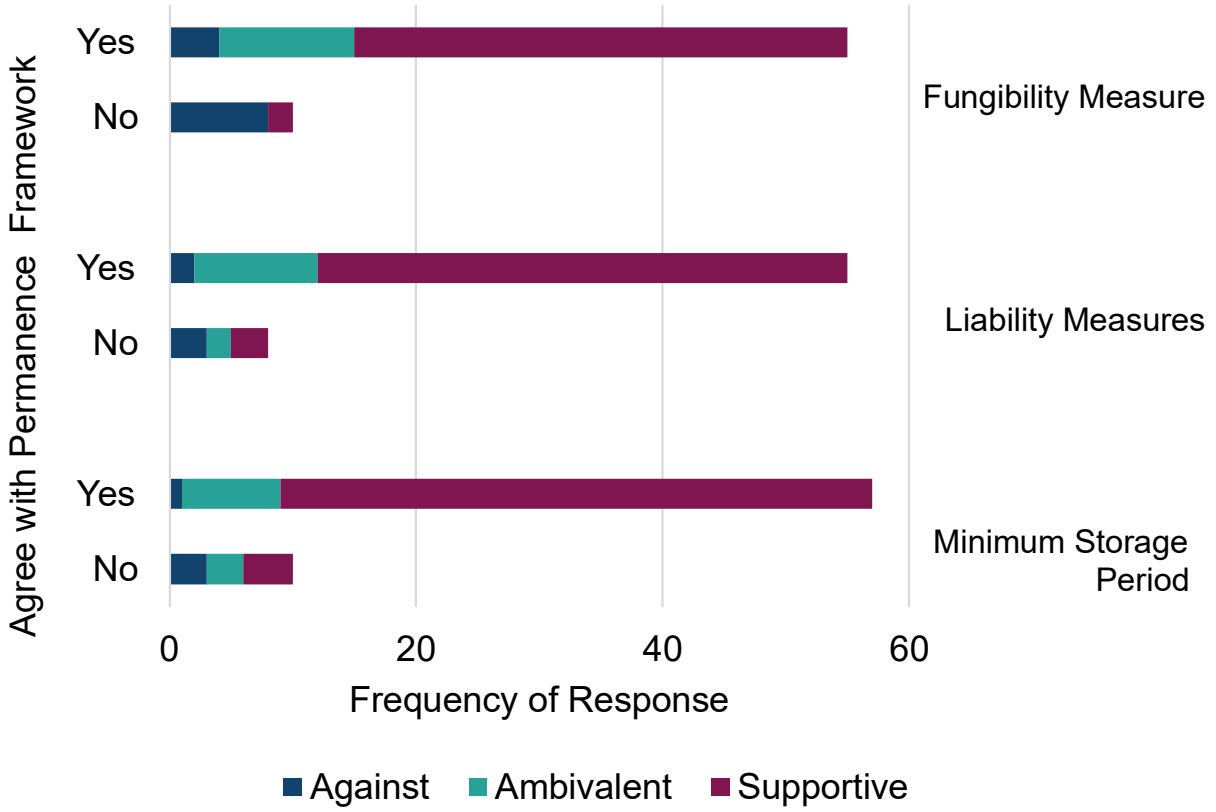
Questions

13. Do you agree with the proposed permanence framework of both a minimum storage period, a liability measure and a fungibility measure? Please explain your answer.

Summary of Stakeholder Responses

There were 94 responses to question 13. 79 (84%) supported the development of a permanence framework for removal technologies. Of those supporting the permanence framework, 33 stakeholders (42%) indicated support for all three components. The most supported component was the minimum storage period, which was rated positively by 52 respondents (55%) (**Figure 3**).

Figure 3. Stakeholder responses to the components of the Permanence Framework.



Breakdown of support for each of the three proposed components of the Permanence Framework. Stakeholder responses were ranked based whether they clearly supported the component, opposed the component or mentioned it without offering a strong opinion (Ambivalent). Whilst some stakeholders were against the Framework as a whole (Yes or No) they still saw value in individual components. Not all respondents who supported the concept of a framework offered an opinion on all three components which means there are slight variations in the total number of responses counted for each component.

Government Response

Proposal: The Authority will adopt the proposed permanence framework.

This framework will consist of liability measures, fungibility measures and a demonstratable minimum storage period for removal technologies which operators must meet to enter the UK ETS. Options and decisions on the minimum storage period, and the liability and fungibility measures are discussed in greater depth in the following sub-sections of this section.

Minimum Storage Period

Summary of Proposal

Removal technologies must prove they can store carbon for a minimum period of time in order to enter the UK ETS. This is to ensure only robust and durable removal technologies which align with the high integrity of the UK ETS enter the scheme. A minimum storage period means removals will have a high environmental integrity with a long-lasting, tangible climate impact.

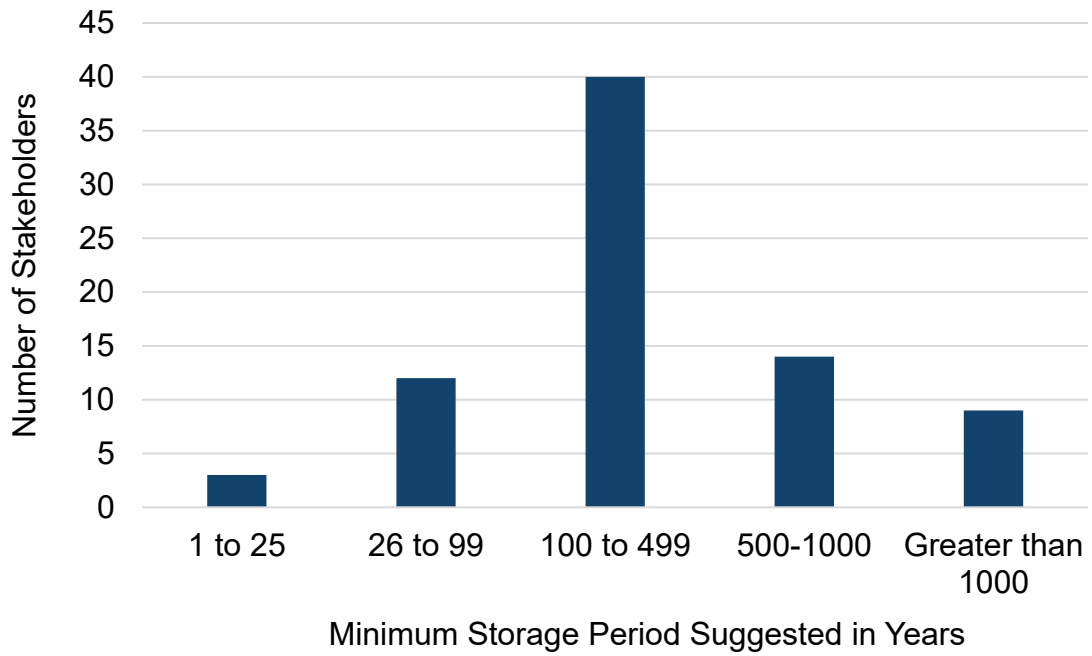
Questions

14. What minimum storage period duration should the Authority set for GGRs entering the UK ETS? Please explain your answer.

Summary of Stakeholder Responses

There were 96 responses to question 14. 69 stakeholders (71%) suggested at least one possible minimum storage period. A range of possible time periods were suggested, ranging from decadal to millennial (**Figure 4**). The median and modal proposed time-period was 100 years, which was cited by 25 stakeholders (37%). Five stakeholders stated a preferred minimum storage period of 200 years.

Figure 4: Frequency of suggested time periods suggested by stakeholders for minimum storage.



The most suggested timeframe was 100 years. Where stakeholders suggested geological time periods these have been included in the 'Greater than 1000 years,' group. If respondents suggested several centuries that was grouped as 100 to 499 as it was at least 200-300 years. Of the 40 suggesting 100-499 years, 25 suggested 100 years, and 5 suggested 200 years explicitly.

Government Response

Proposal: Removal projects will need to prove they can store carbon for at least 200 years in order to participate in the UK ETS.

The Authority has opted for a minimum storage period of 200-years to ensure environmental integrity and provide investor confidence whilst also supporting the inclusion of a range of removal technologies. We recognise that choosing a minimum storage period of 200 years is complex, as there is a lack of academic or scientific consensus on a definition of permanent storage (see Analytical Annex for further detail). As noted in the consultation, there are a range of GGR technologies with different levels of permanence. We recognise some GGR technologies, such as those reliant on the Carbon Capture Usage and Storage network, will be able to geologically store carbon for time periods much longer than 200 years. Analysis by the Authority has shown that the social value of storing carbon for 200 years is 99% of the value of storing it indefinitely (methodology in the Analytical Annex). 200 years is more ambitious than the median value suggested by stakeholders (100 years) and is greater than many voluntary schemes and other compliance markets. The EU Carbon Removal and Carbon Farming regulations[19] (CRCF) states that long-term duration of storage is 'several centuries i.e. at least 200 years'.[20] Whilst the California Air Resources Board, which manages California's cap-and-trade scheme, requires a minimum storage period of 100 years for forestry projects.

The GGR operator will need to present evidence to the UK ETS Authority to prove they can store carbon for at least 200 years. The evidence requirements and mechanism for submitting these will be established through further consultation.

Liability Measures

Summary of Proposal

The Authority invited suggestions and feedback on how liability measures could be implemented and who would be liable for the stored carbon. The Authority proposed that the liable entity could purchase equivalent allowances from the ETS, or, from equally robust GGR projects which may be outside the ETS. A combination of these two options is also possible.

[19] Regulation (EU) 2024/3012 of the European Parliament and of the Council of 27 November 2024 establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products.
[20] Q&A on the provisional agreement on the Regulation establishing an EU-wide voluntary framework for certifying permanent carbon removals, carbon farming and carbon storage in products (CRCF Regulation).

Questions

15. How should the Authority manage potential reversal events from GGRs? Please consider the liability options outlined above, whether any options exist that have not been considered, and how the potential liability options could be used together or in sequence.

16. Where should the liability for any re-release of stored emissions apply if there are multiple actors in the GGR value chain?

17. Should the liability measure differ if the GGR is also subject to a fungibility measure? For example, if the reversal event was avoidable (i.e. within the control of the GGR operator) or unavoidable (i.e. due to factors outside of control of GGR operator).

Summary of Stakeholder Responses

There were 89 responses to question 15. A minority of respondents (23 stakeholders, 26%) supported all or part of the proposed liability measures. Concerns with the proposed liability measures included the perception that this may lead to restrictions in the cap and the possibility that removal operators may no longer be solvent at the time of a future reversal so would not be able to cover their liabilities. Stakeholders suggested other liability measures might be more suitable, these included the use of liability measures through buffer pools (38 respondents, 43%) or specialist insurance products (29 respondents, 33%). There was overlap between these, with buffer pools suggested as an insurance product, or with an insurance company issuing credits to cover the allowances lost. Proposals that liability mechanisms should change in force majeure events, i.e. where reversals occur which are out of the control of the liable party, were raised by 13 stakeholders (15%).

There were 98 responses to question 16. Stakeholders overwhelmingly suggested seller liability, i.e. the liability should lie with the actors supplying removals, not the buyers of the removal allowance. Only one stakeholder (1%) suggested buyer liability. Within the supply chain, 28 respondents (29%) clearly indicated that the liability should lie with the entity storing the carbon, either the landowner or the transport and storage operators. 16 respondents (16%) suggested that only the removal operator should be liable, with 10 of those responses (63%) proposing that the removal operator could transfer that liability to another entity storing or transporting the sequestered carbon as part of the contract.

For question 17 there were 53 responses, of which 21 stakeholders (40%) supported the concept of different liabilities measures for projects with fungibility measures. There were 14 respondents (26%) who disagreed with this approach. Respondents raised concerns with increasing the scheme's complexity and the concept of fungibility measures.

Government Response

Proposal: The Authority will implement liability measures as part of the permanence framework.

The Authority recognises similar liability mechanisms exist within pre-existing frameworks, for example within Carbon Capture and Storage, where the operator must declare emissions from

their storage and purchase UKAs to cover those emissions.[21] Stakeholders offered the Authority new ideas to explore for liability measures. These included financial penalties for non-compliance or reversals, and insurance products to cover the cost of a reversal event. The Authority will continue to develop its position on liability measures through the forthcoming technical consultation. This consultation will identify suitable liability measures and mechanisms for removal operators integrating into the ETS and explore if different GGR technologies will require different liability measures.

Fungibility Measures

Summary of Proposal

In the consultation the Authority proposed two possible fungibility measures: a buffer pool or equivalence ratios.

- **Buffer pool**: the operator will be awarded fewer allowances than the carbon stored. The remainder of the stored carbon would contribute to a buffer pool and would be cancelled in the event of a future reversal. The contribution rate to the buffer pool could be set by removal technology and the estimated risk of reversal. Therefore, low risk removal technologies could have a zero-rate buffer contribution compared to technologies with a greater risk of reversal.

- **Equivalence ratios:** the project would not receive a removal allowance for every tonne of carbon stored. Instead, the operator would receive a proportion of allowances based on the project's equivalence rate. This rate could use a variety of different inputs including the risk of reversal. Overall, this would mean a project with a higher risk would need to store more carbon to receive the same number of allowances compared to a lower risk project.

Fundamentally, the two measures operate in a similar manner by under rewarding carbon stored to cover any future losses based on a level of risk. They differ based how they account for reversals: buffer pools have a pool of carbon units, which the operator creates but cannot sell. These are retired to replace the carbon lost if there is a reversal event, so this process is accountable. The removal operator will need to top up the buffer pool for the allowances lost. With equivalence ratios, there is no accounting action that operators must complete. It is assumed that the reversal is covered by the excess carbon in storage which the operator has not been awarded allowances for.

[21] Carbon Capture and Storage Network Code (January 2025), UK government – *Section J*.

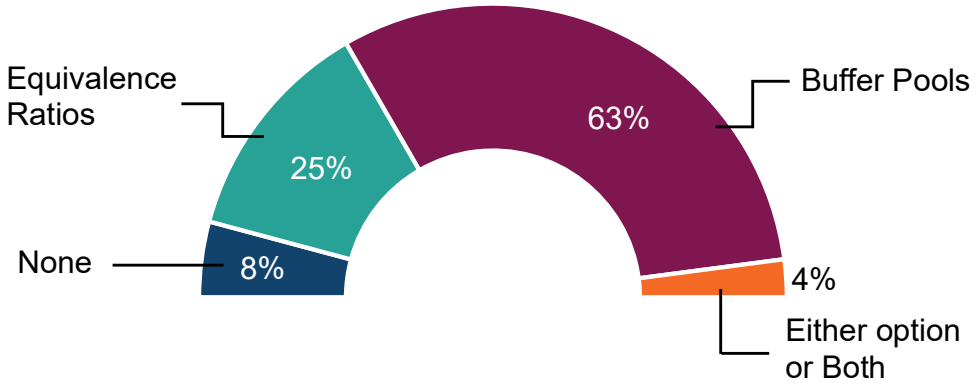
Questions

18. Should the Authority use a buffer pool or equivalence ratio?
19. How could the Authority set the contribution rate for a buffer pool? Should this be a flat rate contribution across all applicable projects, or should this vary per project?
20. Which factors should be considered when determining the appropriate contribution rate for a buffer pool?
21. How should the Authority decide which GGRs would be required to contribute to a buffer pool and at what level any threshold should be set for contributions?
22. Should buffer pool contribution rates remain fixed over time or could they vary? If they vary how should this be assessed? For example, the Authority could require projects to contribute depending on an assessment of risk at each verification period, and this could change over time.
23. How could the Authority design equivalence ratios?
24. Which inputs should be used in determining the appropriate equivalence ratios?
25. Should these equivalence ratios be fixed over time or regularly reviewed and amended?

Summary of Stakeholder Responses

There were 72 responses to question 18. The most supported fungibility measure was buffer pools, supported by 48 respondents (67%) (**Figure 5**). These were preferred due to a perceived lack of complexity and that the method was already established. Equivalence ratios were favoured due to reasons including concerns that buffer pools would restrict the supply of allowances to the market and there were also suggestions that equivalence ratios would be simpler than buffer pools.

Figure 5: Stakeholder preferences for fungibility options:



Based on a total of 72 responses to question 18. There were 3 (4%) stakeholders who were supportive of either proposed fungibility measures. 18 (25%) respondents preferred the use of equivalence ratios.

Buffer Pools

There were 58 responses discussing how the buffer-pool contribution rates could be set (Question 19). The most popular preference, raised by 37 stakeholders (64%) was for the rate to vary by project, being determined by the project's individual risk. Ten respondents (17%) suggested a flat buffer rate across the ETS, frequently citing simplicity and ease of operation.

For question 20 there were 67 responses suggesting possible considerations for buffer pool contributions. The most frequently raised consideration was the risk of reversal cited by 41 stakeholders (61%); projects with a greater risk of reversal would need to contribute more to a buffer pool. The scale of the GGR project was raised by ten stakeholders (15%) in total. Six stakeholders (9%) suggested that the type of removal technology be considered.

For question 21, there were 67 responses. 36 stakeholders (54%) raised the risk of reversal as the deciding factor for which removal technologies should contribute to a buffer pool. 12 stakeholders (18%) suggested that all GGR removal technologies should contribute to a buffer pool.

To question 22, there were 56 responses which suggested either fixed or variable buffer pool contribution rates. The majority of responses (47 stakeholders, 84%) favoured a variable contribution rate. It was frequently raised that contribution rates could vary in response to changes in project risk, this could be assessed on a regular cycle that aligned with credit verification, or for a review every 5 to 10 years. Those who preferred a fixed contribution rate, raised concerns about increasing complexity with variable buffer pool contributions.

Equivalence Ratios

There were 55 responses to question 23. 22 stakeholders (40%) suggested that equivalence ratios should be based on the risk of reversal. However, 18 respondents (33%) objected to the use of equivalence ratios in this context, citing factors such as complexity or a preference for buffer pools.

The importance of permanence continued in question 24 which had 44 responses. 23 respondents (52%) raised the risk of reversal when asked what inputs should be used to calculate equivalence ratios. Nine responses (20%) also suggested that scientific and expert opinion should be consulted when calculating equivalence ratios.

For question 25, there were 44 responses. The majority of responses (38 stakeholders, 86%) stated that equivalence ratios should be regularly reviewed as evidence and technology changes.

Government Response

Proposal: The Authority will use buffer pools as a fungibility measure within its permanence framework.

Both buffer pools and equivalence ratios can be thought of as upfront insurance mechanisms for reversals and consequently help assign a relative value between different removal technologies which have different risks of reversal. This is achieved by awarding fewer allowances to some operators on the basis that there is sufficient risk that some carbon may

be released. The Authority does not currently expect removal technologies utilising geological storage to contribute to the buffer pool given the high durability of this storage and subsequent low risk of reversal, however a final position on this is subject to development of the GGR Standard and further consultation on GGR integration. The Authority recognises that it must strike a balance between ensuring scheme integrity and increasing cost and complexity to removal operators. Using either buffer pools or equivalence ratios may add complexity and cost for removal operators, however, these fungibility measures are necessary to manage the risk of leakage and are important to maintain the integrity of the UK ETS scheme.

Buffer pools have been selected as they are well established, for example within the Woodland Carbon Code[22] and other compliance schemes such as the California cap-and trade-scheme.[23] Buffer pools are easily understood and transparent, enabling stakeholders to see the actions taken to correct for reversals if they occur. Furthermore, they have a clear methodology making it easier for stakeholders and the public to understand the steps taken to control the risk of reversal.

Development of a buffer pool will take place through the forthcoming technical consultation. This consultation will enable the Authority to identify appropriate contribution rates for each removal technology. The consultation will also explore appropriate review periods and mechanisms for updating buffer pool contribution rates as removal technologies develop.

[22] 2.3 Management of risks and permanence - UK Woodland Carbon Code.
[23] Compliance Offset Protocol – U.S. Forest Project. Adopted June 2015. California Environmental Protection Agency – Air Resources Board.

Woodland

The Authority has not yet made a decision on whether high-quality UK Woodland removals should be included in the UK ETS.

Stakeholders have raised concerns on issues around permanence, cost and other wider impacts.

The Authority has listened to these concerns and has assessed new evidence and explored additional safeguards. Taken together, we believe the evidence suggests there is a strong case for integrating woodland.

We are publishing this evidence (in the Woodland Evidence Annex) and welcome further engagement with stakeholders ahead of aiming to make a decision later this year.

The Authority will only include nature-based carbon removals in the UK ETS where there is a strong evidence base demonstrating their environmental integrity, and where the ETS Authority is satisfied that adverse market impacts will be avoided.

The Authority is not considering peatland restoration for inclusion in the UK ETS.

Summary of Proposal

The Authority consulted openly on whether new UK woodland should be included as an eligible removal in the UK ETS, whilst acknowledging the risks identified by the Climate Change Committee (CCC) in their 2022 advice.[24] The consultation asked two follow up questions on the Woodland Carbon Code (WCC) and wider impacts of new UK woodland creation to determine the best way to incorporate woodland should the Authority decide to do so.

In this section the Authority also established that peatland restoration was not being considered for inclusion into the UK ETS.

Questions

26. Should new ex-post woodland units generated in line with UK Woodland Carbon Code standards be considered for inclusion in the UK ETS? Please base your response on the evidence outlined around permanence, costs and wider land management impacts, and on the policy, options outlined in the rest of this consultation.

27. If the Authority does include new ex-post woodland units generated under the UK Woodland Carbon Code in the UK ETS, should any changes be made to the Woodland Carbon Code? For example, this could include changing the 20% flat-rate buffer contribution, or changes to the MRV and measures to mitigate wider land management impacts. Details of the woodland carbon code can be found here: https://woodlandcarboncode.org.uk/standardand-guidance.

28. If the Authority does include new ex-post woodland units generated under the UK Woodland Carbon Code in the UK ETS, should any measures be taken to mitigate potential social and cultural impacts? Please provide details of the impacts, including consideration of impacts on different land ownership models, and potential measures.

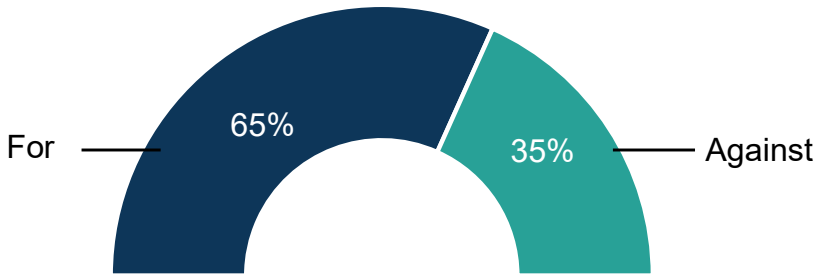
[24] Climate Change Committee (2022).

29. Do you agree with the Authority's assessment of peatland restoration?

Summary of Stakeholder Responses

There were 86 responses to question 26. 56 respondents (65%) supported the inclusion of woodland into the ETS (6). 30 stakeholders (35%) were not in favour of woodland inclusion in the ETS.

Figure 6: Stakeholders for and against woodland inclusion



Based on a total of 86 responses to question 26.

The replies to questions 26 and 28 contained many of the same themes so as a result these responses have been analysed jointly (total 86 responses). There were 41 responses to question 28, all these respondents also answered question 26. In both questions, respondents raised a variety of potential risks and benefits associated with woodland inclusion in the ETS.

The 65% of stakeholders in favour of woodland inclusion cite the role increasing UK woodland can play in meeting UK climate targets and how the compliance market offers a viable investment pathway to facilitate this.

51% of all respondents identified the added benefits woodlands bring such as ecosystem services including flood management, improved air and water quality, increased biodiversity, recreational spaces, economic benefits and job creation. 22 stakeholders (25%) point to the Woodland Carbon Code as an existing credible standard that ETS woodland could build upon and drive increased demand for woodland creation.

For those who do not support woodland inclusion in the UK ETS the primary concern is with permanence. 21 stakeholders (26%) raised concerns that woodland carbon storage was not suitably permanent as it has a high risk of reversal from events such as fires, disease and floods. Three stakeholders cited that only greenhouse gas removals that are proven to be stored for 1000 years or more (GGRs using geological storage) should be eligible for ETS entry. Four stakeholders specifically cite the like-for-like principle, under which fossil fuel emissions need to be balanced by removal technologies using geological storage.

Four stakeholders, against woodland inclusion, raise concerns about market impact with three specifically noting that high quantities of low-cost woodland could disrupt the ETS price. 15 stakeholders (18%) flagged the wider impacts of UK woodland and risks emerging from these. Eight respondents (9%) raised concerns around monocultures, low biodiversity woodland, or

the risk of high-quality habitat destruction for woodland creation. Five respondents also raised the loss of land for agriculture and the potential impact on food security.

There were 39 responses to question 27, which asked stakeholders whether the Woodland Carbon Code (WCC) would need changing if woodland entered the ETS. 24 respondents (62%) felt changes to the WCC were needed. Improvements to the WCC focused on enhancing MRV, the buffer pool, and addressing carbon leakage. 10 respondents (26%) advocated for better MRV methods, and 11 respondents (28%) suggested changes to the buffer pool with seven specifically outlining how the flat 20% contribution could be changed. Most commonly, project specific buffer contributions, based on the project's risk, were suggested by stakeholders (5 responses, 13%). Of the 11 respondents (28%) who felt the WCC was suitable in its current form, four raised the need for it to be continually reviewed and adapted as best practice and the market develops.

Question 29, on peatland restoration, there were 60 responses. 41 stakeholders (68%) agreed with the Authority's assessment of peatland restoration, recognising that although peatlands are significant carbon stores, their net climate impact as a removal requires further research and the development of

before it can be eligible for inclusion in the ETS. Noting the lack of a robust methodology for validating net carbon removal during peatland restoration, and it currently serves as emissions reduction technology as opposed to a removal. 19 stakeholders (32%) disagreed with the position the Authority laid out in the consultation. These stakeholders outlined the strengths of peatland to sequester greenhouse gas emissions and therefore lead to sustained reduction in atmospheric warming and therefore should be considered for inclusion.

Government Response

Proposal: The Authority has not made a decision on whether high-quality UK Woodland removals should be included in the UK ETS.

While there are significant benefits to woodland inclusion, there are also perceived risks surrounding permanence, cost and wider impacts of UK woodland inclusion. The Authority has worked to produce and assess new evidence as well as investigate safeguards for these perceived risks.

The Authority believes this new evidence suggests there may be a strong case for woodland inclusion in the UK ETS. The evidence is summarised below and is published as part of the accompanying Woodland Evidence Annex. We welcome further engagement with stakeholders ahead of aiming to make a decision later this year.

The Climate Change Committee (CCC)

The CCC's recent Seventh Carbon Budget advice recommends a major role for woodland creation in meeting the UK's net zero targets. It recommends more than doubling woodland creation rates, to levels exceeding the combined targets of the four nations of the UK.[25]

[25] CCC Advice on the Seventh Carbon Budget (2025).

In advice published in October 2022 the CCC suggested that, while biological removals such as tree planting have an important role to play in net zero, they did not recommend including them in the UK ETS.[26] In June 2025 the CCC provided updated advice, which continued to recommend against including woodland in the UK ETS.[27] The CCC has argued that:

- Biological removals lack the guarantee of permanence needed for an ETS.
- Afforestation tends to be low-cost meaning ETS inclusion would over-reward landowners for woodland creation.
- Increased UK woodland creation could lead to undesirable outcomes such as monoculture plantations, and upward pressure on land values.

We value the advice of the CCC and take their three concerns seriously. We have therefore explored and developed new evidence on these potential issues. We have used this evidence to assess the risk of negative outcomes, and also to develop potential safeguards to mitigate risks where the evidence suggests they exist. Our overall assessment is that, once carefully designed safeguards are in place, the risk of negative outcomes is low. Therefore, while we agree with the CCC that these issues should be taken seriously, our conclusion is the evidence suggests there is a strong case for woodland inclusion. These findings are outlined below.

Benefits of Woodland Inclusion

There are a range of benefits that incentivising more UK woodland creation can bring through integration into the UK ETS.

The UK's woodland creation targets are 30,000 hectares per year by 2025 and then gradually raising it to 50,000 hectares a year by 2035.[28] The UK is currently not on track to meet these woodland creation targets. In the latest carbon budget advice to government, the CCC emphasise the need to more than double tree planting rates to 37,000 hectares per year by 2030 which would see woodland land cover in the UK increase from 13% today to 19% by 2050.[29]

Analysis by Defra suggests that integrating woodland carbon removals into the ETS could help achieve these targets by creating a strong demand for woodland carbon sequestration from the compliance market. This is a cost-effective carbon budget policy, as it reduces the need for large government grants by leveraging private investment through market demand. Reaching the UK's tree-planting targets would mean woodlands remove 5 million tonnes of CO2 per year by 2050. This is projected to account for approximately 10% of the UK's residual emissions in 2050.[30] Woodland creation also results in co-benefits, including air quality, biodiversity, mental

[26] Climate Change Committee (2022).
[27] Climate Change Committee (2025).
[28] England Tree Planting Increases for 2022/23 – Forestry Commission.
[29] CCC Advice on the Seventh Carbon Budget (Feb 2025).
[30] These figures are quantified using the Woodland Carbon Code carbon calculator, based on afforestation from 2025-2050. They are an underestimate of the carbon stored as they're based on units issued so factor in a 20% reduction for model accuracy and a further 20% reduction for contributions to the WCC buffer. They assume average carbon sequestration based on typical species choices and management approaches across the four nations.

health, recreation and flood regulation benefits. These benefits have been monetised using Defra's natural capital approach,[31] suggesting that ETS integration could generate £3bn in co-benefits by 2050.[32]

Woodland creation is a proven and relatively cost-effective way of removing carbon. By giving businesses in the ETS access to woodland GGRs, we would be providing an additional route to support decarbonisation at least cost.

Risks

The following sub-section outlines the new analysis carried out on the core considerations raised by market participants and the CCC in their advice on woodland inclusion.

Permanence

The Authority commissioned Defra and Forest Research (the research agency of the Forestry Commission) to carry out new analysis into the permanence of UK woodlands, which was independently reviewed by the Trees and Woodland Scientific Advisory Group (academic advisers).[33] The analysis examines both the growth of UK woodlands and the potential loss of woodlands each year to storms, wildfire, pest & disease, and development. It used satellite data to monitor woodland coverage over a 10-year period, and estimate rates of loss, taking into account how many trees are replanted after disturbances of each type.

The results show that while new woodlands continue to be created, currently approximately 0.0038% of all existing woodlands across the UK are lost each year to these four causes. This means that if these rates of loss remained constant – and assuming no woodland regrowth occurs for the next 200 years – on average, 93% of woodland planted today would still be there in 200 years' time. The largest driver of permanent woodland loss is development (0.023%), followed by storms (0.007%), wildfire (0.006%) and pest & disease (0.003%) which have significantly smaller impacts.

These results are the best estimates of the current rates of loss by Defra and Forest Research. We cannot forecast with certainty what the future rates of loss will be, so we have modelled three illustrative scenarios: a Central Scenario, Extreme Natural Disturbance Scenario and a High Development Scenario to explore the scale of the potential risk. Further detail on these scenarios is given in the supplementary Woodland Evidence Annex. Each of these scenarios take into account a 20% buffer, units only awarded for first 100 years, and restocking of woodland losses. They are also likely to be an underestimate because they do not account for ETS liability measures or climate adaptation measures.

The Central Scenario broadly assumes the current rate of woodland loss remains constant. The results show the carbon physically stored by a woodland is projected to remain higher than the amount of units issued for 2,300 years. That is, it takes 2,300 years of reversals for any of the issued removal units to no longer represent stored carbon.

[31] Woodland natural capital accounts, UK - Office for National Statistics.
[32] Enabling a Natural Capital Approach (ENCA).
[33] Trees and Woodlands Scientific Advisory Group: Membership, Minutes and Publications.

The Extreme Natural Disturbance Scenario assumes high rates of storms, wildfires, and pest & disease outbreaks become the norm. The resulting carbon stored remains higher than the amount of units issued for 500 years.

The High Development Scenario assumes long-run development rates are 10 times higher than the central scenario. In this scenario, the carbon stored remains higher than the amount of units issued for 1,100 years.

Overall, the evidence suggests that storing carbon in UK woodlands likely exhibits high levels of permanence.

Cost and Quantities

Cost

The Climate Change Committee (CCC) cautioned whether including woodland in the UK ETS could lead to a potential mismatch between ETS prices, and the costs of planting and maintaining woodland. The concern was that ETS integration could be poor value-for-money as ETS prices could be higher than the costs of woodland creation. However, the evidence suggests high land, labour, and regulatory costs for woodland creation in the UK. At the current Woodland Carbon Code price (£25 per tonne), carbon income is estimated to cover just 17% of the costs of establishing a typical mixed-species woodland over 20 years. Analysis by Defra, described in more detail in the Woodland Evidence Annex, suggests that the cost of incentivising woodland creation such that government can meet its targets is significantly higher (£173 per tonne).

Appropriately priced carbon in the ETS would therefore contribute to making woodland creation a more financially viable option in the UK. However, the ETS alone is not projected to over reward woodland creation, if woodland carbon were to be included in the scheme. In fact, Defra analysis shows that additional grants for co-benefits are needed if the market is to incentivise woodland creation at the efficient level to meet targets. This approach offers a good value for money policy for woodland creation.

The CCC has also suggested that in the longer term ETS prices could rise to the cost of engineered removals, which are projected to be higher than woodland creation costs. They propose safeguards to manage negative consequences, which we will consider as we continue to develop policy in this area.

Quantities

A second potential concern is that the ETS could be oversupplied with allowances from woodland removals. However, the evidence suggests woodland oversupply is highly unlikely, for four reasons:

First, modelling using farm-level data and projected carbon values, suggests ETS is unlikely to over-incentivise woodland creation, due to the cost of woodland creation. Further details on this analysis are given in the Woodland Evidence Annex. The overall quantity of woodland is therefore unlikely to exceed the 2050 targets.

Second, even if all woodland targets are met, woodland carbon would make up only a small proportion (approximately 10% by the end of the 2030s) of total ETS allowances in the market, assuming the current scope of the scheme is maintained.[34]

Third, whatever level of supply of woodland removals ended up entering the market, the Authority's decision to maintain the cap would limit any market impact. This approach means that an emissions allowance would be removed for every removal allowance integrated. It would ensure no source of removals, including woodland, would impact the total number of allowances in the ETS and therefore adversely impact market stability.

Fourth, if woodland removals were to be included in the ETS, the Authority could combine this with an additional, woodland-specific safeguard in the form of a Woodland Cap on allowances. A Woodland Cap would provide a final guarantee, in additional to all other measures, that the quantity of woodland removals entering the system could not exceed a given level, and therefore destabilise the system.

Wider Impacts

The following concerns were raised on wider impacts, and we have assessed the extent to which they could occur.

- **Poor quality woodland** (potential increased monocultures and loss of biodiversity) – UK Forestry regulations set a firm upper bound of 65% of any one species, ruling out the creation of monocultures. Incentives for ensuring this include the Woodland Carbon Code's carbon calculator and UK Forestry Standard, which monitor diverse species mix and incentivise woodlands with added public benefits like flood management.

- **Food security** (food production reduced due to competition with woodland). UK wide woodland creation targets have been set at levels consistent with maintaining food security. The National Food Strategy (2021) found that the 10% least productive farmland grows only 1% of the UK's calories and by comparison the total woodland creation target represents 5.5% of the UK's total agricultural land. Therefore, the UK can grow enough forest on the least productive land to reach net zero targets.[35] Details of this are explored further in the Woodland Evidence Annex.

- **Social impacts** (Welsh language impacted through displacement of communities). Woodland creation is unlikely to cause negative social impacts. Evidence shows it largely results in co-benefits, including air quality, biodiversity, mental health, recreation and flood regulation benefits. Stakeholder engagement suggests language loss is unlikely.

- **Increased land values** (Increased purchase of land for woodland creation driving competition for land). ETS integration would likely impact the types of land where new

[34] Net Zero Strategy (2021).
[35] United Kingdom Food Security Report 2024: Theme 2: UK Food Supply Sources.

woodlands are created, and therefore marginal land, that is currently low-value land, may increase in price.

- **Carbon leakage** (the displacement of carbon emissions due to woodland creation in one area, leading to increased farming or deforestation in another). At the project level this is mitigated through the WCC Project Design Document which records land use change and impacts beyond the specific project boundaries. At the UK level, deforestation and habitat loss are protected in legislation,[36] while agricultural intensification is managed by Defra to reduce nationwide emissions.[37] At the international level leakage will also be low due to UK afforestation utilising the low-yield agricultural land, limiting additional agricultural imports occurring as a result of increased woodland creation.

Woodland: Potential Policy Package

If the Authority were to include high quality UK woodland in the UK ETS, it could be done as outlined below. The Authority is setting this out so that stakeholders can assess any remaining risks to woodland inclusion in the context of the evidence above and the specific policy safeguards proposed below. No decision has been made on whether high quality UK woodland will be included in the UK ETS. If the Authority were to respond in favour of including high quality woodland later in the year, further detail around these components will be outlined.

1. The Authority would introduce a Woodland Cap. This would be a fixed limit on the number of woodland allowances that could enter the UK ETS over a given timeframe.
2. Only new woodland would be eligible, with allowances awarded ex-post (i.e. once the removal has taken place). Based on woodland growth and carbon sequestration rates, this means the earliest allowances would be awarded is 5 years after planting, and most allowances are awarded 15 years after planting.
3. All components of the permanence framework would apply to woodland. The Authority commissioned Defra and Forest Research to explore the permanence of UK woodlands managed under the Woodland Carbon Code to ensure they were suitably durable and could meet the and could meet the 200-year minimum storage period. Woodland would be required to contribute to the buffer pool. The Woodland Carbon Code has a flat 20% contribution rate for all woodland operators. This could be increased if the evidence suggested this was required. Woodland would be subject to a liability measure to account for reversal events.
4. Woodland allowances could be differentiated from other allowances, including removals.
5. Woodland MRV would be based on the Woodland Carbon Code. This could be adapted to suit ETS integration.

[36] Wildlife and Countryside Act (1981).
[37] Due diligence requirements were added to the Environment Act (2021) to tackle illegal deforestation in UK supply chains.

Peatland Restoration

The Authority acknowledges there are benefits to peatland restoration. However, peatland restoration will not be included in the UK ETS at this stage, because peatland restoration currently represents a reduction of emissions rather than an overall removal.[38] Therefore, it does not currently fall within the Authority's definition of removals to be integrated into the UK ETS.

[38] Peatland Code | IUCN UK Peatland Programme.

Pathway to Integration

The Authority will aim to legislate to integrate removals in the UK ETS by the end of 2028, aiming for integration to be operational by the end of 2029 subject to consideration of appropriate legislative powers, regulatory assessments and further consultation.

The Authority will not implement controls on the way removals are used for compliance, e.g. limits on the proportion of surrendered allowances than can be from removals.

The Authority will adopt transitional supply controls consistent with the net zero pathway for GGRs.

The Authority confirms that there will not be a separate market for removals, consistent with proposals in the consultation.

Summary of Proposal

This section covers the proposals set out in the Pathways to Integration section of the consultation. This section covers two key aspects of integration:

1) Timing – this relates to the point in time from which GGRs that meet the market participation requirements are allowed to enter the UK ETS market.

2) Degree of integration – this considered whether there will be any supply restrictions on GGRs entering the UK ETS and/or demand restrictions on who can buy GGRs and how they can be used in the ETS.

The consultation asked stakeholders to provide feedback on the following questions.

Questions

30. Do you agree with the Authority's assessment that, by maintaining the gross cap on emissions, additional controls could be used to target wider impacts but not mitigation deterrence?

31. To what extent will GGR operators seek to sell into voluntary markets and will this provide a control on GGR supply entering the UK ETS?

32. Should the Authority consider the use of demand controls to target any impacts other than mitigation deterrence?

33. Do you agree with the Authority's minded to position to adopt supply controls to target other objectives, such as phasing GGR integration or addressing market impacts? Please consider how supply controls can be used in a way that is compatible with providing a strong demand signal for GGRs.

34. What would be the optimal timing for GGRs to be integrated into the UK ETS, taking into account the considerations set out above? Please explain your answer with reference to impacts on both the UK ETS and GGR deployment.

Stakeholder Responses

There were 108 responses to the question 34 on the timing of integration. 80 stakeholders (74%) expressed that optimal timing for integration was as soon as it was feasible for the Authority. 38 stakeholders (35%) noted that this signal would provide a strong demand signal and therefore support investment. Six stakeholders (6%) stated integration should be delayed to after 2030 due to concerns with MRV, business models and infrastructure.

There were 65 responses to question 30, with 48 respondents (74%) agreeing that by maintaining the cap, additional measures should focus on wider impacts and not mitigation deterrence. There were 86 responses to question 31. 61 respondents (71%) suggested operators would still seek to sell on the voluntary carbon market, providing the price was competitive. Seven respondents (8%) note how the option of selling into the voluntary carbon market could act as a natural supply control, but that this should not be relied upon by the Authority.

Question 32 had 70 responses, with 32 respondents (46%) not in favour of any demand controls. 24 stakeholders (34%) were supportive of introducing an obligation on those covered by ETS obligations to purchase a given number of allowances from removals. 11 (16%) suggested that the Authority should restrict demand, by placing a limit on the proportion of a firm's compliance obligation that can come from removals.

On question 33, 41 out of the total 80 respondents (51%) were in favour of the minded to position to adopt supply controls. 18 respondents (23%) recognised that supply controls would help manage market impacts and eight (10%) saw supply controls preventing any oversupply of removal credits into the market. 29 respondents (36%) were not in favour of supply controls, citing there were already sufficient controls in the market with the cap approach. Five stakeholders (6%) not in favour of supply controls caution that this market intervention may restrict investment and demand for removals.

Government Response

Timing

Proposal: The Authority will aim to legislate to integrate removals in the UK ETS by the end of 2028, aiming for integration to be operational by the end of 2029 subject to consideration of appropriate legislative powers, regulatory assessments and further consultation.

The Authority intends the GGR Standard to provide MRV for removals entering the ETS. This means the GGR Standard will need to be in place with verifiers accredited, ahead of integration of removals being operational within the scheme. Removals being operational means that firms can have their removals calculated according to the UK GGR Standard, be verified by accredited third party verifiers and be awarded with an ETS allowance to sell on the UK ETS market. We will aim to have this overall system operational by the end of 2029. These timeframes are subject to further consultation. They are also subject to the identification or taking of appropriate powers, consideration of potential interactions with GGR funding models

and the completion of any regulatory assessments required (including any required in connection with the Subsidy Control Act 2022).

The Authority saw no strong rationale to delaying integration to post-2030, as this could weaken the demand signal for removals and reduce investment.

Supply Controls

Proposal: The Authority intends to implement transitional supply controls to ensure market stability and overall value for money during integration.

These supply controls will place a limit on the number of GGRs that can enter the UK ETS market. The limit will be consistent with net zero targets across the UK and align with updated carbon budget delivery plans.[39]

The Authority recognises the benefits of providing market certainty for removal operators. We would therefore aim to design supply controls in a way that gives as much certainty over future market access as possible, to support investment decisions. We will seek stakeholder views on the details of how supply controls could be designed in our next consultation.[40]

Demand Controls

Proposal: The Authority will not implement controls on the way removals are used for compliance, e.g. limits on the proportion of surrendered allowances than can be removals.

The Authority confirms that there will not be a separate market for removals, consistent with proposals in the consultation.

This means we will not introduce minimum removal purchasing requirement (referred to as a sub-mandate) or restrictions on how removals can be used for compliance once they have entered the UK ETS.

The Authority is keen to encourage demand for GGRs in the UK ETS and ensure wherever possible the market is not complicated or distorted by restrictions. The Authority also recognises the importance of the market determining the price for GGRs. For these reasons, the Authority does not intend to introduce demand controls, as an open and competitive ETS market will best support investment and growth in GGR projects.

Additionally, as outlined in the previous sub-section the Authority intends to implement transitional supply controls, which achieve many of the key objectives of demand controls. Implementing both demand and supply controls would lead to unnecessary market distortion.

[39] For example, the Net Zero Strategy (2021) and updated Carbon Budget Delivery Plan (2023). UKG will deliver an updated plan that sets out the policy package out to the end of Carbon Budget 6 in 2037 for all the sectors in due course. This will outline the policies and proposals needed to deliver Carbon Budgets 4-6 and our NDC commitments on a pathway to net zero.

[40] Supply controls combined with the lack of demand controls means our overall proposal for GGR integration corresponds approximately to the ‘connected with restrictions’ option in La Hoz Theuer et al (2024).

The Authority recognises that a sub-mandate could be introduced in the future, as a way of increasing demand for removals in the ETS. However, since this could place additional costs on ETS compliance entities, a sub-mandate is not being considered for initial integration.

This publication is available from: www.gov.uk/government/consultations/integrating-greenhouse-gas-removals-in-the-uk-emissions-trading-scheme

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