

Free Allocation Review

Final Impact Assessment



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Contents

Introduction	5
1. Purpose of this document	5
2. Summary of the final policy position	5
3. Expected impacts	6
4. Notes	6
Regulatory scorecard for the final policy	7
Part A: Overall and stakeholder impacts	7
Part B: Impacts on wider government priorities	10
Strategic case for the review	11
5. The problem under consideration	11
6. Policy objectives	13
Policy overview	13
7. Free allocation policy in the first allocation period	13
8. The introduction of the UK CBAM from 2027	15
9. Proposals considered	15
10. Detailed policy options	18
Changes to ALCs	19
Changes to benchmarks	22
Changes to the carbon leakage list and the application of the carbon leakage exposure factor	25
Consideration of the availability of decarbonisation technologies	31
Consideration of conditionality	33
FA for CBAM-covered sectors	35
11. Policy packages taken forward	38
Policy cost-benefit analysis	41
12. Analytical approach	41
13. Summary of the modelling platform	44
14. Identifying costs and benefits	45
15. Analysis results	48
Free allocation impacts	48
Emission impacts	52
Cost-benefit analysis	56
16. Analytical justification for the final policy position	64
17. Impacts on businesses	65

18.	Impacts on households	66
	Uncertainty	68
19.	Risks, limitations and assumptions	68
	Post-2030 UK ETS policy	68
	Future abatement technologies	72
	Market uncertainty	74
	Appraisal carbon values	75
	Benchmark uncertainty	76
	Optimism bias	79
	Switching values	79
	Indirect impacts and the modelling approach	80
	Additional assessments	81
20.	Small and Micro Business Assessment (SaMBA)	81
21.	Trade Assessment	83
22.	Equalities Impact Assessment	85
23.	Monitoring and evaluation plan	86
	Annex A: Modelling methodology	88
24.	Free Allocation model	88
25.	Industrial Competitiveness and International Carbon Leakage model	94
26.	Carbon Markets Model	99
27.	Cost Benefit Analysis model	100

Introduction

1. Purpose of this document

- 1.1. This Impact Assessment (IA) accompanies the UK ETS Authority (henceforth 'the Authority) Response to the Free Allocation Review (FAR) consultation, published in December 2023, and the interim consultation related to carbon leakage in December 2024.^{1,2}
- 1.2. Following extensive stakeholder engagement, policy development and analysis, the Authority confirms the implementation of a number of technical changes to the Free Allocation (FA) calculation in the UK Emissions Trading Scheme (UK ETS) from the start of the second allocation period, in 2027,³ and the indicative phase-out of FA for Carbon Border Adjustment Mechanism (CBAM) covered sectors beyond 2030.
- 1.3. This document covers the analytical assessment of this position, including a full cost-benefit analysis of each short-listed policy package, a Small and Medium Business Assessment (SaMBA) and a trade assessment.
- 1.4. It has been agreed by all four devolved governments of the United Kingdom.

2. Summary of the final policy position

- 2.1. The final policy position of the FAR can be found in the Authority Response to the consultation, which accompanies this impact assessment.
- 2.2. Key decisions include:
 - Operators able to choose to have activity data for the years 2020 or 2020 and 2021 excluded for the purpose of determining historical activity level (HAL) for the 2027-2030 allocation period.
 - The retention of current benchmarks for 2027, with the in principle intent to adopt updated EU benchmark values from 2028-2030.
 - Retaining the current carbon leakage list⁴,
 - No introduction of tiering of free allocation for sectors at risk of carbon leakage,
 - No early phase out of free allocations for sectors not on the carbon leakage list,

¹ [UK Emissions Trading Scheme: Free Allocation Review](#)

² [UK Emissions Trading Scheme: Free allocation review - carbon leakage consultation](#)

³ As set out in December 2024, the Authority has confirmed that the start of the second allocation period for stationary installations has moved from 2026 to 2027, in line with the introduction of the UK Carbon Border Adjustment Mechanism: [UK Emissions Trading Scheme: Moving the UK ETS Second Free Allocation Period](#)

⁴ With the exception of temporary amendments made to the list for 2024 – 2026.

- No additional methodologies to be introduced in 2027, which would introduce conditions on the provision of free allocation. With a pathway set out to reconsider their introduction for future allocation periods, and
- A gradual phase out of free allocations for sectors covered by the UK Carbon Border Adjustment Mechanism beginning in 2027, with an indicative phase out trajectory of 9 years.

3. Expected impacts

- 3.1. This IA draws on both quantitative modelling and qualitative analysis to build a holistic view of expected impacts. Given the limitations and complexity of the economic modelling, qualitative insights are used to supplement and refine the assessment.
- 3.2. Monetised appraisal impacts are drawn from Carbon Markets Model (CMM), with some additional supportive quantitative analysis from the Industrial Competitiveness and International Carbon Leakage (ICICL) model, both held by the Department for Energy Security and Net Zero (DESNZ).
- 3.3. The central assessment estimates the Net Present Social Value (NPSV) of the final policy at £9.8 billion, though unquantified impacts could lower this figure. These results are entirely dependent on our assumption that allowances that would have been given out for free are now retained by the Authority, given there is no automatic route for these accrued allowances to enter the market.
- 3.4. ICICL analysis indicates that while emission impacts are likely to vary by sector, the total emissions associated with UK consumption could feasibly fall. However, this analysis carries significant uncertainty.
- 3.5. Given a significant level of uncertainty, we have undertaken extensive sensitivity testing, which estimates that the monetised NPSV could conceivably range from £3.3 billion to £16.4 billion, depending on various external factors.
- 3.6. In addition to the net impacts, economic transfers may occur between sectors, as those receiving FAs may sell their allowances for a price which is above their marginal abatement costs, to sectors facing higher abatement costs.

4. Notes

- 4.1. Regulations which fall under The Greenhouse Gas Emissions Trading Scheme Order 2020 are imputed tax-and-spend measures. As such, this impact assessment falls outside of the scope of the Regulatory Policy Committee (RPC).
- 4.2. This document follows on from the previous Analytical Annexes published alongside FAR consultations and Authority responses.^{5,6}

⁵ [Analytical Annex to the Free Allocation Review](#)

⁶ [Free Allocation for CBAM Sectors: analytical annex](#)

Regulatory scorecard for the final policy

Part A: Overall and stakeholder impacts

(1) Overall impacts on total welfare		Directional rating
		Note: Below are examples only
Description of overall expected impact	We expect the overall impact of the final policy position to be positive, given the significant monetised benefits of emission reductions. These benefits are only partially outweighed by the additional costs of abatement. However, there are a number of uncertain impacts that have not been monetised, which could change this outcome.	Positive Based on all impacts (incl. non-monetised)
Monetised impacts	The central estimate for the Net Present Social Value (NPSV) is £9.8 billion, with a broad uncertainty range of £16.4bn - £3.3bn. Monetised impacts include the emission reductions across all UK ETS sectors (including those who are not eligible for FA) due to lower total allowance supply, and the abatement costs of those emission reductions. Any separate decision to re-introduce forgone free allowances into the auction share could partially erode the net positive impacts created by the FAR. The positive NPSV reflects the outcomes of greater exposure to the carbon price, with the cost of compliance (either through the carbon price or abatement) being significantly lower than the value of abatement to society.	Positive Based on likely £NPSV
Non-monetised impacts	Familiarisation costs to business: Expected to be negligible compared to the monetised impacts. Administration costs to government: Expected to be negligible, with no significant impact on the way in which HMG or regulators undertake their engagement with the UK ETS. Indirect impacts: Based on previous evaluation evidence of the inability for sectors exposed to carbon leakage to pass on costs to consumers, our working assumption is that all costs are incurred to business, with no indirect impacts. However, in the instance	Negative

	where businesses can pass on these costs to consumers, this could result in higher prices and a reduction in consumer surplus. We also note the potential for reductions in UK production levels, with a loss of profits which may be transferred abroad. Given the significant uncertainty associated with these impacts, we consider an alternative appraisal methodology in Section 19. International emissions: We are unable to robustly quantify the change in international emissions (from both import and export markets) due to the policy change. This is highly uncertain and dependent on specific sector contexts. However, based on quantitative ICICL modelling presented in this assessment, we estimate the international emissions associated with UK consumption could feasibly fall in response to the reduction in FA, principally due to the role of the CBAM. Enabling benefits: The final policy position has been agreed with due regards to linking. Any policy option which facilitates a successful linking arrangement with the EU ETS will enable the benefits of linking. A linked carbon market would offer long-term benefits including price stability, increased liquidity, and reduced compliance costs for UK operators. Market engagement: Given the reduction in FA, this could lead to more operator engagement in primary and secondary allowance markets. This could include operators engaging for the first time or increasing the level of engagement, both of which could incur time costs for business.	
Any significant or adverse distributional impacts?	A change in FA could result in economic transfers between sectors, although the net impact would be neutral. However, given the uneven distribution of sectors through regions of the UK, we may see some economic transfers from one region to another.	Neutral

(2) Expected impacts on businesses

Description of overall	By reducing FA across all sectors, we increase exposure to the prevailing carbon price, and this will	Negative
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business impact	have an impact in increasing business costs in the short run, either through higher abatement or purchasing a greater number of allowances on the market. Some sectors will see greater increases in exposure than others. In the long-run, business impacts are more uncertain, but it is plausible that we could observe reductions in running costs due to the higher efficiency of new low-carbon technologies.	
Monetised impacts	We estimate an Equivalent Annual Net Direct Cost to Business (EANDCB) of £92 million, which includes the additional cost of abatement and purchasing of UKAs. The costs of familiarisation are negligible compared to the monetised impacts. This assessment of the EANDCB may be over-estimated, due to our central assumption on the inability for business to pass on costs to the consumer. As such, we assume all compliance costs are borne by business.	Negative Based on likely business £NPSV
Non-monetised impacts	We have not estimated familiarisation / administrative costs on the basis of proportionality. These are expected to be negligible.	Neutral
Any significant or adverse distributional impacts?	A change in FA may result in economic transfers between sectors; however, the overall net impact is expected to remain neutral. Typically, we would anticipate transfers from sectors with high marginal abatement costs towards those with lower marginal abatement costs.	Neutral

(3) Expected impacts on households

Description of overall household impact	Impacts are highly uncertain and depend on the extent of cost-pass through from business. Based on previous UK ETS evaluation evidence, sectors exposed to carbon leakage find it more challenging to pass on costs to consumers. As such, our working assumption is that all costs are incurred to business, with no indirect impacts to households. However, if businesses can pass on these costs to consumers, this could result in higher prices and a reduction in consumer surplus. Based on ICICL modelling, we estimate that cost-pass through for most sectors could feasibly be at 80-90% of the change in	Uncertain
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	carbon costs, although this is highly uncertain and expected to be an over-estimate. Additionally, any increase in the carbon price due to a reduction in the total supply of allowances could have an impact on compliance costs for wider UK ETS participants.	
Monetised impacts	N/A	Uncertain Based on likely household £NPSV
Non-monetised impacts	A loss of consumer surplus through higher prices, which would be negative if costs are passed on.	Uncertain
Any significant or adverse distributional impacts?	N/A	Uncertain

Part B: Impacts on wider government priorities

Category	Description of impact	Directional rating
Business environment: Does the measure impact on the ease of doing business in the UK?	In the short term, this measure may introduce transitional challenges for UK businesses receiving FA. However, the UK ETS Authority has clearly signalled that FA will need to fall in line with the industry cap, and the announcement of this measure provides businesses with the certainty needed to plan effectively for the second allocation period and to re-evaluate their abatement strategies. Over the longer term, this measure has the potential to unlock opportunities for UK industry to adopt new abatement technologies and strengthen its competitive position in low-carbon production.	Neutral
International Considerations:	Reducing FA could affect trade through a few different channels, although WTO compliance is not expected to be an issue. For those sectors covered by the CBAM, a reduction in FA will support the transition toward	May work against

Does the measure support international trade and investment?	the CBAM becoming the principal mechanism for mitigating carbon leakage. This will incentivise low-carbon imports and disincentivise high-carbon imports. For those sectors not covered by the CBAM, a reduction in FA could reduce the international competitiveness of UK firms, which is likely to result in greater quantities of imports. However, the CBAM can only mitigate against import leakage and is not an export leakage mitigation measure. A reduction in FA could affect the international competitiveness of UK exports. Further information on the UKG strategy for addressing export leakage is detailed in the Authority Response.	
Natural capital and Decarbonisation: Does the measure support commitments to improve the environment and decarbonise?	This policy is expected to contribute towards emission reductions required by the UK's legally binding carbon budget targets. This is driven by the reduction in the total supply of allowances. Any separate decision to re-introduce forgone free allowances into the auction share could partially erode the emission savings created by the FAR. However, the impact on international emissions is uncertain. Quantified analysis suggests that for emissions associated with UK consumption (including imports), emissions could feasibly fall. We are not able to assess the impacts on export leakage.	Supports

Strategic case for the review

5. The problem under consideration

- 5.1. Free allocation of UK ETS allowances is the main policy instrument through which carbon leakage risk is currently addressed in the UK. The UK ETS Authority defines 'carbon leakage' as the movement of production and associated emissions from one country to another due to different levels of decarbonisation effort, through carbon pricing and climate regulation.
- 5.2. The provision of free UK ETS allowances means that an operator needs to buy fewer allowances to cover their emissions, in effect, reducing the carbon price they pay and mitigating the risk of industrial carbon leakage. Evidence suggests that to date, free allowances have been important for energy intensive industries to

maintain operations in the UK, whilst having a lower effect in relatively less energy intensive industries.⁷

- 5.3. Whilst limiting firm exposure to the carbon price, the incentive to decarbonise is maintained as, in general, recipients of FA that decarbonise keep any surplus FAs. They can sell these on the secondary market to their benefit or save for use in the future. The benchmarking methodology also further incentivises decarbonisation as the most efficient installations will have a greater proportion of their emissions covered by FA.
- 5.4. That being said, the UK has committed to legally binding carbon budget targets on its pathway to Net Zero by 2050, and as the total UK ETS cap declines overtime, the level of FAs will also need to decline. To ensure the carbon price signal is maintained, the UK ETS utilises an industry cap,⁸ with the backstop tool of a Cross Sectoral Correction Factor (CSCF).
- 5.5. If FA exceeds the industry cap over the entirety of an allocation period, with insufficient allowances remaining in the flexible reserve, the CSCF is triggered, bluntly reducing each sector's share of FA, regardless of carbon leakage risk. In any event, this would reduce production and investment certainty for industry.
- 5.6. Separately, the UK Government has planned for the introduction of the UK Carbon Border Adjustment Mechanism (CBAM) in 2027; which will provide an alternative carbon leakage mitigation measure for those sectors who are covered. In order to ensure a smooth transition of carbon leakage mitigation from FA to the CBAM, FA needs to decline overtime.
- 5.7. As such, there are clear economic rationales for intervention through FA policy to address market failures:
 - The primary rationale for intervention is to address the social and environmental costs of greenhouse gas emissions from UK ETS sectors affected by FA policy, and to support UK ETS objectives. This review aims to better target FA policy toward sectors most at risk of carbon leakage and further mitigates negative production externalities.⁹ While carbon leakage has no effect on the UK's legally binding carbon budgets, emissions, regardless of origin, still harm the UK population as a social and climate cost.
 - Ensuring that industrial sectors can take advantage of knowledge and productivity spillovers, which are positive externalities, through a reduction in the deployment costs of clean technologies. The Authority seeks to ensure that this decarbonisation incentive remains sufficiently strong through the effective targeting of FA.
- 5.8. The FAR considers how the Authority can use FA to better target carbon leakage mitigation and incentivise further decarbonisation across the next allocation period.

⁷ [Evaluation of the UK Emissions Trading Scheme: Phase 1 report](#)

⁸ A proportion of allowances that are set aside to be distributed for free in each year

⁹ Negative externalities occur when production and/or consumption impose external costs on third parties outside of the market for which no appropriate compensation is paid. This causes social costs to exceed private costs.

- 5.9. If the Authority does not intervene with changes to FA rules, there are three notable implications:
- Incentives to decarbonise industrial production may not be sufficient to promote investments in green technologies, particularly in hard-to-abate sectors.
 - FA levels remain at current levels, resulting in a greater risk of exceeding the industry cap and drawing on the flexible reserve to avoid triggering a reduction in each sector's share of FA through the Cross Sectoral Correction Factor. This would reduce production and investment certainty for industry.
 - For those sectors covered by the CBAM, retaining FA at current levels would limit the role of CBAM in mitigating carbon leakage risk.

6. Policy objectives

- 6.1. As stated in the 2023 FAR consultation, the objective of the review is to focus on changes to the methodology for distributing FAs, ensuring that support is better targeted for sectors most at risk of carbon leakage, in the context of UK industry and within the bounds of the new net zero consistent industry cap.
- 6.2. These bottom-up changes will be implemented to take effect from 2027 during the second allocation period of the UK ETS.
- 6.3. Given this, we have defined three key SMART objectives, which are:
- Obtaining evidence that the changes made as part of the FAR are not resulting in increased carbon leakage.
 - Ensuring that the CSCF is not triggered in the second allocation period.
 - Observing clear evidence that the CBAM rate charged on imported goods covered by the CBAM is rising in line with a reduction in FA.
- 6.4. We discuss our plan to assess progress against these objectives in Section 23.

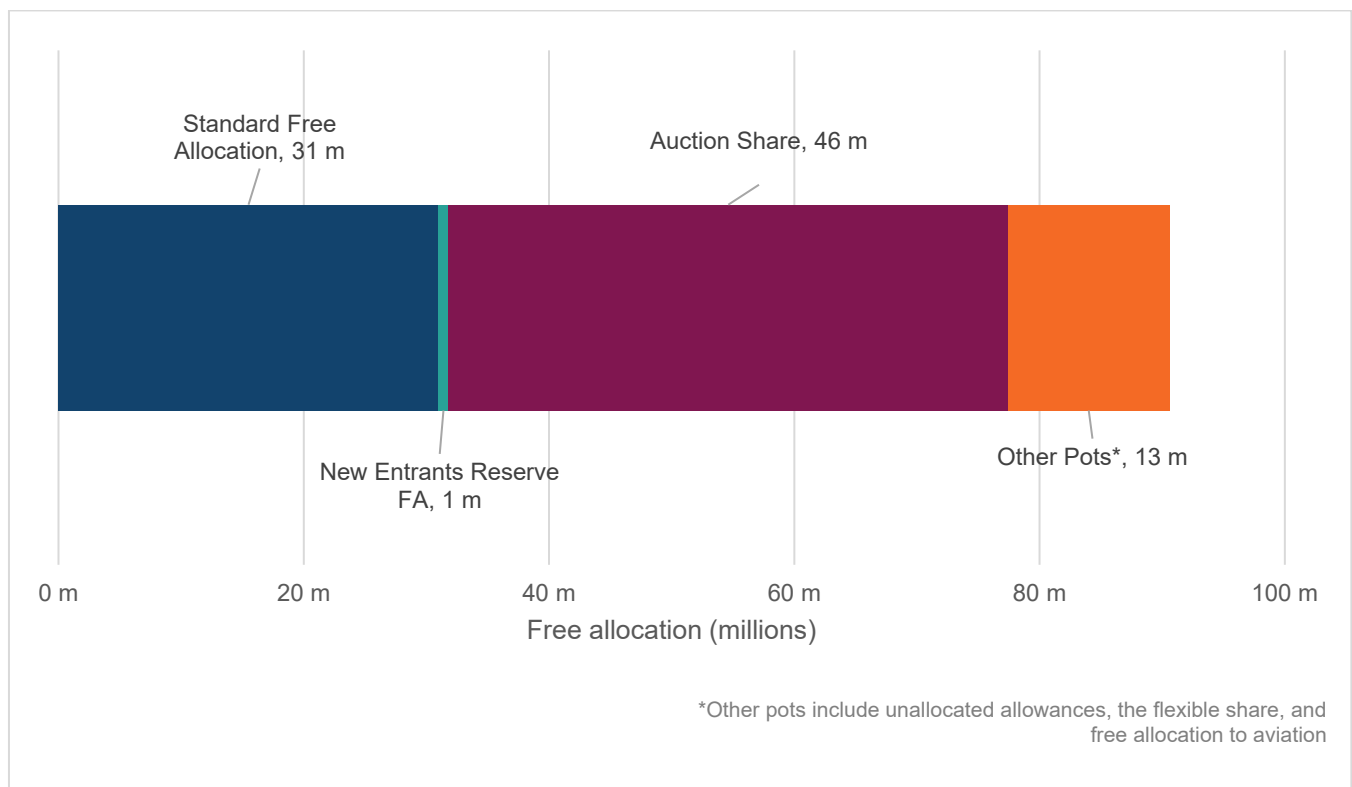
Policy overview

7. Free allocation policy in the first allocation period

- 7.1. Total scheme allowances are distributed into different pots for different purposes, as shown in Figure 1, including the auction share and free allocation, whereby allowances are given to operators for free to help mitigate the risk of carbon leakage.¹⁰

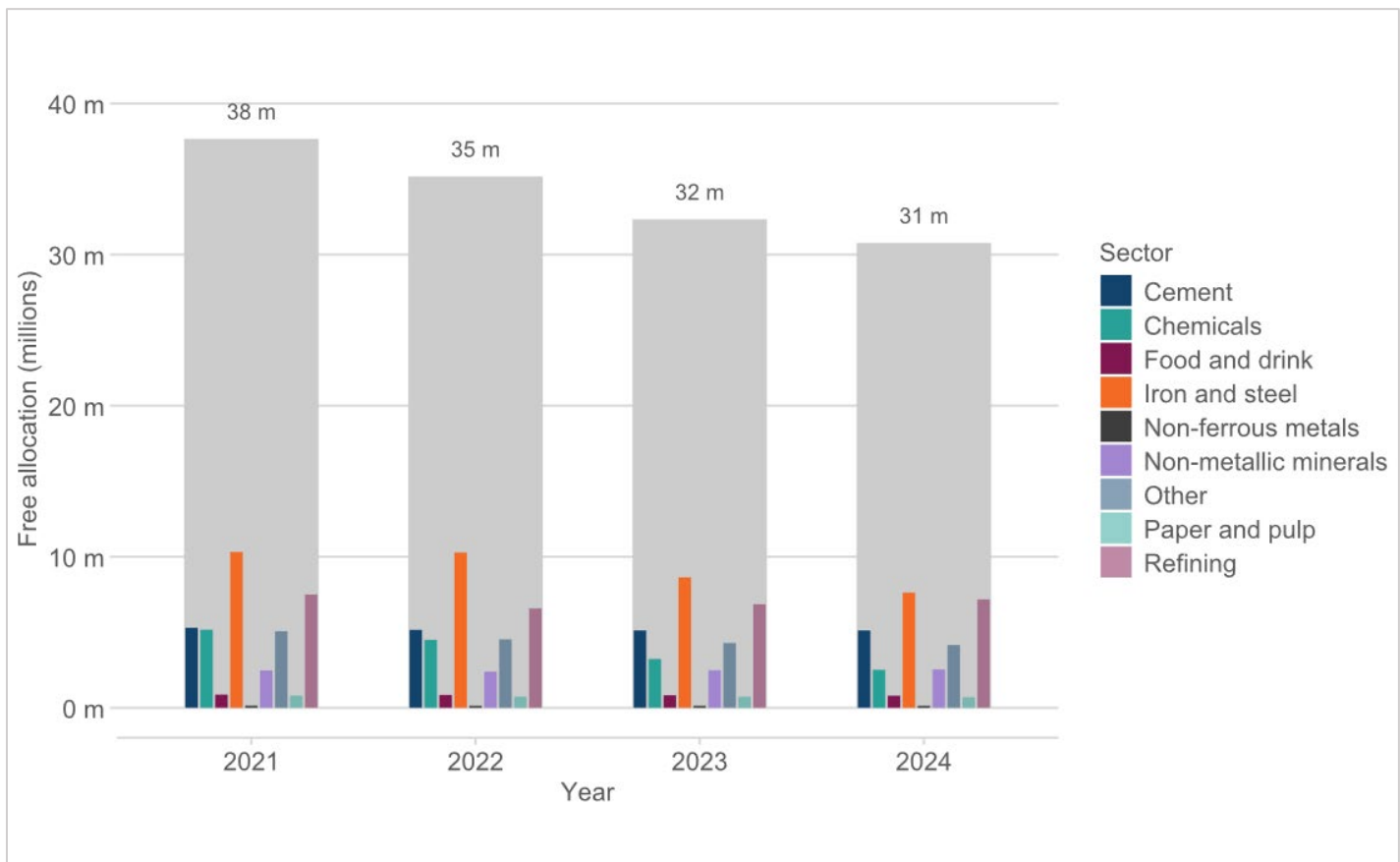
¹⁰ A full description of the latest UK ETS allowance purposes and reserves are detailed in [Developing the UK Emissions Trading Scheme: Main Response](#) (2023)

Figure 1: The total number of allowances distributed within the annual cap for 2024



- 7.2. The approach to FAs for stationary installations in the first allocation period under the UK ETS prioritised continuity for operators and largely carried over methodology from the EU ETS Phase IV. Details of the current methodology can be found in the Authority Response.
- 7.3. As a result of the methodology and the number of participants in each sector, FA can vary significantly between sectors. FA levels are expected to be relatively constant throughout an allocation period.
- 7.4. Figure 2 outlines the distribution of free allowances by sector in previous scheme years, with the recent overall reduction largely driven by reductions in activity within the iron and steel sectors, which has historically received the largest amount of FA.

Figure 2: The total number of FAs by sector and total, 2021-2024



8. The introduction of the UK CBAM from 2027

- 8.1. The UK Government will introduce the UK CBAM on 1 January 2027. This will ensure highly traded, carbon intensive products that are imported from overseas face a comparable carbon price to that which would have been payable had they been produced in the UK, so that UK decarbonisation efforts lead to a true reduction in global emissions rather than simply displacing carbon emissions overseas.
- 8.2. The UK CBAM will place a carbon price on some of the most emissions intensive industrial goods imported to the UK from the aluminium, cement, fertiliser, hydrogen and iron & steel sectors that are at risk of carbon leakage. Within these sectors, the UK CBAM will only apply to specific imported 'CBAM goods'.
- 8.3. The UK CBAM will work cohesively with the UK ETS. That includes on free allowances, where the methodology to determine the UK CBAM rate will reflect the availability of free allowances.
- 8.4. Further information on the UK CBAM can be found on GOV.UK.

9. Proposals considered

- 9.1. Since 2023, the Authority has consulted on a wide range of proposals across the FA methodology as part of the FAR. As part of the first Authority response, the UK

Government has now legislated for moving the start of the allocation period from 2026 to 2027 and permanent cessations.¹¹

9.2. The Authority response accompanying this IA covers the remaining areas for which we sought stakeholder views, covering:

- Changes to Activity Level Changes (ALCs)
- Changes to benchmarks
- Changes to the carbon leakage list (CLL) and the application of the carbon leakage exposure factor (CLEF)
- Consideration of availability of decarbonisation technologies
- Consideration of conditionality
- Introducing a phasing-out / down FA for sectors covered by the UK CBAM
- Technical changes to policy implementation¹²

9.3. Each individual policy option has been assessed against a set of Critical Success Factors (CSFs) and considered thoroughly by the Authority based on our extensive stakeholder engagement and analysis. CSFs are the attributes that any successful proposal must have, if it is to achieve successful delivery of its objectives, as per HMT Green Book guidance.¹³

9.4. The CSFs used to assess the options long-list were chosen to ensure that the FAR was able to deliver against its objectives, whilst considering wider factors. These CSFs are aligned with those used in the qualitative assessments of options in the Analytical Annex on FA for CBAM sectors.¹⁴ These are listed in Table 1.

Table 1: The CSFs used to assess the full range of policy options

Critical Success Factors (CSFs)	Description
Carbon leakage mitigation	FA aims to mitigate the risk of carbon leakage – the displacement of emissions due to carbon pricing policies – while retaining incentives for effective decarbonisation and lower emissions. We have assessed the impact of each policy decision in terms of how well they may mitigate carbon leakage, including in the UK domestic market, international markets in which UK producers compete (export leakage), investments, or leakage to downstream products.
Impact on ETS effectiveness	The scheme will continue to be an important lever for delivering an economically efficient transition to net zero. Appropriate pricing of emissions in accordance with the polluter pays principle incentivises decarbonisation and green innovation. This gives businesses covered

¹¹ An installation ceasing operations if a regulated activity is no longer being carried out under the UK ETS.

¹² The Authority Response provides further detail on the decision regarding technical changes, which are not evaluated against CSFs due to the technical nature of the proposals

¹³ [The Green Book \(2022\) - GOV.UK](#)

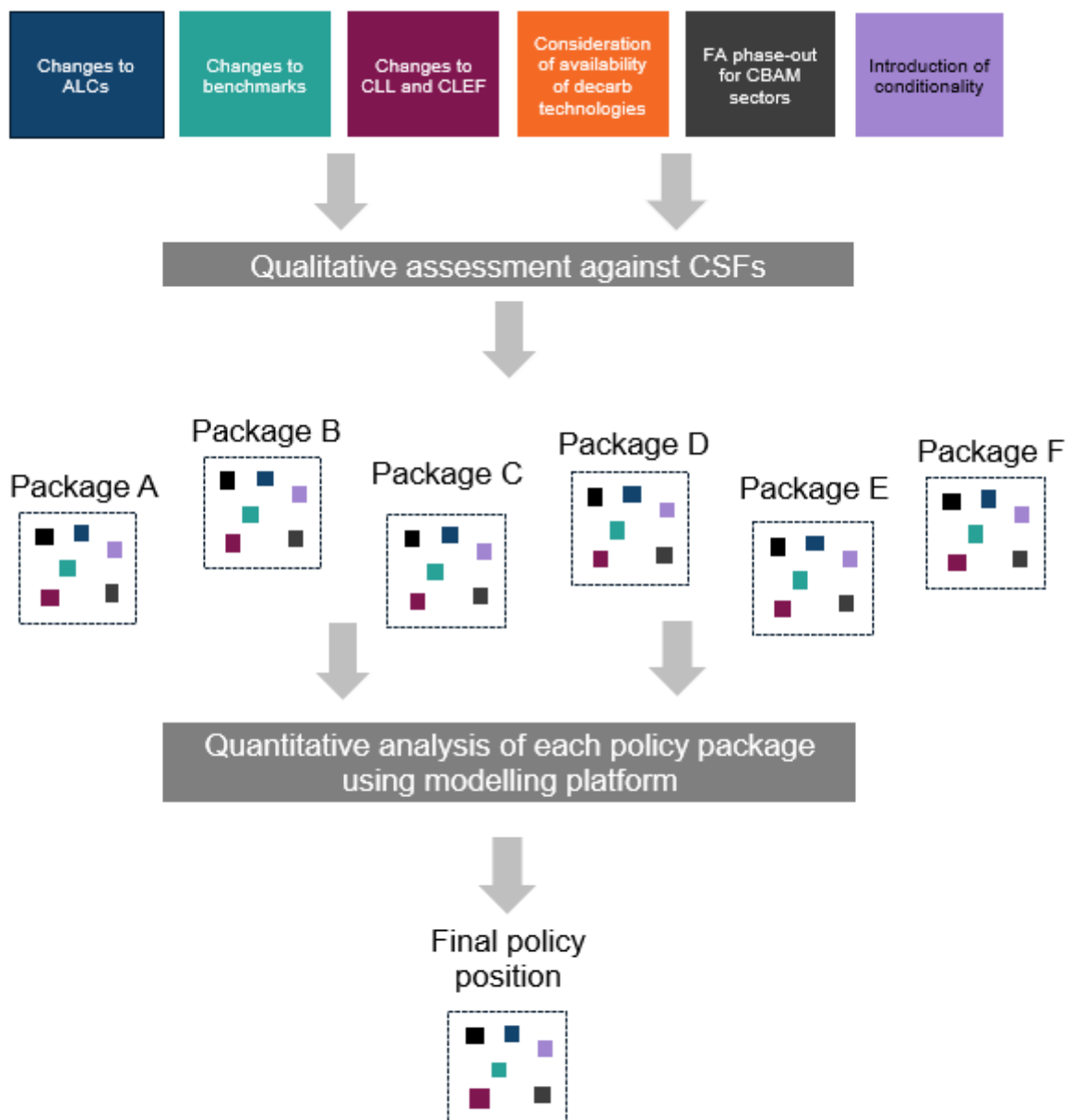
¹⁴ [Analytical Annex: Free Allocation for CBAM Sectors](#)

	by the UK ETS the flexibility to decide how to decarbonise most effectively. It does so at least cost across the sectors covered by the scheme while providing revenue to help fund public services, including to support the net zero transition. ¹⁵
Technical feasibility	To what extent can options be implemented consistently and operate within ongoing rules and reporting requirements; do they add complexity or challenges or align with the implementation of the UK ETS, FA, the implementation of UK CBAM; and are there risks of any unintended consequences.
Affordability and fiscal impact	We consider the impact of options on Government affordability. Options may have an impact on Government finances through both the FA channel (as fewer allowances are given by Government to operators, depending on adjustment option) and the CBAM channel (faster reductions in FA lowers the FA support ratio, increasing the CBAM rate and potential CBAM revenues).
Other impacts	Other considerations for opportunities and risks, or potential unintended consequences for the UK ETS or wider policy.

- 9.5. Following the qualitative assessment based on the above criteria, options were either discounted for further consideration or shortlisted for further analysis and combined with other remaining options to create a series of policy packages. Each package has been designed to align with specific themes and internally agreed with the Authority.
- 9.6. The Authority then performed additional quantitative analysis, assessing the combined impact of each policy package against the CSFs, ahead of the final policy decision. Each policy package has been run through the full modelling platform, detailed in Section 12. The full option decision-making process is shown in Figure 3.

¹⁵ Source: [DESNZ \(2022\)](#)

Figure 3: The process of the policy option short-listing and decision-making process



10. Detailed policy options

- 10.1. This section will provide the qualitative assessment of options under consideration, which the Authority has then used to take options forward to be combined into policy packages.
- 10.2. While the assessment has been made with a consideration to the impacts on small and micro businesses, alternative provisions already exist with the UK ETS for these participants. As such this would limit the number of small or micro businesses that operate within the main ETS scheme and therefore are impacted by FAR changes. Further detail is provided in Section 20.
- 10.3. Table 2 provides the criteria table for the RAG ratings provided.

Table 2: The RAG ratings against CSFs and justifications for each used in the qualitative assessment

RAG rating	Justification
	Outcomes are fully aligned with the criteria and objectives of the Authority.
	Outcomes are mostly aligned with the criteria and objectives of the Authority.
	Outcomes are partially aligned with the criteria and objectives of the Authority, but there are some notable risks or challenges.
	Outcomes are undesirable and do not align with the criteria and objectives of the Authority due to significant risks or challenges.
	Outcomes are fully misaligned with the criteria and objectives of the Authority due to very significant risks or challenges.

Changes to ALCs

- 10.4. The FA methodology is designed to ensure that FA is reflective of an operator's activity levels. Under the current approach, the basic quantity of free allowances that eligible operators can receive is determined by historical activity levels (HAL), a measure of average activity levels over a baseline period. The quantity of free allowances received in each year would only change if an Activity Level Change (ALC) is triggered.
- 10.5. If an operator's average activity level in any two-year period increases or decreases by 15% or more relative to their historic activity level (HAL), an ALC is triggered. FA is recalculated for the scheme year following the two-year period in which the threshold was exceeded, using the two-year average in place of HAL. An adjustment is only made when the change in activity levels would lead to an annual adjustment of 100 free allowances or more.
- 10.6. Changes to an operator's average activity which are below the +/- 15% threshold will not trigger an ALC, and therefore FA does not respond to such changes in production levels, which may lead to cases of over- or under-allocation for individual operators.
- 10.7. Additionally, a sharp threshold may create perverse incentives or market distortions, whereby operators may have an incentive to alter production to a sub-optimal level to receive more FA.

Table 3: The high-level long list of options under consideration for ALCs

Activity level options tested for consultation:	
Option 1.1 Counterfactual:	Retain current methodology for historical activity level (HAL) and activity level changes (ALCs)
Option 1.2 Dynamic Allocation:	Provisional FA calculated using average of two most recent years of data for activity, such as 2023 and 2024 for 2026 allocation. This would be distributed at the start of the year then adjusted once actual activity for the year was reported. This would replace the historical baseline approach and remove thresholds for triggering activity level changes

Table 4: The Authority's RAG rating assessment of long list options for ALCs

Critical Success Factor	Option 1.1 Counterfactual	Option 1.2 Dynamic Allocation
Carbon leakage mitigation	The 15% threshold for triggering an activity level change (ALC) allows for the possibility that individual sub-installations' actual activity may deviate from the historical baseline used to determine FA levels. Consequently, they might receive a higher or lower level of FA compared to a methodology that precisely reflects annual activity, which may be more or less sufficient to effectively mitigate carbon leakage risk. However, the Authority's internal assessments indicate that, at the overall scheme level, the counterfactual has led to a greater total number of free allowances being distributed to operators than if FA had exactly mirrored annual activity.	This option would update FA annually based on recent activity levels. Consequently, each sub-installation would receive the precise level of carbon leakage mitigation needed to match their actual activity levels.
Impact on ETS effectiveness	This option would have no impact on ETS effectiveness as it would not be a change from the status quo.	This approach would align FA levels with actual activity, thereby enhancing the effectiveness of the ETS in reducing carbon leakage risk. However, it may introduce

Critical Success Factor	Option 1.1 Counterfactual	Option 1.2 Dynamic Allocation
		greater uncertainty for UK ETS participants regarding the precise level of FA each year, potentially influencing decisions related to investment in decarbonisation.
Technical feasibility	This option requires no change to be made, with the current approach being technical feasible and practically assured.	The feasibility of this option would depend on the final design of the policy. Consultation respondents had a preference for any dynamic option to process Activity Level Changes (ALC) in a much shorter timeframe than under the current process. Given the significantly higher number of ALCs that would need to be processed, this would necessitate a substantial increase in processing capacity and a streamlining of the process. The Authority considers this to be unachievable before the 2027 implementation deadline.
Affordability and fiscal impact	This option produces no change and therefore has no additional affordability impacts.	This option could result in relatively more or less FA being distributed, depending on overall activity levels in the scheme. There could therefore be some fiscal impact, but this cannot be quantified conclusively. Dynamic allocation could also remove some of the perverse incentives created for changes in activity which fall within the +/- 15% threshold.
Other impacts	No other unintended risks, opportunities or consequences.	This would be a divergence from the approach taken by the EU ETS, which could have

Critical Success Factor	Option 1.1 Counterfactual	Option 1.2 Dynamic Allocation
		an impact on competitive distortions with EU industry.

- 10.8. Based on this assessment, the Authority has opted to retain the counterfactual position (Option 1.1). However, as noted in the Authority Response, many respondents raised concerns about the impact of COVID-19 on activity in 2020 and 2021, skewing their HAL and making FA for the 2027-2030 period unrepresentative of normal activity.
- 10.9. To address these concerns, the Authority will allow operators to choose to exclude either 2020 only, or both 2020 and 2021 activity from the 2019-2023 HAL average. This policy position applies to all shortlisted policy packages.

Changes to benchmarks

- 10.10. Benchmarks are emissions intensity reference values used to determine the number of FAs eligible operators are entitled to receive.¹⁶ The intent of benchmarks is to reward the most efficient installations and incentivise decarbonisation. In principle, installations with carbon efficiency closer to the benchmarks will have a higher proportion of their emissions covered by free allowances, while those further from the benchmarks will have a lower proportion covered.
- 10.11. Current benchmarks for UK ETS Phase 1 were adopted from Phase IV of the EU ETS. Benchmarks account for improvements in emissions intensity by the top performing installations using Annual Reduction Rates (ARRs), bounded by a maximum and minimum value of 1.6% and 0.2% respectively which limits the change overtime. Changes in emissions intensities between 2007/08 and 2016/17 were used to determine ARRs for the 2021-2025 allocation period, extrapolated to the mid-point of the UK's first allocation period, 2022 – 2023.

Table 5: The high-level long list of options under consideration for benchmarks

Benchmark options tested for consultation:
Option 2.1 Counterfactual: Retain current benchmark values for next allocation period
Option 2.2 Updated 2026 EU ETS benchmarks: This would follow any update to EU benchmarks if implemented in 2026-2030 allocation period
Option 2.3 UK benchmarks: Use a UK focused benchmark update

¹⁶ [Published benchmark values](#) for UK ETS Phase I

Table 6: The Authority's RAG rating assessment of long list options for benchmarks

Critical Success Factor	Option 2.1 Counterfactual	Option 2.2 Updated 2026 EU ETS benchmarks	Option 2.3 UK benchmarks
Carbon leakage mitigation	The current approach excludes UK data and therefore may not be representative of level of FA required to provide sufficient carbon leakage mitigation for UK industry.	This approach excludes UK data and therefore may not be representative of level of FA required to provide sufficient carbon leakage mitigation for UK industry.	This approach utilises UK data, making it directly representative of UK performance. However, due to the limited sample sizes, the benchmark values may not accurately reflect the potential efficiency improvements achievable by UK industry. Consequently, it may not be sufficient to support the industry in mitigating carbon leakage risk.
Impact on ETS effectiveness	This option would not reflect the efficiency improvements made since 2016/17, and as such could over provide FA, providing a lower incentive for decarbonisation.	Greater annual reduction rates to further incentivise decarbonisation, with an inclusion of low and no carbon production processes, in line with ETS intent and increasing effectiveness.	This option may weaken decarbonisation incentives if the benchmark values do not accurately reflect the potential efficiency improvements achievable by UK industry, due to the limited sample sizes.
Technical feasibility	This option requires no change to be made, with the current approach being technical feasible and practically assured.	This option is technically feasible to implement, with limited changes required to the methodology. Although the implementation is contingent upon the EU publishing the updated benchmark	This option is technically feasible to implement, with limited changes required to the methodology.

Critical Success Factor	Option 2.1 Counterfactual	Option 2.2 Updated 2026 EU ETS benchmarks	Option 2.3 UK benchmarks
		values in advance, this is not anticipated to pose any significant issues.	
Affordability and fiscal impact	This option produces no change and therefore has no additional affordability impacts.	This option would lower the level of Free Allowances being distributed, which could feasibly increase revenues from UKA purchases.	This option would lower the level of Free Allowances being distributed, which could feasibly increase revenues from UKA purchases.
Other impacts	This would be a divergence from the approach taken by the EU ETS, creating significant differences to FA support between the two markets.	This option would be aligned with the approach taken for the EU ETS.	Whilst benchmark values would account for efficiency improvements since 2016/17, this would not be aligned with the exact approach taken by the EU ETS, creating significant differences to FA support between the two markets which could impact on competitive distortions.

10.12. Based on this assessment, the Authority considers that adopting the updated EU benchmarks (Option 2.2) would provide the most robust and representative approach to capturing industry efficiency improvements and driving decarbonisation. However, the EU benchmark values were not published at the time of decision making. While the Authority initially intended for updated benchmarks to be implemented across the entirety of the second allocation period, the unavailability of these values has led to the consideration of implementing EU benchmarks from 2028, whilst retaining current benchmark values for 2027. As such, for the purpose of the impact assessment, the Authority has used UK benchmarks as a proxy for the unpublished EU benchmarks, and tested below implementation from 2027 and 2028 as part of detailed option analysis.

10.13. We are not able to assess the suitability of using UK benchmarks as a proxy for EU benchmarks. However, as shown by the analysis in Section 19, the UK

benchmark methodology results in a level of FA which lies broadly in the centre of the possible bounds when considering updates to the Annual Reduction Rates.

- 10.14. Nevertheless, we note there is considerable uncertainty with modelling this specific policy choice and continue to emphasise the potential range of outcomes driven by higher or lower EU benchmark values relative to modelled UK benchmarks. Further detail on the methodology for UK benchmarks, and the associated uncertainty is provided in Section 24.

Changes to the carbon leakage list and the application of the carbon leakage exposure factor

Carbon leakage list

- 10.15. The Carbon Leakage List (CLL) is a list of sectors which are deemed to be at risk of carbon leakage. The UK ETS currently uses the EU ETS Phase IV CLL. The CLL defines the sectors at greatest risk of carbon leakage based on an assessment of their emissions intensity and trade intensity.
- 10.16. Those UK ETS industry sectors on the CLL receive a provisional allocation of 100% of their benchmarked FA as part of the preliminary FA stage (a Carbon Leakage Exposure Factor (CLEF) of 1). Those industry sectors not on the CLL receive a provisional allocation of 30% of their benchmarked FA as part of the preliminary FA stage (a CLEF of 0.3).
- 10.17. The FAR consultation from December 2023 reviewed the full methodology for determining carbon leakage list status. After extensive stakeholder engagement with that initial consultation, the Authority sought further views in the FAR carbon leakage consultation on whether to introduce a carbon leakage list based on UK-specific data or to retain the current list.

Table 7: The high-level long list of options under consideration for the carbon leakage list

Carbon leakage list options tested for consultation:	
Option 3.1 Counterfactual:	Retain the current CLL for next allocation period
Option 3.2 Updated UK CLL:	Implement the draft UK list proposed

Table 8: The Authority's RAG rating assessment of long list options for the carbon leakage list

Critical Success Factor	Option 3.1 Counterfactual	Option 3.2 UK CLL
Carbon leakage mitigation	The EU's carbon leakage list was compiled over a two-year period using complete data sets from 2014 to 2016.	This list relies heavily on fallback data, as noted in the NERA technical report ¹⁷ . In some cases, this may have

¹⁷ [Updated Carbon Leakage Indicators for the UK Emissions Trading Scheme](#)

Critical Success Factor	Option 3.1 Counterfactual	Option 3.2 UK CLL
	This process utilised a wide data pool and involved detailed assessments during both the second-level quantitative and qualitative evaluations. UK data was also included in the development of the list. Although it reflects a more historic period, it is likely to be mostly representative of the carbon leakage risk currently faced by UK industry, making it an appropriate mitigation tool.	resulted in artificially high or low carbon leakage indicator values which do not effectively reflect UK carbon leakage risk in some sectors. The data used also spans Covid years which may not be representative of a sector's true trade and emissions intensity values. As shown in the NERA technical report, 9 sectors on the current list would no longer be considered at risk, while 8 sectors would join the list.
Impact on ETS effectiveness	This option would have no impact on ETS effectiveness as it would not be a change from the status quo.	Given the risks associated with fallback data, this could risk overcompensating some operators, reducing the decarbonisation incentive and reducing ETS effectiveness.
Technical feasibility	This option requires no change to be made, with the current approach being technical feasible and practically assured.	Delivering the draft UK list which was included in the consultation document would be technically feasible to introduce by the implementation deadline. However, as noted in the Authority Response, many respondents argued for a second stage quantitative and qualitative assessment, similar to the current list, which would not be deliverable ahead of 2027 implementation.
Affordability and fiscal impact	This option produces no change and therefore has no additional affordability impacts.	Implementing the draft UK CLL consulted upon would increase the level of FAs distributed, which could feasibly reduce revenues from UKA which would have

Critical Success Factor	Option 3.1 Counterfactual	Option 3.2 UK CLL
		otherwise been purchased on markets. Additionally, the implementation of an enhanced UK CLL that had undergone further second stage assessment would have a cost to UKG associated with it.
Other impacts	No other unintended risks or consequences	Introducing the draft UK CLL consulted would result in the introduction of FA eligibility for some sectors such as Extraction of Natural Gas, and the removal of eligibility for other sectors such as Manufacture of Industrial Gases which may not align with other carbon leakage mitigation policies. Additionally, the draft UK CLL would result in different sectors on or off the list with the EU ETS.

10.18. Following this assessment, the Authority has agreed to retain the current EU Phase IV carbon leakage list (Option 3.1). This option applies to all shortlisted policy packages.

Carbon leakage exposure factor

10.19. Under the current rules, those installations that are included on the carbon leakage list are currently eligible for FAs up to 100% of the relevant benchmark level. Those not on the carbon leakage list receive 30% of the relevant benchmark level up to 2026, with linear reductions in each year until FA is fully phased out by 2030. This factor is referred to as the Carbon Leakage Exposure Factor (CLEF).

10.20. This policy option was considered most notably as a tool for reducing FA in line with the industry cap, and to mitigate the event of a CSCF triggering; an event that would bluntly reduce FA across all sectors regardless of carbon leakage risk.

Table 9: The high-level long list of options under consideration for the carbon leakage exposure factor

Carbon leakage exposure factor options tested for consultation:	
Option 4.1 Counterfactual:	Current application of the CLL and CLEF rules
Option 4.2 Introducing a tiered CLEF:	Introducing a tiered CLEF, with illustrative examples presented including four balanced tiers, a large high-risk tier or tiering on a continuum.

Table 10: The Authority's RAG rating assessment of long list options for the carbon leakage exposure factor

Critical Success Factor	Option 4.1 Counterfactual	Option 4.2 Introducing Tiering
Carbon leakage mitigation	This option presents no change and as such will have an equivalent mitigation of carbon leakage risk to current policy. That being said, there may be opportunities to better target FA at those sectors most at risk of carbon leakage.	In principle, a tiered system could more effectively allocate free allowances to sectors most at risk of carbon leakage, reducing allocations for those with a lower level of risk. However, the Authority's assessment that a CSCF is highly unlikely to be triggered during the second allocation period reduces the immediate necessity for this policy option. Moreover, the complexity of developing a metric that perfectly captures carbon leakage risk could inadvertently remove free allowances from those at high risk, ultimately undermining the initial intended purpose of tiering.
Impact on ETS effectiveness	This option presents no change therefore will have an equivalent ETS effectiveness to current policy.	Introducing tiering could better target FA and so may increase ETS effectiveness.

Critical Success Factor	Option 4.1 Counterfactual	Option 4.2 Introducing Tiering
Technical feasibility	This option presents no change therefore has no technical feasibility considerations.	This option is technically feasible to implement, with limited changes required to the methodology.
Affordability and fiscal impact	This option presents no change therefore has no additional fiscal or affordability impacts.	This option would lower the level of Free Allowances being distributed, which could feasibly increase revenues from UKA purchases.
Other impacts	This option presents no change therefore has no other unintended risks or consequences.	Introducing tiering, depending on which illustrative example were to be introduced, could reduce FA support for some sectors who are to be included in other carbon leakage mitigation policies such as the CBAM, developing an inconsistent approach to carbon leakage mitigation across UKG.

10.21. Based on this assessment, the Authority has agreed to take forward both the counterfactual position and the option whereby any sector deemed 'not a risk' would see their FA fully phased out from 2027 (Options 4.1 and 4.2).

10.22. As set out in the Authority Response, these options are in line with policy objectives to ensure that FA is better targeted at those sectors specifically at risk of carbon leakage. Any sector which remains on the list will receive 100% of their benchmarked allocation.

Cross sectoral correction factor

10.23. Another way that the Authority has considered better targeting those sectors most at risk of carbon leakage is to tier the Cross Sectoral Correction Factor (CSCF) in the event of its application. This can then focus any FA reduction due to a triggering of the CSCF away from those sectors which are most at risk of carbon leakage.

Table 11: The high-level long list of options under consideration for tiering the cross sectoral correction factor

Cross sectoral correction factor options tested for consultation:	
Option 5.1 Counterfactual:	Current rules, under which a CSCF is applied when the total number of allowances in a scheme year exceeds the industry cap. This applies an equal percentage reduction to each participant's FAs, a uniform reduction independent of carbon leakage risk.
Option 5.2 Tier the CSCF:	This would apply individual rules for different tiers when a CSCF is triggered, applying different CSCF reduction factors according to level of carbon leakage risk. In practice, this would require a new CSCF formula, determining the proportion of the reduction from each tier

Table 12: The Authority's RAG rating assessment of long list options for tiering the cross sectoral correction factor

Critical Success Factor	Option 5.1 Counterfactual	Option 5.2 Tier the CSCF
Carbon leakage mitigation	This option presents no change therefore will have an equivalent mitigation of carbon leakage risk to current policy.	The Authority have concluded that the CSCF is highly unlikely to be triggered during the second allocation period in the UK ETS, therefore introduction of this change will have little bearing in practice against this factor.
Impact on ETS effectiveness	This option presents no change therefore will have an equivalent ETS effectiveness to current policy.	The Authority have concluded that the CSCF is highly unlikely to be triggered during the second allocation period in the UK ETS, therefore introduction of this change will have little bearing in practice against this factor.
Technical feasibility	This option presents no change therefore has no technical feasibility considerations.	This option is technically feasible to implement, with some changes required to the methodology in the highly unlikely event of a CSCF triggering.
Affordability and fiscal impact	This option presents no change therefore has no	The Authority have concluded that the CSCF is highly unlikely to be triggered during

Critical Success Factor	Option 5.1 Counterfactual	Option 5.2 Tier the CSCF
	additional fiscal or affordability impacts.	the second allocation period in the UK ETS, therefore introduction of this change will have little bearing in practice against this factor.
Other impacts	This option presents no change therefore has no other unintended risks or consequences.	The Authority have concluded that the CSCF is highly unlikely to be triggered during the second allocation period in the UK ETS, therefore introduction of this change will have little bearing in practice against this factor.

10.24. Ahead of completing this assessment, the Authority completed a series of analytical model runs, to test the likelihood of a CSCF triggering across several FAR policy options.

10.25. On the basis that we have very high confidence that a CSCF will not be triggered between 2027-2030 due to the size of the flexible reserve, even under extreme sensitivity testing, the Authority opted to discount the option of tiering the CSCF and to retain the counterfactual position (Option 5.1).

Consideration of the availability of decarbonisation technologies

10.26. The availability of decarbonisation technology to scheme participants was also considered within the consultation, to respond to a concern from some stakeholders regarding unequal opportunities for large-scale decarbonisation technologies amongst sectors.

10.27. As such, the FA methodology would differentiate between installations with and without access to large-scale decarbonisation technologies, to address potential market distortions caused by government support.

Table 13: The high-level long list of options under consideration for the availability of decarbonisation technologies

Availability of decarbonisation technologies options tested for consultation:
Option 6.1 Counterfactual: No action to address the risk of potential market distortions driven by government policies.
Option 6.2 Disaggregating benchmarks: Benchmarks could be disaggregated to consider whether a sub-installation has access to a large-scale decarbonisation project. This

approach would put installations with different availability of decarbonisation technologies on different benchmarks and so they would not be measured against each other.

Option 6.3 Including low/no carbon production processes in benchmark calculations:

The consideration of decarbonisation technologies that have very low or no carbon emissions in the calculation of benchmarks (such as green hydrogen). Including these no-carbon production processes in the calculation of benchmarks would lower the benchmark for production and encourage a switch to more efficient processes. This method has been used by the EU therefore is implicitly linked to the Authority decision to use EU benchmarks, as presented in option 2.2 above.

Table 14: The Authority's RAG rating assessment of long list options for the availability of decarbonisation technologies

Critical Success Factor	Option 6.1 Counterfactual	Option 6.2 Disaggregating benchmarks	Option 6.3 Including low/no carbon production processes in benchmark calculations
Carbon leakage mitigation	This option presents no change therefore will have an equivalent mitigation of carbon leakage risk to current policy.	This option presents no change therefore will have an equivalent mitigation of carbon leakage risk to current policy.	This option has not been assessed separately – it is implicit to option 2.2 to use updated EU benchmarks.
Impact on ETS effectiveness	This option presents no change therefore will have an equivalent ETS effectiveness to current policy.	This option may increase ETS effectiveness towards the end of UK ETS Phase I, but this is likely to have no impact in this phase.	
Technical feasibility	This option presents no change therefore has no technical feasibility considerations.	This option has no current feasible methodology for implementation in 2027.	
Affordability and fiscal impact	This option presents no change therefore has no additional fiscal or affordability impacts.	Administrative burden of developing a methodology and requirement to collect additional data would	

Critical Success Factor	Option 6.1 Counterfactual	Option 6.2 Disaggregating benchmarks	Option 6.3 Including low/no carbon production processes in benchmark calculations
		have an impact on affordability of this option.	
Other impacts	This option presents no change therefore has no other unintended risks or consequences.	This option would not be aligned with the approach in the EU ETS. It could negatively impact UK industry competitiveness as the EU are not introducing this change.	

10.28. Based on this assessment, the Authority agreed to discount disaggregation of benchmarks (Option 6.2). To ensure the UK ETS remains responsive to future policy developments, we will continue to consider evidence on how technology deployment interacts with free allocation, and consider the implications on UK ETS participants, to maintain a fair and effective scheme ahead of future benchmark setting exercises.

10.29. As described in the table Option 6.3 is implicitly tied to the Authority decision to take forward EU benchmark values for the next allocation period (Option 2.2) which use different definitions for some product benchmarks, strengthening incentives to reduce emissions and ensuring no negative competitive distortions for new and existing technologies. The counterfactual position applies to all shortlisted policy packages.

Consideration of conditionality

10.30. The application of conditionality is considered in the consultation, whereby FA would be dependent on, or adjusted by additional criteria, such that it creates additional incentives to encourage installations to invest in emissions reduction or resource efficiency measures.

Table 15: The high-level long list of options under consideration for conditionality

Conditionality options tested:
Option 7.1 Counterfactual: No action to introduce conditionality

Option 7.2 Introduce conditionality: Require worst performing sub-installations to submit a decarbonisation plan or risk having their FA reduced by a pre-determined amount.

Table 16: The Authority's RAG rating assessment of long list options for conditionality

Critical Success Factor	Option 7.1 Counterfactual	Option 7.2 Introduce conditionality
Carbon leakage mitigation	This option presents no change therefore will have an equivalent mitigation of carbon leakage risk to current policy.	This option could result in reduced FA for some operators at high risk of carbon leakage. While this reduction could be avoided by completing a decarbonisation plan, it places carbon leakage mitigation contingent on financial and administrative resources, which may not be feasible.
Impact on ETS effectiveness	This option presents no change therefore will have an equivalent ETS effectiveness to current policy.	Conditionality is likely to incentivise additional industrial decarbonisation by those who fall within scope. Additionally, it may also indirectly incentivise all operators to improve their efficiency in order to avoid being captured for future allocation periods.
Technical feasibility	This option presents no change therefore has no technical feasibility considerations.	This option is technically feasible to implement, but a number of updates to systems would need to occur on which could be challenging for a 2027 implementation.
Affordability and fiscal impact	This option presents no change therefore has no additional fiscal or affordability impacts.	There may be costs involved in this option for implementing the system requirements and processing any submitted decarbonisation plans as this would require additional staff resource. However, these fiscal impacts are not likely to be large.
Other impacts	This option would not be aligned with the approach	This option is based on one aspect of the EU's three-pronged

Critical Success Factor	Option 7.1 Counterfactual	Option 7.2 Introduce conditionality
	in the EU ETS, although it is unlikely to impact linking negotiations due to the limited impact on distortions between the two markets.	approach and is therefore partially aligned with the EU ETS approach. However, this option is not linked to an equivalent to the EU's energy efficiency scheme, which is a key component of EU conditionality. If this option was implemented, then UK installations would be at-risk of having their FA reduced if they did not comply with conditionality, but unlike their EU equivalents could not benefit from positive conditionality which would award additional FA to the top-performing installations. This could create competitive distortion to the detriment of the UK.

- 10.31. Based on this assessment, the Authority agreed to take forward both the counterfactual position and the option to introduce conditionality for the least efficient sub-installations under each benchmark, for further analyses (Options 7.1 and 7.2).
- 10.32. At the time of producing this IA, the EU's updated conditionality thresholds were not published. As such, for the purposes of this analysis, the current 80th percentile EU thresholds have been assumed, which are provided in Section 24.

FA for CBAM-covered sectors

- 10.33. As set out in UK Government's consultation on carbon leakage,¹⁸ the UK CBAM will be introduced to address carbon leakage risk by applying an effective carbon price to imported products.
- 10.34. In response to this announcement to introduce a UK CBAM from 2027, the Authority has considered how FA policy could be adjusted. This is to reflect the reduced risk of carbon leakage for those sectors covered. The Authority consulted on:
- The parameters for the adjustment
 - The extent of the adjustment (phasing out or phasing down)
 - Technical implementation of the adjustment

¹⁸ [Addressing carbon leakage risk to support decarbonisation - GOV.UK](https://www.gov.uk/government/consultations/addressing-carbon-leakage-risk-to-support-decarbonisation)

- And the assessment criteria the Authority should consider in reaching a final decision of the adjustment

Table 17: The high-level long list of options under consideration for FA phase-out for CBAM sectors

FA for CBAM sectors options tested:	
Option 8.1 Counterfactual:	Retain current methodology for FA, with no adjustment to CBAM-covered sectors. While other changes to FA methods may affect installation and sectoral FA, there would be no differentiation between CBAM and non-CBAM sectors.
Option 8.2 Top-down FA adjustment to zero:	For sectors within scope (defined as covered by the UK CBAM), any installation would receive a reduction to final FA according to a defined adjustment factor. Under this option, covered sectors would see FA gradually adjusted.
Option 8.3: Top-down adjustment to non-zero:	As above, adjusting FA for CBAM covered sectors during a transitional period, but keeping in a non-zero FA level in the long run. This would aim to provide mitigation against potential remaining carbon leakage risk not covered by the CBAM
Other options around the parameters for reduction were included in the consultation document and analytical annex where any possible combination of start year, trajectory and end year could form the final adjustment curve.	

Table 18: The Authority's RAG rating assessment of long list options for FA phase-out adjustments

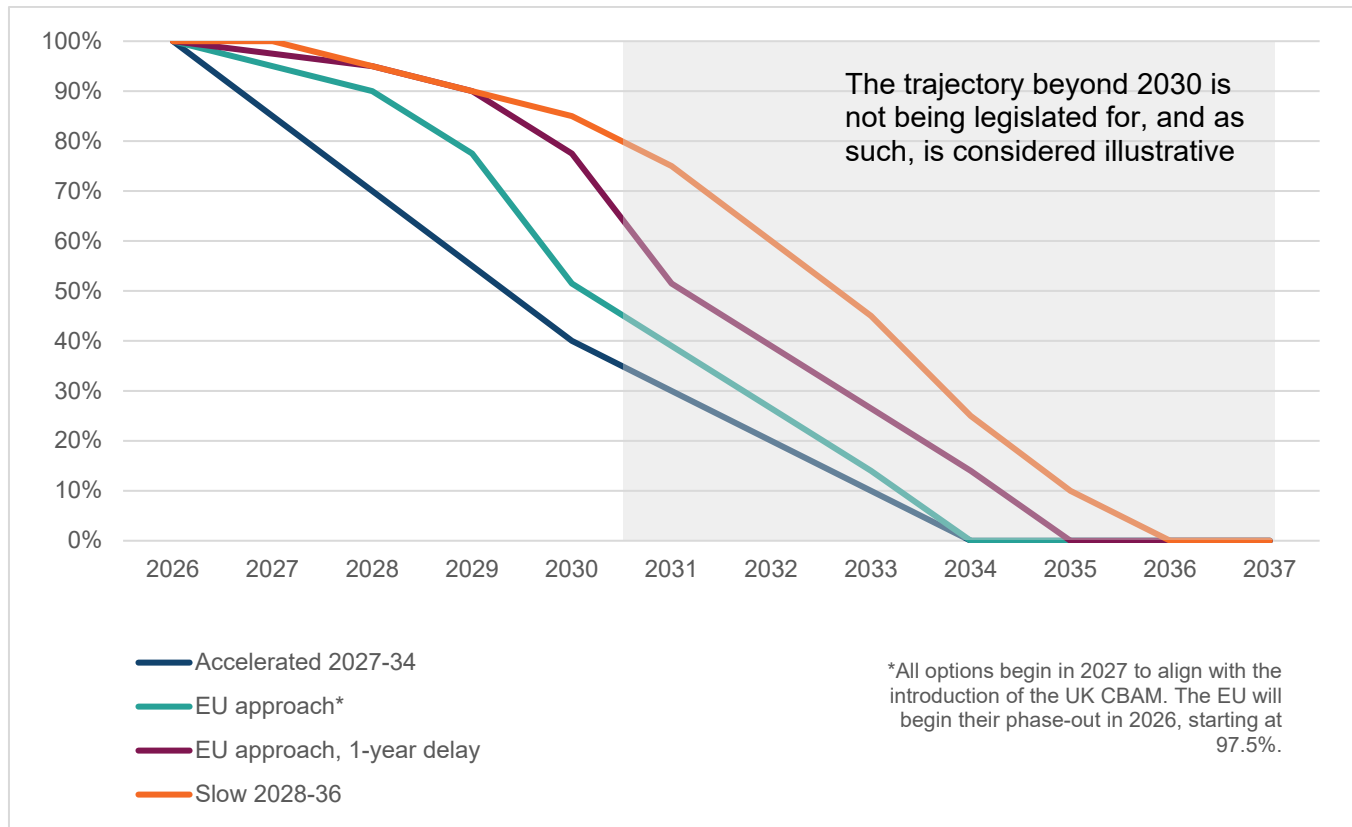
Critical Success Factor	Option 8.1 Counterfactual	Option 8.2 Adjustment to zero	Option 8.3 Adjustment to non-zero
Carbon leakage mitigation	Retaining FA at current levels would limit the role of CBAM in mitigating carbon leakage risk. The UK CBAM may be a better tool at effectively mitigating import carbon leakage risk, although it does not cover export leakage risks.	FAs are currently intended to address carbon leakage risk covering imports and exports. Under an option which adjusted FA to zero for CBAM sectors, this could create wider export leakage risks, unless an alternative export leakage solution was implemented.	A methodology which accounted for FA for export leakage would in theory deliver the policy intent of carbon leakage mitigation, however being based on UK data which, as described in the section above regarding the UK CLL data gaps, could reduce accuracy of assessing leakage risk.

Critical Success Factor	Option 8.1 Counterfactual	Option 8.2 Adjustment to zero	Option 8.3 Adjustment to non-zero
Impact on ETS effectiveness	This option presents no change therefore will have an equivalent ETS effectiveness to current policy.	This option would increase carbon price exposure for those sectors covered by the CBAM, increasing decarbonisation incentives.	This option would increase carbon price exposure for those sectors covered by the CBAM, increasing decarbonisation incentives but less so than a full adjustment to zero.
Technical feasibility	This option presents no change therefore has no technical feasibility considerations for the ETS, but it would reduce the effectiveness of the CBAM.	An adjustment to zero can be provided for through technical solutions being developed ahead of the Stage 2 Baseline Data Reporting exercise.	Due to the data gaps in UK data to determine carbon leakage risk, no methodology exists to determine an export leakage FA level, therefore technically this solution is not feasible to implement.
Affordability and fiscal impact	This option presents no change therefore has no additional fiscal or affordability impacts for the ETS. It would however limit the role of CBAM in mitigating carbon leakage risk, with a relatively low effective CBAM rate and that could lower potential revenues.	This option has the potential to increase both revenues from UKAs purchased on markets, which would have otherwise been given out for free, and also increase CBAM revenues due to a higher effective CBAM rate.	This option has the potential to increase both revenues from UKAs purchased on markets, which would have otherwise been given out for free, and could also increase CBAM revenues due to a higher effective CBAM rate. It would however have a higher administrative cost associated owing to the requirement to develop a methodology that determined the appropriate levels of FA for export leakage risk.

10.35. Based on this assessment, the Authority agreed to progress with trajectory options which adjust FA to zero (Option 8.2), for those sectors covered by the CBAM.

10.36. A number of illustrative trajectory options were proposed as part of the consultation, with varying combinations of start date, trajectory and end date. Given the number of potential trajectory options within the long list, the Authority opted to narrow down the options space by considering one accelerated option, one slower option, and two options somewhere in between. These are shown in Figure 4.

Figure 4: The short-listed FA phase-out for CBAM sector trajectories



10.37. Whilst the Authority Response only confirms the rules for free allocations for the next allocation period, in order to provide greater clarity for UK businesses, the Authority are also providing an indicative trajectory for the phase out beyond 2030, allowing businesses to plan their decarbonisation investments ahead of time.

11. Policy packages taken forward

11.1. Following the Authority's assessment of each policy option against the CSFs, alternative combinations of the remaining policy options were combined to form policy packages. These packages are listed below:

Table 19: The short-listed policy packages taken forward for further quantified analysis

	Package					
	A	B	C	D	E	F
Changes to ALCs	COVID mitigation for calculating HAL					
Changes to benchmarks	Updated EU benchmarks ¹⁹					Updated EU benchmarks from 2028 ²⁰
Changes to CLL and CLEF	Current CLL, early non-CL phase-out from '27	Current CLL, no early non-CL phase-out from '27	Current CLL, no early non-CL phase-out from '27	Current CLL, early non-CL phase-out from '27	Current CLL, no early non-CL phase-out from '27	Current CLL, no early non-CL phase-out from '27
Consideration of access to decarbonisation technologies	No consideration					
Consideration of conditionality	20% reduction to those within EU 80 th percentile	No conditionality	20% reduction to those within EU 80 th percentile	No conditionality	No conditionality	No conditionality
Introducing phase-out / down FA for CBAM	Steep phase-out	Delayed phase-out	EU aligned phase-out, 1-year delay	EU aligned phase-out, 1-year delay	EU aligned phase-out, 1-year delay	EU aligned phase-out, 1-year delay

11.2. These package combinations were chosen to align with themes, with a clear underlying rationale for each:

- Package A: FAs are provided for on the primary basis of mitigating carbon leakage risk, and as such, those sectors that are not at risk should have their entitlement removed as soon as possible. This option is considered the most ambitious.

¹⁹ At the time of completing the analysis for this impact assessment, updated EU benchmarks were not publicly available. For this reason, UK benchmarks have been used as a proxy. We test the potential implications of this proxy in Section 19.

²⁰ The Authority has an intent to use updated 2026 EU benchmarks in the free allocation calculation over 2028-2030, however will continue to use current benchmarks for the 2027 scheme year as the updated 2026 EU benchmark values were not available at the point of decision making.

- Package B: FAs are provided to mitigate carbon leakage risk, regardless of the size of that risk, and so it should be retained for as many sectors as possible for as long as possible. This option is considered the least ambitious.
- Package C: Moving towards closer alignment with EU ETS FA policy with due regards to UK-EU linking negotiations.²¹
- Package D: Similar to package C, without the introduction of conditionality, recognising the high administrative burden placed on regulators, but with an early phase-out for sectors not at risk of carbon leakage
- Package E: An option between C and D, but with neither the introduction of conditionality nor an early phase-out for sectors not at risk of carbon leakage to support UK Industry.
- Package F: An option which mirrors Package E but reflects the unavailability of published EU benchmarks at the time of final FAR decision making, and so we assume that EU benchmarks are implemented from 2028 and that current benchmarks are retained for 2027. **This is the preferred option.**

11.3. In line with HMT Green Book guidance, a full economic appraisal of each package had been undertaken, with results presented in the following section.

²¹ [UK-EU Summit - Common Understanding \(HTML\) - GOV.UK](#)

Policy cost-benefit analysis

12. Analytical approach

- 12.1. This section provides detail of the analytical approach taken to assess the final policy options. Given the scale of the intervention, we have undertaken a full final stage impact assessment, including FA modelling and a cost-benefit analysis (CBA) of each option.
- 12.2. For the final policy position, we have also considered business impacts, and undertaken a SaMBA, sensitivity analysis and various qualitative assessments. This is in line with HMT Green Book guidance for appraisals and guidance issued by the RPC on regulatory IAs.
- 12.3. The decisions that are made as part of the FAR concern FA policy in the second allocation period, from 2027 until 2030. However, the Authority are also confirming the indicative phase-out FA for CBAM sectors beyond 2030.
- 12.4. Additionally, as businesses adjust to a new level of FA, investing in low-carbon technologies to reduce carbon price exposure, benefits and costs are likely to extend far beyond 2030, as we progress through our legally binding carbon budget targets and towards net zero by 2050.
- 12.5. Therefore, for the purposes of this assessment, it is necessary to construct illustrative assumptions of post-2030 UK ETS policy, enabling the assessment to fulfil an appropriate appraisal period, which we define as 12 years. We note that post-2030 UK ETS policy will be subject to future consultations. **Assumptions assumed for the purposes of this assessment should not be treated as an indication of likely policy direction.**

Table 20: Model parameters and assumptions for the cost-benefit analysis

Modelling assumptions	Assumption parameter
Allocation period 2 within the UK ETS Phase 1	2027 - 2030
Appraisal period	12 years, 2025 – 2037 ²²
Appraisal values	2025 prices deflated using the latest GDP deflator series. Impacts are discounted from 2025 using the standard HMT Green Book discount rate of 3.5%

²² The modelling platform accounts for market foresight and so impacts occur before policy changes take place.

Total cap post-2030	The total cap sets the total amount of emissions (and therefore allowances) available to participants within the UK ETS. For the purposes of this assessment, for simplicity, we assume that the post-2030 cap is aligned to the UK Government's Net Zero Strategy, and the carbon savings necessary for the traded sector to achieve Carbon Budget 6.
Industry cap post-2030	The industry cap is the pot of allowances in any one year that is set aside to be allocated for free. If in any one year the number of FA exceeds the industry cap, allowances will be drawn from the flexible reserve to avoid triggering a CSCF ²³ . For the purposes of this assessment, we centrally assume that the industry cap remains at the current percentage of the total cap (40%). The centrally assumed industry cap is provided in Section 24. Noting significant policy uncertainty, we test alternative levels as part sensitivity testing analysis, presented in Section 19.
Unallocated allowances	Unallocated allowances can be accrued on the basis of auction markets not clearing, or spare allowances from free allowance which fall below the industry cap. For the purposes of this assessment, we simply assume current and future unallocated allowances are retained in the flexible reserve and are only used to mitigate the risk of a CSCF triggering. This is a critical assumption for the analysis. The implication is that a reduction in FA reduces the total supply of allowances available and therefore has system wide impacts for all UK ETS participants by increasing the level of emission reductions required. By 2026, we estimate that the flexible reserve will stand at approximately 70m, growing in all scenarios where FA remains below the industry cap.
Scope expansion	The Authority has consulted on expanding the scope of the ETS to include the maritime and waste incineration sectors. This expansion is not yet legislated for, and as such, we simplistically assume no expansion to these sectors within the analysis. Any changes to

²³ The exception is for changes in activity above the 15% threshold, where triggering an activity level change will draw on allowances from the new entrants reserve (NER) rather than the flexible reserve.

	wider UK ETS policy due to scope expansion will be considered within a separate consultation process.
Post-2030 FA policy	The scope of FAR covers the period 2027-2030 for all policy options other than the indicative FA phase-out for CBAM sectors beyond 2030. For the purposes of this assessment, we simply assume that FA policy post-2030 (aside from the FA phase-out for CBAM sectors) will be determined by rules that align with each respective scenario's assumptions on allocation period 2 FA policy.
FA opportunity cost	Allowances allocated for free have the same market value as those purchased on markets. This means that if an operator can cut emissions at a cost lower than the UKA price, it would be rationale to sell a portion of FA, and abate, rather than emitting and surrendering allowances. As such, we assume that initial emission reductions take place in the sectors where marginal abatement costs are lower than the UKA price, irrespective of the initial recipient sectors of FA.
Installations receiving FA	We assume that all stationary installations currently operating within the UK ETS continue to be fully operational, with a few notable exceptions. ²⁴ Further detail is provided in Section 24. We assume full, on-time compliance as per HMT Green Book guidance. In our central scenario, we assume that activity levels remain fixed at current levels, although this assumption is flexed for sensitivity testing.
UK CBAM	As set out in the published CBAM legislation, the CBAM will be introduced in 2027, covering a range of sectors. Due to the design of the CBAM, the extent to which it mitigates carbon leakage risk is directly related to the removal of FA for covered sectors. We assume that in all scenarios (including the counterfactual), the CBAM will cover the sectors of Aluminium, Cement, Fertilisers, Hydrogen and Iron and steel for all future modelled years. Given this assessment is focussed on FA impacts, and not

²⁴ Specific assumptions relate to the steel making operations at Port Talbot and Scunthorpe. Noting the significant uncertainty associated with activity assumptions, we include alternative sensitivity tests in Section 19.

	the CBAM, we have adopted a simplified yet proportional approach to model the UK CBAM. This approach is not fully aligned with the legislative design. For example, this analysis assumes that the benchmark emissions intensity values for each sector are consistent with global importer average values, regardless of whether a country self-reports its actual emissions intensity value. More information on the legislative design of the CBAM can be found here.
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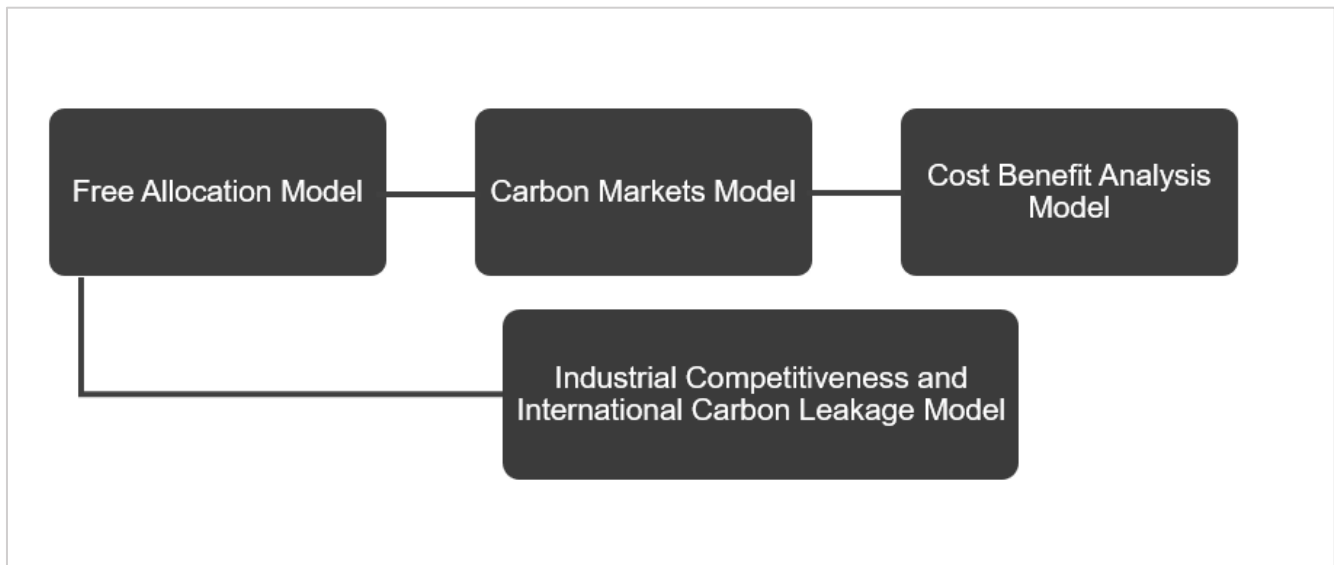
The do-minimum counterfactual position

- 12.6. To assess the impact of the final policy position, we have defined a ‘do-minimum’ policy option. In the absence of the FAR, existing legislation sets out that the distribution of free allocation under existing policy from the first allocation period remains. As such, we assume no change to benchmarks or the carbon leakage exposure factor. We do however update HAL to reflect activity from the period 2019-2023.
- 12.7. As in current FA policy, if the total amount of preliminary free allocation exceeds the industry cap and there are insufficient allowances in the flexible reserve, the Cross Sectoral Correction Factor (CSCF) is triggered, reducing the number of FAs distributed by a proportional amount until the industry cap is achieved. This is considerably more likely if FA remains constant in each year, while the IC falls overtime.
- 12.8. As such, in our central counterfactual scenario, given the assumed size of the flexible reserve by 2030, we estimate that a CSCF would be triggered around 2037. This outcome is relevant for the appraisal, and we explore its implications and the associated uncertainty in Section 19.

13. Summary of the modelling platform

- 13.1. This IA has been conducted using a suite of internal modelling tools and evidence bases held by DESNZ. Figure 5 presents the modelling platform used in the cost-benefit analysis and supporting quantitative analysis.

Figure 5: The high-level modelling platform used for the cost-benefit analysis of policy packages



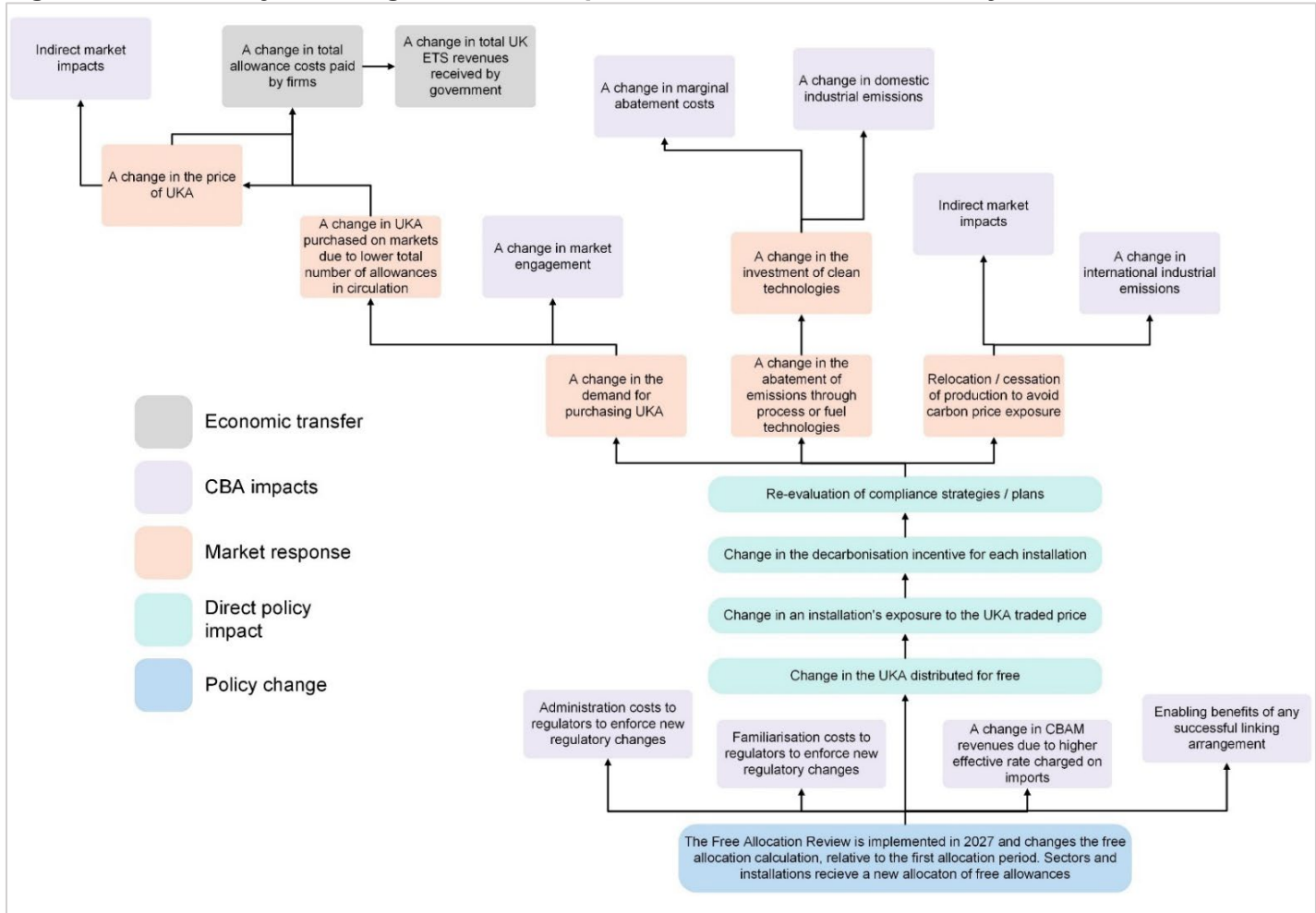
13.2. In summary, the modelling platform consists of the following tools:

- The FA model estimates future FA and support ratios by sector and region for a range of different scenarios. It is a bespoke model specifically built for the purposes of modelling the impacts of free allocation policy.
- The Carbon Markets Model (CMM) which assess the total market impacts of changes to UK ETS policy. This tool has been used previously in many other IAs published by the Authority.
- The Industrial Competitiveness & International Carbon Leakage (ICICL) model evaluates interactions among firms within energy-intensive industries to estimate the potential effects of carbon leakage resulting from policy changes. Given the specificity and uncertainty inherent in the model's data inputs and assumptions, this model is regarded as a highly uncertain, stylised tool that is most appropriately used to supplement other analytical approaches.
- The Cost Benefit Analysis model estimates the monetised costs and benefits included within this CBA for a given scenario.

13.3. Further detail of these models can be found in Annex A: Modelling methodology.

14. Identifying costs and benefits

14.1. The list of potential cost and benefits have been identified through a theory of change. This is shown in Figure 6.

Figure 6: The theory of change to derive impacts for the cost-benefit analysis

14.2. We firstly consider the policy change, resulting in changes to the FA methodology. This has a direct impact on the number of allowances distributed for free, changing firm exposure to the carbon price with the following responses:

- purchasing higher quantities of UKA to cover their emissions
- adopting abatement technologies if the marginal cost of abatement is now lower than the effective carbon price paid
- ceasing activity, where their forgone output is captured by foreign firms or relocating production abroad

14.3. From here, this results in the impacts that directly change social welfare, which are considered in Table 21, alongside the valuation approach. Our analysis separates the impacts of the policy packages into monetised or qualitative costs and benefits:

- Monetised impacts are those for which there is a clear methodology for valuing the costs and benefits to consumers, business and government.
- Qualitative impacts are significantly uncertain, or not proportional to quantify, and so discuss their likely impact qualitatively.

Table 21: The list of monetised and qualitative impacts considered within the cost-benefit analysis

Impact	Category	Scope	Description	Valuation
Monetised impacts				
Domestic carbon emissions	Monetised	Society	Changes in domestic carbon emissions associated with UK production due to a reduction in the total supply of allowances	Change in emissions as measured in the CMM multiplied by the DESNZ carbon values
Marginal abatement costs	Monetised	Business	Changes in abatement costs due to changes abatement levels	Change in cumulative total marginal abatement cost from the traded sector as measured in the CMM
Qualitative impacts				
Familiarisation costs to business	Qualitative	Business	Changes in costs for business for familiarisation with regulatory changes	-
Administrative costs to government	Qualitative	Government	Changes in administrative costs needed to enforce FA policy changes	-
International carbon emissions	Qualitative	Society	Changes in international carbon emissions associated with UK production due to decarbonisation incentives	Not assessed in the central assessment, but are partially considered in Section 15.
Indirect impacts	Qualitative	Various	Indirect impacts due to a potential change in the UK ETS price	Not assessed in the central assessment, but are considered separately in Section 19.
Enabling benefits	Qualitative	Various	Alignment of UK ETS FA rules with the EU ETS, enabling benefits of any	-

			potential future linking arrangement	
Market engagement	Qualitative	Business	Greater participation in the primary and secondary allowance markets due to a reduction in free allowances	-

14.4. Further detail on the valuation technique for each monetised impact can be found in Annex A. Economic transfers, which is a transfer of purchasing power from one part of society to another, are not included within the appraisal. Importantly, for each policy package, our appraisal focuses on the total system-wide impact resulting from changes in the total supply of allowances due to reductions in FA. We do not appraise the impact of FA changes between sectors.

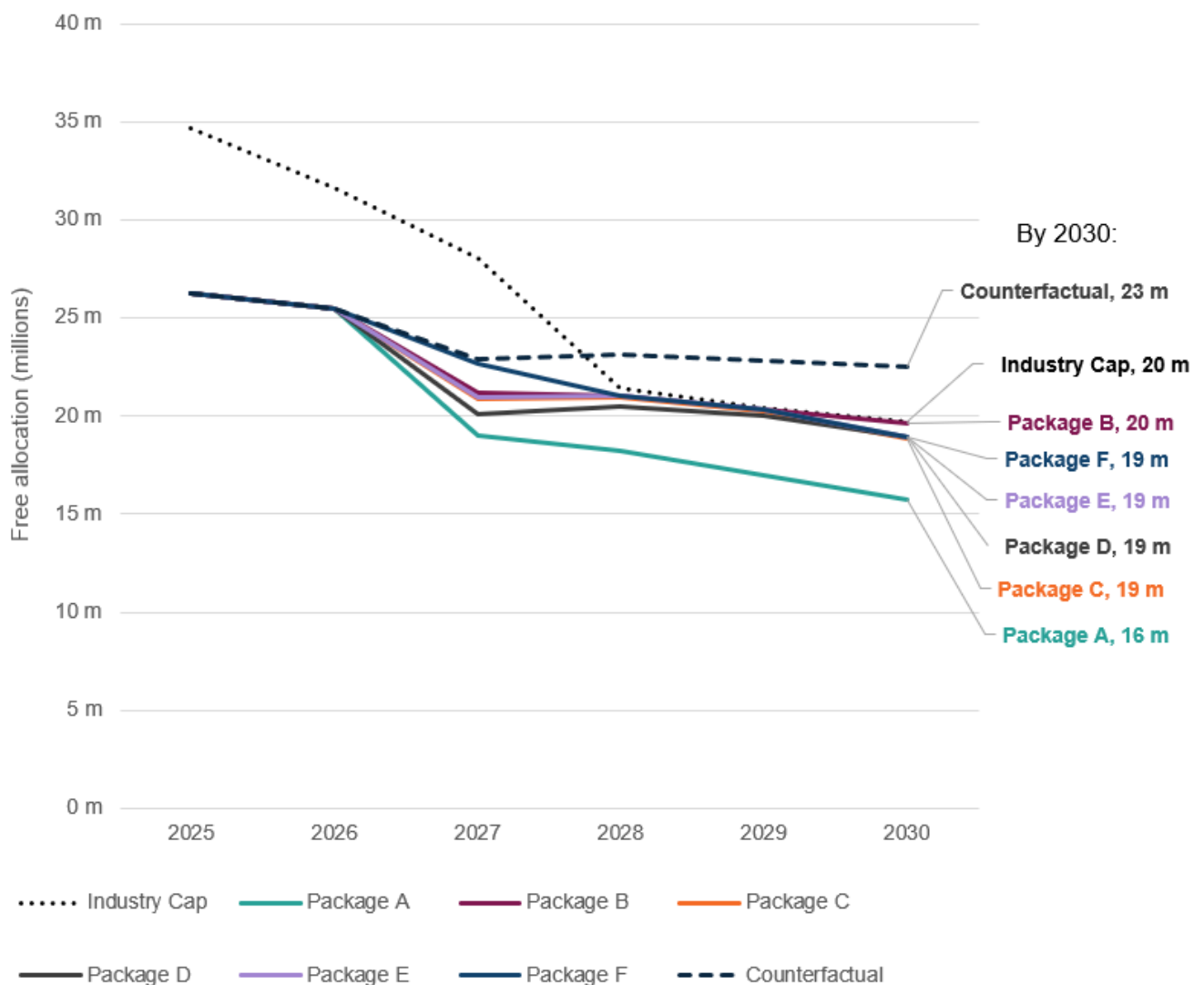
15. Analysis results

Free allocation impacts

15.1. Each policy package's combination of options result in a different projected total FA level, between 2027-2030, as shown in Figure 7, with the total level of FA for the entire allocation period provided in Table 22.

Table 22: Total FA for the second allocation period in each scenario and relative difference to the counterfactual

	Total FA (millions)	Difference relative to the counterfactual (millions)
Industry Cap	89.5	-1.9
Package A	70	-21.5
Package B	82.1	-9.3
Package C	80.9	-10.6
Package D	79.6	-11.9
Package E	81.3	-10.1
Package F	83.0	-8.4
Counterfactual	91.4	0

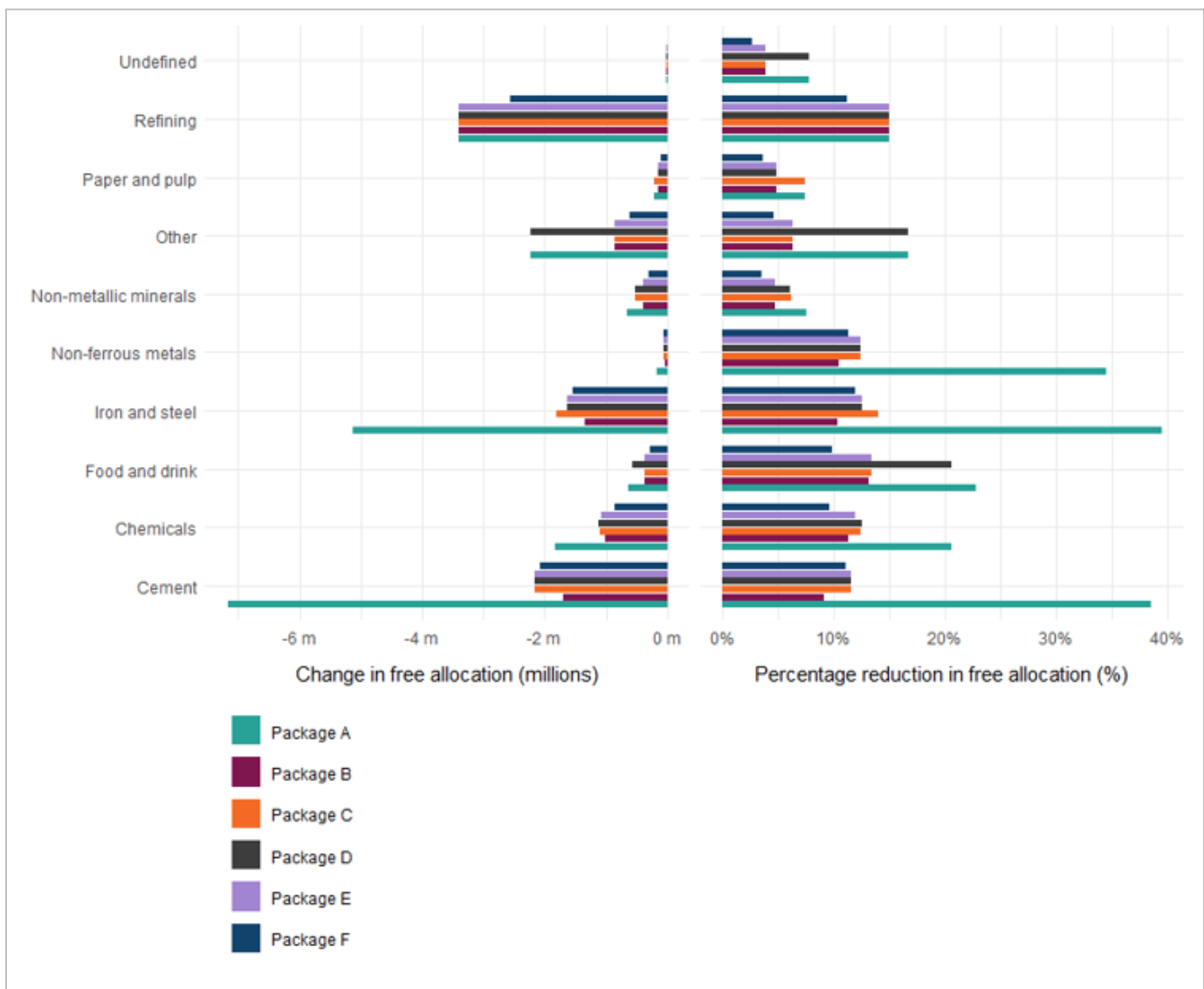
Figure 7: Estimated FA for each policy package, 2025 – 2030

- 15.2. Policy package A achieves the largest reduction in FA by 2030, whereas package B results in the lowest reduction. This outcome is anticipated, as these options comprise combinations of policies with the highest and lowest individual impacts by 2030, respectively.
- 15.3. Packages C, D, and E result in similar projected FA levels over the allocation period, suggesting that adding conditionality or removing FA from sectors not on the carbon leakage list has a limited impact compared to different phase-out trajectories for CBAM sectors. However, policy package F achieves the absolute lowest reduction over the whole period, with the delay to the implementation of EU benchmarks being a significant driver of distinction between the options. This is supported by a comparison of sector-specific FA impacts, as shown in Figure 8 and Table 23.

Table 23: Total reduction in FA (millions) for each scenario and sector, relative to the counterfactual for the second allocation period

	Package A	Package B	Package C	Package D	Package E	Package F
Cement	-7.2	-1.7	-2.2	-2.2	-2.2	-2.1
Chemicals	-1.8	-1	-1.1	-1.1	-1.1	-0.9
Food and drink	-0.6	-0.4	-0.4	-0.6	-0.4	-0.3
Iron and steel	-5.1	-1.3	-1.8	-1.6	-1.6	-1.5
Non-ferrous metals	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1
Non-metallic minerals	-0.7	-0.4	-0.5	-0.5	-0.4	-0.3
Other	-2.2	-0.9	-0.9	-2.2	-0.9	-0.6
Paper and pulp	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1
Refining	-3.4	-3.4	-3.4	-3.4	-3.4	-2.6
Undefined	0	0	0	0	0	0

Figure 8: The estimated absolute and percentage FA impact under each package for each sector, relative to the counterfactual scenario, for the second allocation period



- 15.4. Sectors receiving the highest levels of FA are estimated to have the largest absolute reductions compared to the counterfactual scenario. However, when considering percentage changes, the impacts are more consistent across sectors, with most expected to see a reduction of between 5% and 20% in FA under policy packages B, C, D, E and F over the second allocation period.
- 15.5. For sectors not covered by the CBAM, differences between policy packages are driven primarily by two factors: the early phase-out of FA from 2027 for sectors removed from the carbon leakage list, and the application of conditionality. The exception to this is Package F, with part of the difference driven by the implementation of updated benchmarks from 2028. In the case of the refinery sector, updated benchmarks are the sole driver of changes in FA. Overall, benchmark updates appear to have the greatest impact on FA for sectors outside the scope of the CBAM, relative to the counterfactual scenario.
- 15.6. For sectors covered by the CBAM, while benchmark updates also contribute to reductions in free allocation, the phase-out of FA remains the most significant

driver of change. This is particularly evident in Package A under the accelerated phase-out option, which results in a disproportionately large impact on these sectors.

- 15.7. It is important to re-emphasise that these impacts are based on the analytical assumption of a UK benchmarks methodology, with a broad potential range of outcomes driven by higher or lower possible EU benchmark values relative to modelled UK benchmarks. Further detail on the methodology for UK benchmarks, and the associated uncertainty is provided in Section 19.

Emission impacts

- 15.8. Assessing the total level of FA provides limited information about the extent of emissions changes from each option. Differences in FA reductions between sectors could lead to different implications for emissions changes, even if the total level of FA in any two scenarios is similar.
- 15.9. Changes in FA will alter participant's exposure to the carbon price. This can impact on emissions in several ways:
- Incentivising new abatement technologies, reducing domestic emissions.
 - Incentivising production relocation of goods which are domestically consumed, displacing emissions abroad.
 - Altering the competitiveness of UK firms to export markets, incentivising the production relocation of goods which were previously domestically produced to a country with higher emissions intensity of production.
 - Cost-pass through of the carbon cost to further down the supply chain.
 - Changing the total supply of allowances to market, increasing carbon prices for all UK ETS participants and resulting in emission reductions through abatement from sectors who are not eligible for FA.
- 15.10. These incentives are likely to differ across sectors due to the availability and marginal costs of abatement technologies and the role of other carbon leakage mitigation policies, such as the UK CBAM.

International competitiveness modelling

- 15.11. It is important to understand how the emissions impact on each sector could vary, given the differences in FA impact as shown previously. To gain a quantitative insight into the potential impacts of the change in emissions from both domestic industrial emission reductions and import emissions international emission changes stemming from UK consumption, this analysis has used the Industrial Competitiveness and International Carbon Leakage (ICICL) model, which evaluates changes in participant's incentives, when faced with industrial competition, and estimates market responses.²⁵ Importantly, it considers these changes in the context of a UK CBAM. Detail on the ICICL model can be found in Annex A.

²⁵ The ICICL model is unable to capture the effects of changes in exports. Additional ad-hoc analysis on exports is provided in Section 21.

15.12. Table 24 shows how much domestic and import emissions are estimated to change, split by CBAM and non-CBAM sectors.

Table 24: Estimated percentage change in emissions for domestic production and imports (for UK consumption) split by CBAM and non-CBAM sectors over the second allocation period

	CBAM sectors			Non-CBAM sectors		
	Domestic production	Imports	Imports (excluding the EU)	Domestic production	Imports	Imports (excluding the EU)
Package A	-5.0%	-13.8%	-43.8%	-0.2%	0.1%	0.1%
Package B	-1.2%	-4.9%	-13.7%	-0.2%	0.1%	~0.0%
Package C	-1.5%	-5.9%	-16.7%	-0.2%	0.1%	~0.0%
Package D	-1.4%	-5.7%	-16.2%	-0.2%	0.1%	0.1%
Package E	-1.4%	-5.7%	-16.2%	-0.2%	0.1%	~0.0%
Package F	-1.4%	-5.2%	-14.8%	-0.1%	~0.0%	~0.0%

15.13. One clear implication is that the impact is likely to differ significantly between CBAM and non-CBAM sectors. For sectors that are not covered by the CBAM, they typically see either smaller reductions in FA, thereby resulting in a more limited increase in carbon price exposure, or compliance costs account for a relatively low proportion of total production costs. Without an alternative carbon leakage mitigation policy in place, there is a counteracting effect of increased import emissions.

15.14. For CBAM sectors, the impact is estimated to be greater, generally negative and sensitive to the assumed trajectory of FA phase-out. To explore this result further, Table 25 provides a detailed breakdown for the Iron and steel sector and the Cement sector, two major CBAM covered sectors that have different emission implications.

Table 25: Estimated percentage change in emissions for domestic production and imports (for UK consumption) split by Iron and steel and Cement sectors over the second allocation period

	Iron and steel			Cement		
	Domestic production	Imports	Imports (excluding the EU)	Domestic production	Imports	Imports (excluding the EU)
Package A	-1.9%	-20.2%	-45.1%	-10.1%	52.4%	-30.5%
Package B	-0.6%	-6.4%	-14.2%	-2.2%	5.0%	-6.4%
Package C	-0.7%	-7.8%	-17.3%	-2.7%	6.8%	-8.1%

Package D	-0.7%	-7.5%	-16.7%	-2.7%	6.8%	-8.1%
Package E	-0.7%	-7.5%	-16.7%	-2.7%	6.8%	-8.1%
Package F	-0.6%	-6.9%	-15.3%	-2.6%	5.7%	-7.7%

15.15. This reveals an important insight for emission impacts. Some sectors have access to abundant import alternatives that may not be subject to significant UK CBAM charges, due to domestic carbon pricing, such as in the Cement sector where a significant proportion of imports come from the EU. Consequently, this sector is sensitive to the FA phase-out trajectory for CBAM sectors, with Package A estimated to significantly increase import emissions under the accelerated trajectory. However, since imports in this sector constitute a small proportion of domestic consumption, the absolute increase in emissions from imports remains relatively low, despite the large percentage increase for this package.

15.16. Conversely, in the Iron and steel sector, both domestic and import-related emissions associated with UK consumption are projected to decline across all scenarios. This is primarily driven by the relatively high CBAM charges applied to low carbon pricing regions, contributing to a reduction in imports from these sources.

15.17. While some increase in import emissions from producers with a similar carbon price (and therefore goods are charged a low or no CBAM rate) is likely, the analysis estimates that the emissions associated with these new imports are considerably lower and are more than offset by the reduction in high-carbon iron and steel from previous import origins.

15.18. Furthermore, our assumption that all importers face the same emissions intensity benchmark means that estimated changes in import emissions are driven solely by differences in carbon pricing between regions. However, in reality, differences in emissions intensity could also be a significant factor in determining the CBAM rate.

15.19. Given the uncertainty surrounding this analysis, we do not treat these figures as indicative of expected outcomes. However, they are useful for illustrating the extent to which changes in emissions depend on several key factors:

- The percentage reduction in FA for a given sector.
- UK ETS compliance costs as a proportion total production cost. Even with large changes in carbon price exposure, if marginal costs of compliance are relatively small then this may have a very limited impact on market prices, and therefore international competitiveness.
- Existing UK comparative advantage in production.
- The availability of low-cost abatement options.
- Whether imported goods face an equivalent carbon price (either through carbon pricing or a CBAM).

15.20. In addition, there may also be an impact on emissions due to the role of the EU CBAM. While the modelling does account for the reduction in free allocation within

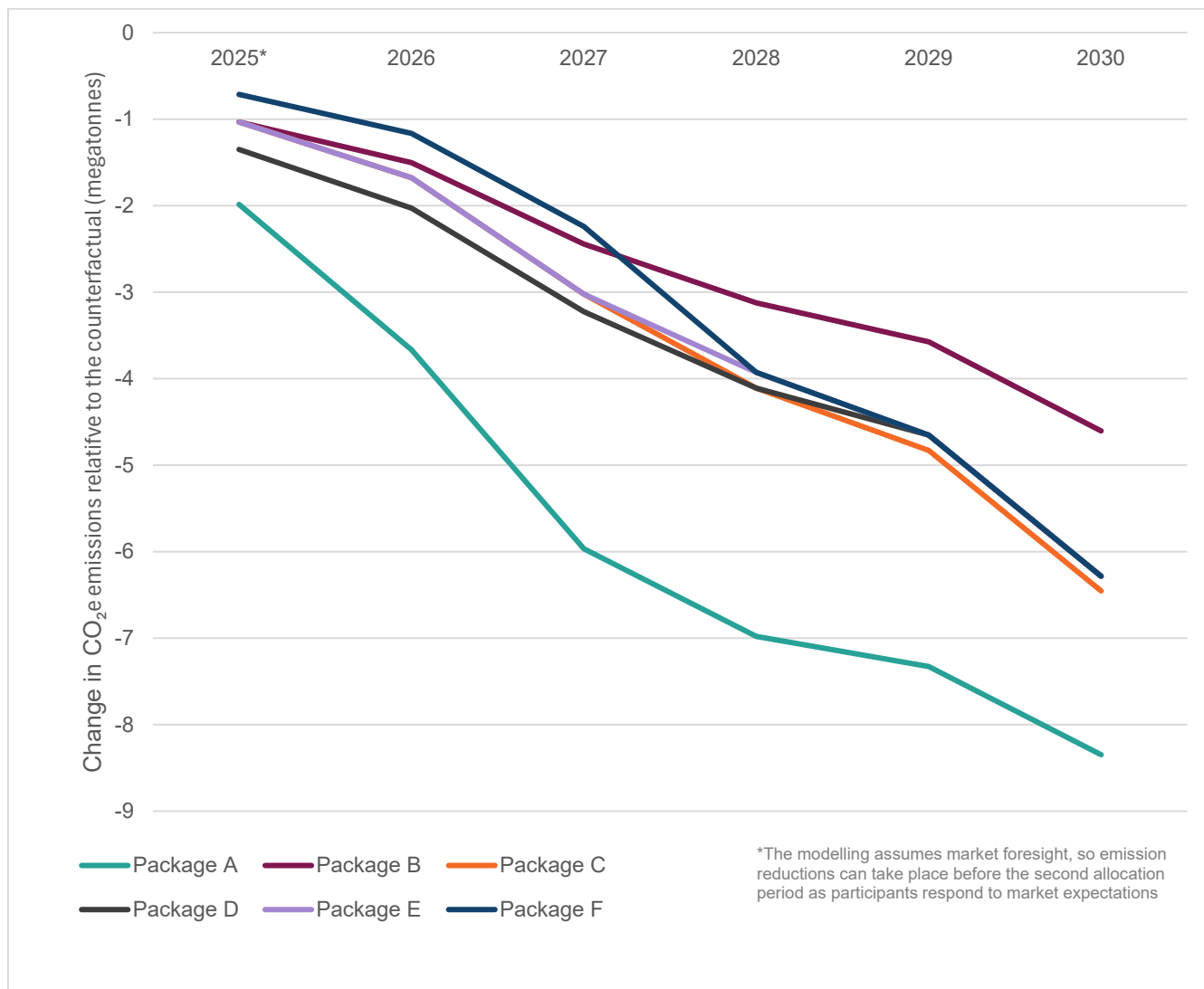
the EU ETS in line with announced legislation, it does not model the EU CBAM, which could have an implication for estimated import emission changes.

- 15.21. Separately, there may be emission impacts due to changes in the export market, which we are not able to quantitatively estimate using ICICL. As UK operators see their FA reduced, higher marginal costs of compliance may be passed on to higher prices for UK exports. This could reduce the international competitiveness of UK firms, alter trade flows and reduce domestic emissions. UK exporters may also benefit from a competitive advantage within export markets with a CBAM, such as the EU. However, the effect on emissions is similarly likely to be variable, depending on the emissions intensity of competitor markets that may service forgone UK exports.
- 15.22. If a competitor market has a lower emissions intensity than the UK, holding demand constant and all other things equal, this could see net global emissions fall. Alternatively, the opposite effect would be expected for a competitor market with a higher emissions intensity.
- 15.23. Nevertheless, those UK sectors with significant proportions of production heading to export markets may have a greater incentive for abatement options, if it reduces operating costs in the long run, to remain internationally competitive. This will depend on the cost of available abatement options. These impacts are highly uncertain and are likely to be highly variable between each sector.
- 15.24. This illustrative analysis, based on international competitiveness modelling, offers useful insights into potential emissions impacts, highlighting how estimated outcomes can vary significantly across sectors depending on their specific context. However, these results are sensitive to the overarching modelling framework, sector-specific assumptions for industry, and the quality of up-to-date data sources for each country and sector combination.

UK ETS Carbon Markets Modelling

- 15.25. Given this assessment assumes that any forgone FA under the industry cap is retained by the Authority within the flexible reserve, this reduces the total number of allowances in circulation relative to the counterfactual scenario. This is then expected to result in a rise in the carbon value, impacting on all UK ETS sectors, increasing the decarbonisation incentive beyond participants eligible for FA.
- 15.26. To consider total UK production emission impacts, we have used the CMM to assess how changes in total allowances in circulation affect carbon price exposure, and as such, emission reductions across all UK ETS sectors. Figure 9 shows this impact across the next allocation period, relative to the counterfactual.

Figure 9: The estimated change in UK emissions across all UK ETS participants due to a change in FA



15.27. As shown, and comparable with the ICICL analysis above, Packages with the largest reductions in FA result in the largest emission impacts. Packages C, D and E are all expected to have very similar emission impacts, due to their similarities in FA impacts. Package F has a smaller initial reduction, due to the role of continued current benchmark values in 2027, reducing the demand for auctioned allowances, but catches up to align with Package E from 2028.

15.28. This result is intuitive, given that the reduction in FA reduces the total supply to market in any one year, increasing the effort of participants to abate their emissions. We use the emission impacts estimated using the CMM for the CBA appraisal.

Cost-benefit analysis

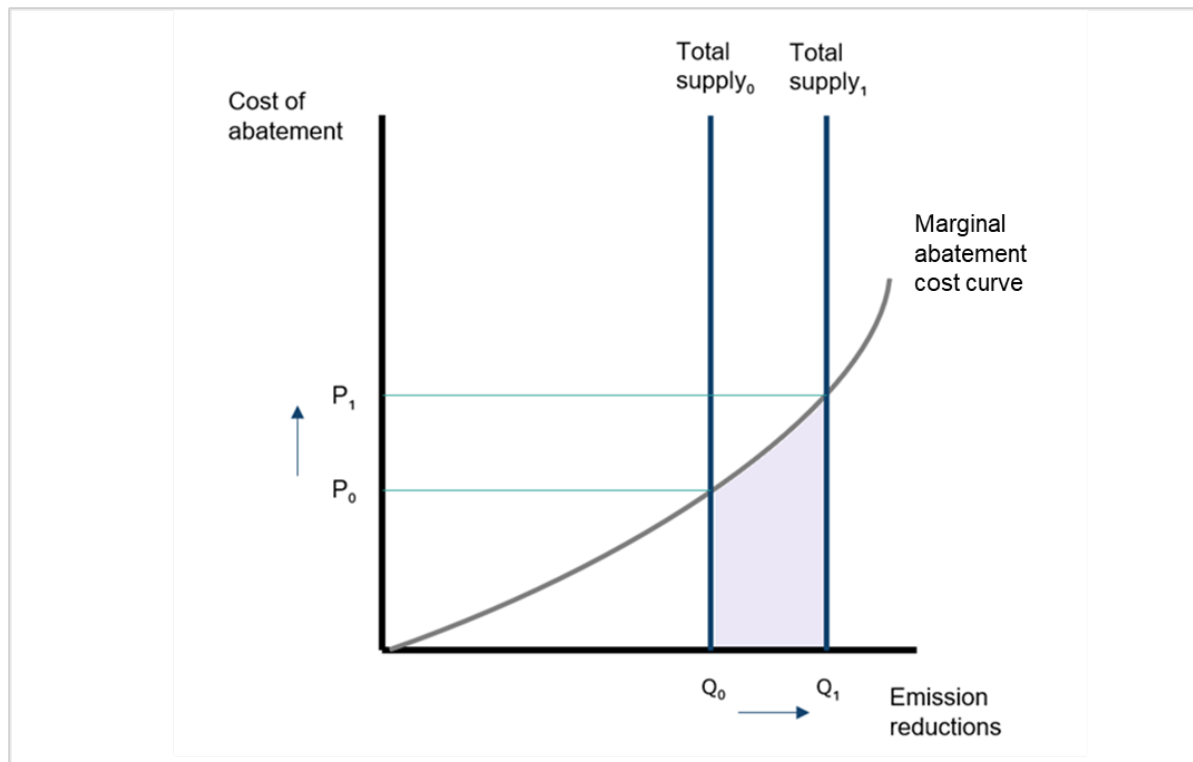
Monetised impacts

15.29. The monetised impacts of emission savings and changes in marginal abatement costs have been estimated using the CMM. Given the reduction in the level of FA, this reduces the total supply of allowances, increasing the level of 'effort' or emission reductions required. As shown in Figure 10, a reduction in the total

supply of allowances, due to a reduction in the level of FAs, results in a shift in the total supply curve from TS0 to TS1. This occurs due to a tightening cap, implying additional emissions reductions.

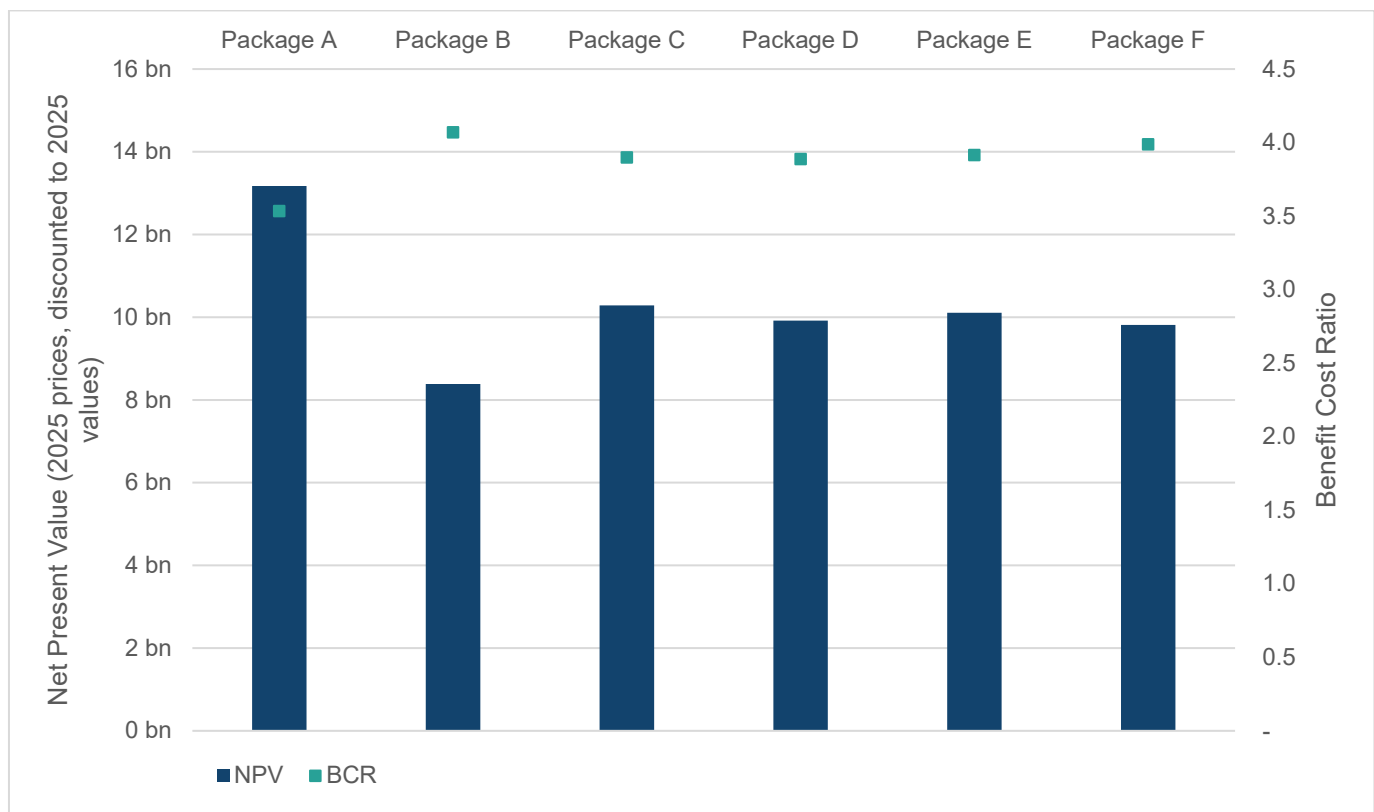
- 15.30. This pushes participants to move further up their marginal abatement cost curve,²⁶ increasing the cost of abatement and as such, the cost of allowances. The shaded region shows the additional total marginal costs of abatement incurred by UK ETS participants due to lower total supply of allowances.

Figure 10: The illustrative impact on marginal abatement costs due to a reduction in free allowances



- 15.31. The private cost of abating these emissions is then considered relative to the benefit of the emission reductions to society, valued using the appraisal carbon values. Figure 11 presents the Net Present Social Value (NPSV) and Benefit Cost Ratio (BCR) for each policy package.

²⁶ The marginal abatement cost curve shows the marginal cost of reducing an additional unit of emissions, which is constrained by potential abatement options. In principle, abatement will initially occur where costs are lowest.

Figure 11: The total central NPSV impact and BCR for each policy package

15.32. The difference between scenarios is due to the differences in the reduction of FA. In scenarios where FA reductions are largest, the total supply of allowances falls by a greater amount, requiring more abatement effort and consequently larger emissions reductions. Conversely, smaller reductions in FA lead to less required effort in abatement and smaller emissions impacts.

15.33. Based on the monetised impacts alone, each policy package demonstrates a positive NPSV in the billions of pounds. That is an expected outcome, given the private cost of abating emissions is lower than the value of those emission reductions to society. Most notably, the ratio of benefits to costs broadly represents the ratio of the value that society places on emissions and the value on the traded market.

Table 26: The full monetised impacts estimated for each policy package under the central assessment

	Package A	Package B	Package C	Package D	Package E	Package F
NPSV	£13.2bn	£8.4bn	£10.3bn	£9.9bn	£10.1bn	£9.8bn
Monetised benefits (emission savings)	£18.4bn	£11.1bn	£13.8bn	£13.4bn	£13.6bn	£13.1bn

Monetised costs (abatement costs)	£5.2bn	£2.7bn	£3.5bn	£3.4bn	£3.5bn	£3.3bn
BCR	3.5	4.1	3.9	3.9	3.9	4.0

15.34. Although estimating the size of these monetised impacts gives us an expectation of overall welfare effects, it's also important to consider non-monetised factors that could influence the results. For significant qualitative impacts, Section 19 uses switching analysis and optimism-bias sensitivity testing to assess how they might affect the appraisal outcomes.

Familiarisation costs to businesses

15.35. The final policy position introduces several significant changes to FA policy, necessitating a period for eligible participants to familiarise themselves with these adjustments.

15.36. The extent of familiarisation required will vary among participants, with those experiencing a greater impact on their business operations needing more time to understand the policy changes. Additionally, these participants may need to re-evaluate and develop new abatement plans to determine the most appropriate pathway to compliance.

15.37. We would expect familiarisation costs to detract from the NPSV. However, given the uncertainty in the time for familiarisation for each sector, and that these costs are expected to be negligible when compared to the monetised impacts, it was deemed unproportional to assess them quantitatively.

Administration costs to government

15.38. Administration costs refer to those costs that are incurred by HMG and UK ETS regulators for the operation and monitoring of the UK ETS.

15.39. The final policy position is not expected to have any significant impact on the way in which HMG or regulators undertake their engagement with the UK ETS, and therefore we expect very marginal administration costs that are negligible relative to the monetised impacts.

International carbon emissions

15.40. As discussed in Section 15, higher carbon price exposure is expected to raise compliance costs, which could reduce relative international competitiveness. As noted previously, the direction and size of this impact is highly dependent on the market conditions faced by each sector. Based on the analysis from ICICL, we estimate that emissions associated with imports could feasibly fall, specifically driven by the size of emission reductions in the Iron and steel sector, although this is uncertain.

- 15.41. That said, the UK is a price-taker in many markets and represents a relatively small share of global industrial output. As a result, while shifts in international competitiveness could lead to changes in imports into the UK (affecting emissions associated with UK consumption) or changes in exports from the UK (potentially affecting emissions from international producers supplying sectors previously served by UK exports), the degree to which these emission changes are truly additional remains uncertain.
- 15.42. While this IA considers changes in international emissions as a significant potential impact, it does not attempt to monetise them given the uncertainties associated with the ICICL model, the limitations of only partial coverage without export emissions, and the challenge of determining the additionality of emissions.
- 15.43. In Section 21, we explore the potential scale of export leakage risk, particularly for CBAM sectors who may be more carbon leakage exposed and will see their FA phased out more quickly.

Enabling benefits

- 15.44. In May 2025, the UK Government and the EU announced that they have agreed to work towards linking the UK ETS and the EU ETS. To that end the UK Government has agreed parameters for a new agreement. The UK and EU are working closely with the EU to agree a timetable for linking negotiations to try and deliver a successful agreement.
- 15.45. At this stage, there is uncertainty over what any potential future agreement could look like, and how that might directly or indirectly impact on FA policy. However, decisions on the final policy position of the FAR have been made with a potential link in mind.
- 15.46. On that basis, any final policy position which facilitates alignment in FA policy between the UK ETS and the EU ETS, and therefore facilitates a successful linking arrangement, will enable the benefits of linking. The benefits of linking could include:
- More efficient, least cost decarbonisation
 - Improved, more liquid ETS markets
 - Potential UK/EU CBAM exemption
 - Energy security
 - Business certainty and investment
- 15.47. However, given there are also many other policy decisions in scope of linking negotiations, the quantification and analysis of those benefits fall outside of the scope of this assessment.

Indirect impacts

- 15.48. As shown by the monetised appraisal impacts, marginal abatement costs (and costs of purchasing UKAs) are expected to increase under all scenarios, given the greater exposure in carbon price. The extent to which this cost is passed on to households will depend on the dynamics of the market in which the business

operates (perfect competition, homogenous products, price inelastic demand). Equally, it is also plausible that a reduction in marginal costs brought about by more efficient low-carbon technologies could reduce costs for consumers; although we expect this is unlikely in the short-run.

- 15.49. Faced with potentially higher prices, consumers could reduce their demand, resulting in losses in both consumer surplus and producer surplus. However, the UK ETS Phase I evaluation report concluded that the sectors most at risk of carbon leakage may find it more challenging to pass on additional compliance costs to consumers. For this reason, our working assumption in the central assessment is that any indirect impacts would be more concentrated to those sectors which are considered less at risk of carbon leakage.
- 15.50. If increases in cost are sufficient to result in non-viable supply to the market, the operator could choose to cease operations, or move their production abroad, reducing the size of the UK industrial production base. This loss of production and therefore profits to UK business is a potential welfare loss to society, which may instead be captured by international competitors.
- 15.51. Due to the possible significance of these impacts, we have used an alternative appraisal methodology with ICICL to verify our central assessment results of the final policy position. This is considered in Section 19.
- 15.52. Finally, reductions in the total supply of allowances could raise carbon prices for all UK ETS participants. As such, there is a potential for wider indirect impacts to sectors who are not eligible for FA, increasing costs and potentially raising prices for consumers.

Market engagement

- 15.53. Given the reduction in FA, this could lead to more operator engagement in primary and secondary allowance markets. This could include operators engaging for the first time or increasing the level of engagement, both of which could incur time costs for business. The monetised impacts assume that free allowances carry the same opportunity cost as auctioned allowances, implying that businesses will buy and sell allowances regardless of how they were obtained. This assumption further relies on a scenario of perfect information, where all participants have complete knowledge of their marginal abatement costs and face no transaction costs when engaging in trading.
- 15.54. In practice, these assumptions are unlikely to hold, which could result in further costs. While we cannot quantify these potential costs, they are expected to be relatively minor compared with the marginal costs of abatement or the total costs of purchasing allowances.

Un-monetised impacts

- 15.55. Based on the assessment above, Table 27 summarises the potential impacts of each un-monetised impact.

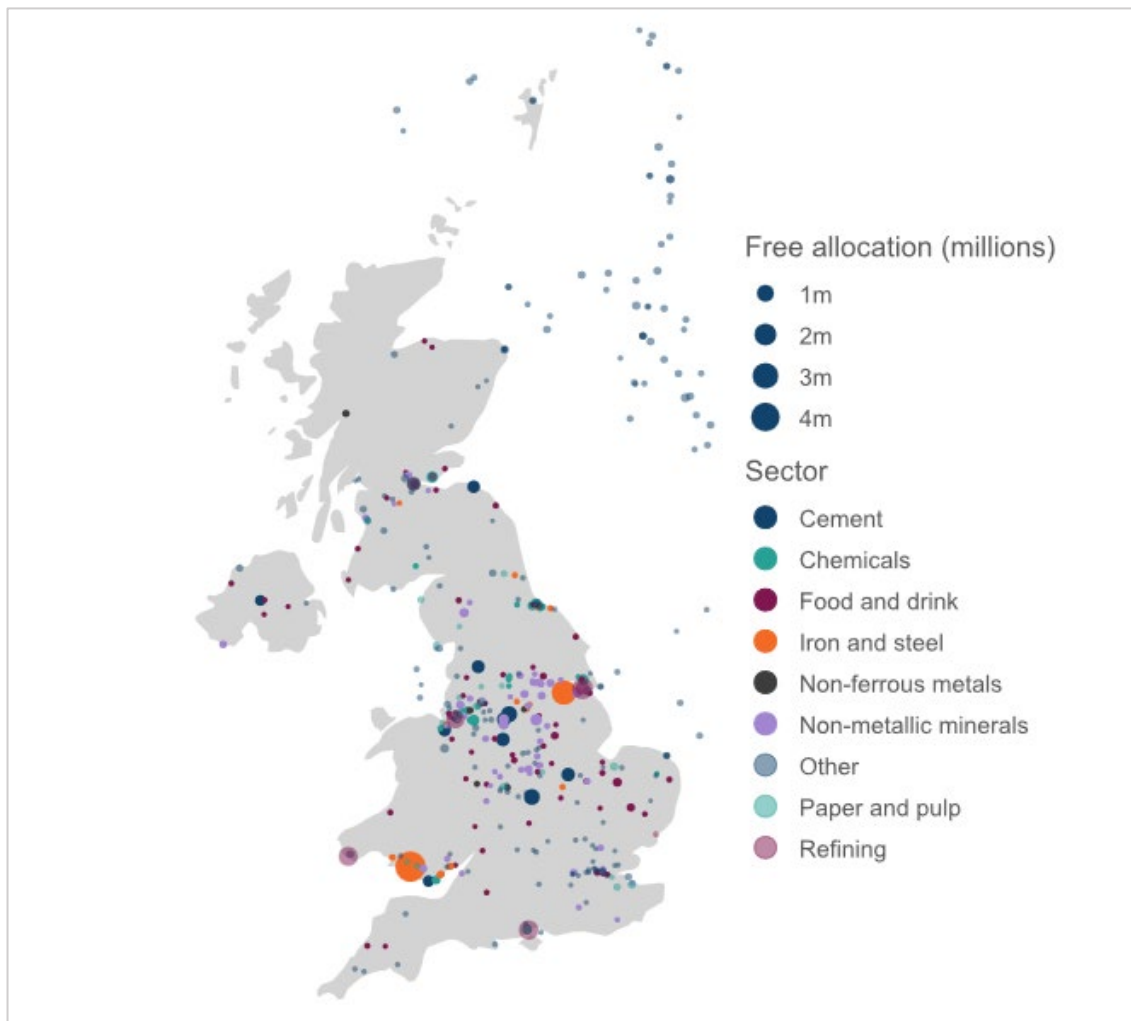
Table 27: Quantitative assessment of impact for each un-monetised impact

	Qualitative assessment
--	------------------------

Familiarisation costs to business	Negligible
Administration costs to government	Negligible
International carbon emissions	Uncertain, but some evidence to suggest positive
Enabling benefits	Strong positive (conditional)
Indirect impacts	Uncertain, but likely negative
Market engagement	Negative

Regional impacts

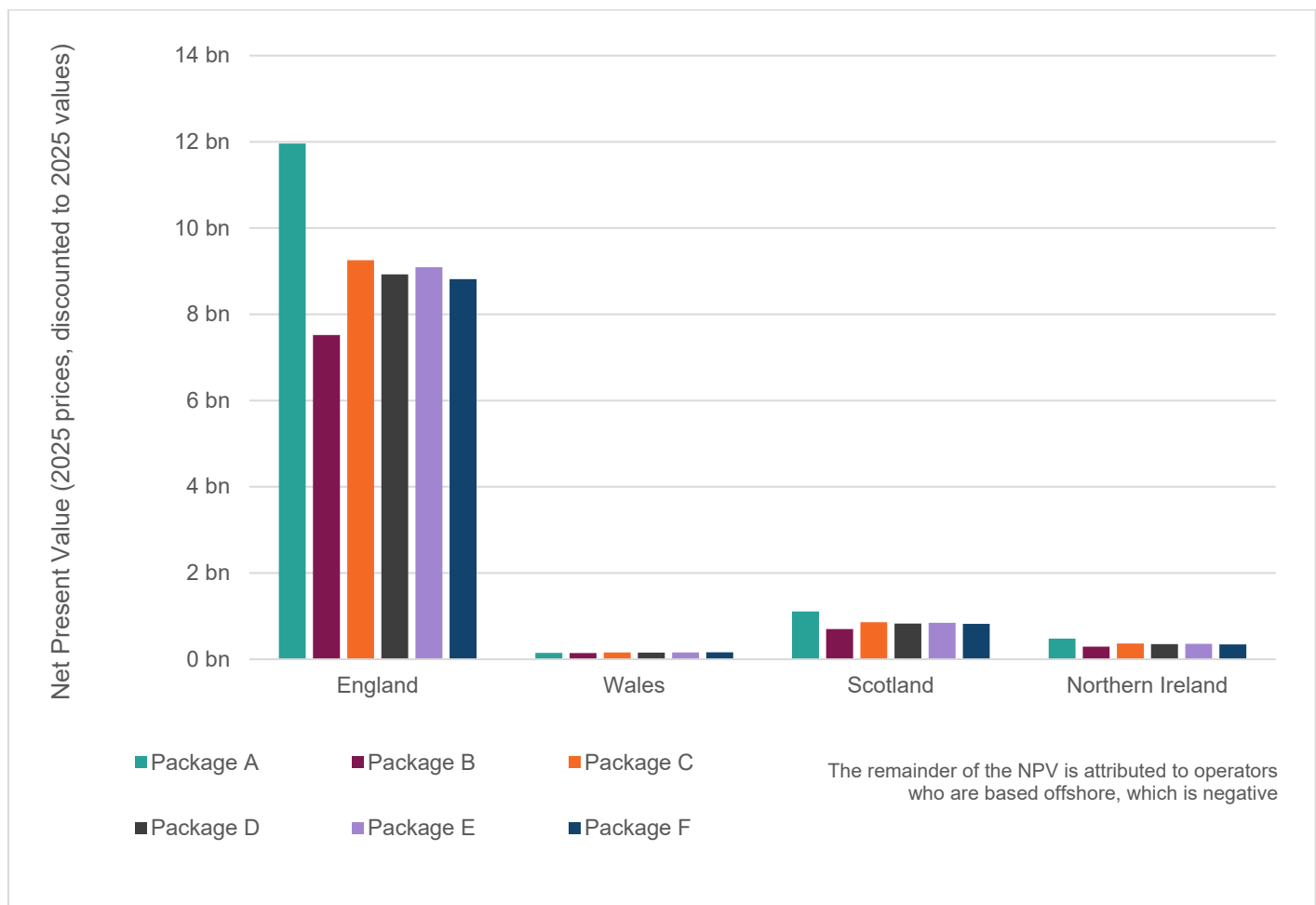
15.56. UK ETS participants that are eligible for FA are distributed across England, Scotland, Wales and Northern Ireland, as well as some offshore operators. Within regions, there are often different clusters of sector activity. Figure 12 demonstrates the distribution of FA by sector and geographical location in 2024.

Figure 12: FA by industry sector and geographical location, 2024

15.57. As a result, the impacts of FA changes are expected to vary across regions. In regions with a higher concentration of sectors that have relatively low-cost abatement options, there may be greater inflows of economic transfers from the sale of FA to sectors facing higher abatement costs. However, due to the uncertainty surrounding these transfers, and given that the central appraisal has been conducted at the UK level, incorporating these transfers into region-specific analysis was not considered proportionate.

15.58. Nevertheless, to demonstrate an indication of the regional impact, we assume that total marginal abatement costs are distributed across regions by the share of emissions in 2024,²⁷ with the benefits of emission savings spread equally over the population of each nation. Figure 13 demonstrates the estimated share of the NPSV for each policy option across the four nations.

²⁷ As such, this simplified regional analysis does not account for the abatement that will have taken place since 2024

Figure 13: The total NPSV impact by region for each package

15.59. Due to the higher concentration of operators, emissions and the population in England, the largest net impacts are attributed to that region, followed by Scotland, Northern Ireland and then Wales.

16. Analytical justification for the final policy position

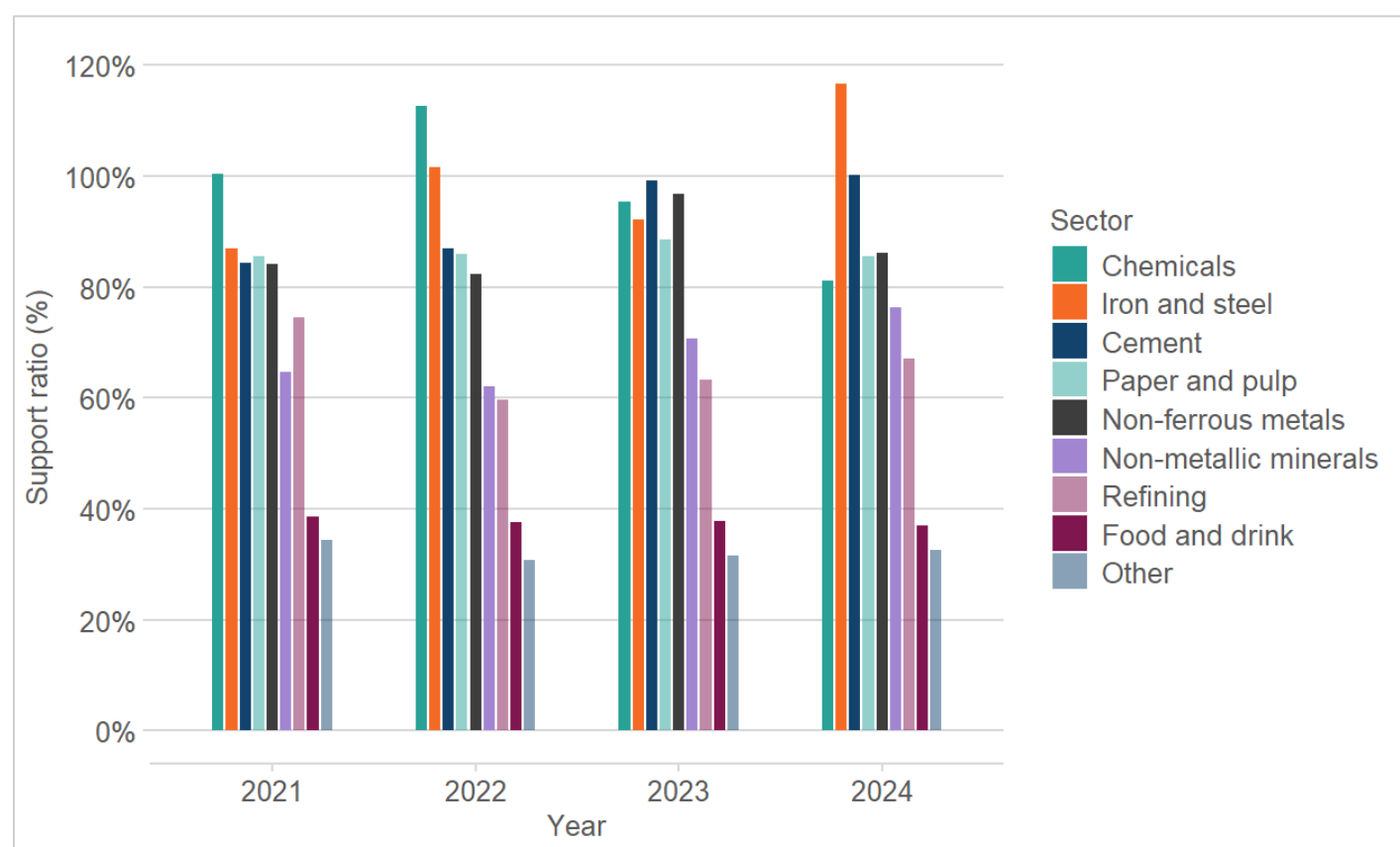
- 16.1. The Authority Response to the FAR consultations provides a comprehensive explanation of the strategic rationale for each policy option included within **Package F**, which together form the final policy position.
- 16.2. The analysis of Package F presents a clear economic case for this position, with impacts expected to be positive and large, mainly due to the significant value of emission reductions, although noting some uncertainty with the size and direction of non-monetised impacts. Given EU benchmarks were not available at the point of decision making, the Authority intends to adopt EU benchmarks from 2028, subject to an assessment of their impacts once they are made available.
- 16.3. As noted previously, this position has also been chosen with a potential link between the UK ETS and the EU ETS in mind. Any policy option which supports the UK's strategic objective of maintaining alignment to facilitate potential future linking would enable the benefits of linking. It should be noted that the UK's FA policy in a linked market will be subject to negotiation, and we will provide further

updates related to linking negotiations at the appropriate time. From here onwards, this IA will consider analysis that is relevant to the final policy position only.

17. Impacts on businesses

- 17.1. In the first allocation period, FA has been an important resource for the industrial sector. Figure 14 shows the average sector support ratio, which is defined as total FA divided by total emissions for each sector.

Figure 14: The average support ratio for each sector, 2021 - 2024



- 17.2. For nearly all sectors, FA has covered at least half of their emissions since 2021, with some sectors consistently seeing up to 80% of their emissions covered, and a smaller amount receiving over 100%. As shown previously, the relative impact between sectors is variable, and some sectors will see greater reductions in their FA than others.
- 17.3. As such, there are some sectors that are more dependent on FA, and any reduction in FA could have a disproportionately larger impact on their operations.
- 17.4. FA does not alter the marginal abatement costs faced by each sector and therefore does not affect overall demand in the allowance market. Moreover, every allowance carries the same opportunity cost, regardless of whether it was allocated for free or acquired through auctions/trading.
- 17.5. This implies that operators capable of abating emissions at a cost lower than the prevailing carbon price may find it profit-maximising to sell their freely allocated allowances to sectors facing higher abatement costs. As such, we may observe

economic transfers from sectors with high marginal abatement costs to those with lower costs. However, the scale and distribution of these transfers remain uncertain.

17.6. However, for the purposes of assessing the overall impact on businesses, these economic transfers are excluded from consideration. The Equivalent Annual Net Direct Cost to Business (EANDCB) reflects the range of direct business impacts captured within the cost-benefit analysis. This includes:

- **Familiarisation costs with new legislation.** Given the UK ETS Authority will not be introducing significant changes to the technical implementation of FA regulations, we anticipate this cost to business to be negligible relative to the counterfactual position. In any case, any costs would be a one-off cost at the start of the period. This is not quantified.
- **The net costs of purchasing UKA to cover the emissions that were previously covered by FA.** While some businesses may reduce their emissions in response to greater carbon price exposure, others will continue to pay the carbon price.
- **Abatement costs of investing in new low carbon technologies that reduce carbon price exposure.** We would expect businesses to invest in these new technologies if the marginal cost of abatement is now lower than the effective carbon price for a given level of FA. This includes the potential cost savings from fuel switching / higher productivity technologies.

17.7. The EANDCB is calculated using the net social present value cost over the annuity rate, which is calculated using a 3.5% interest rate. The EANDCB is estimated to be approximately £100 million over the 12-year appraisal period.

18. Impacts on households

18.1. The central assessment assumes that producers receiving FA will absorb the additional costs of compliance, maintaining the price level. However, given we also assume that a reduction in free allowances will result in a reduction in the total supply of allowances, the implication is that this could raise carbon prices for all UK ETS participants.

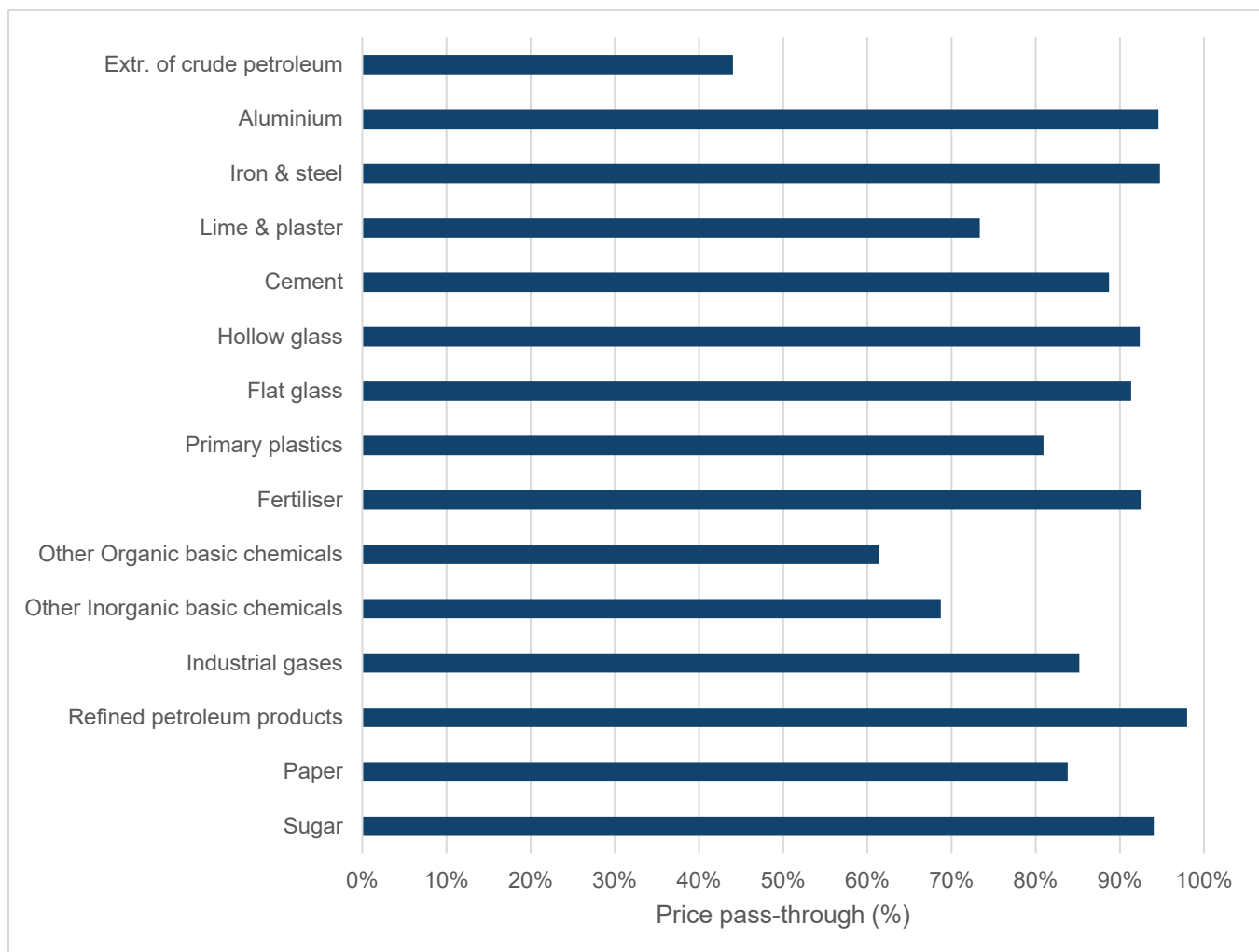
18.2. Internal analysis estimates that the traded carbon value could be approximately £25/t lower by 2030 (2024 prices) in the counterfactual scenario; notably if FA does not fall in line with the industry cap. However, this counterfactual was developed specifically for this IA and does not align with the assumptions used for the annual published DESNZ traded carbon value projections. The recommended policy will not affect the forthcoming 2025 traded carbon value for modelling projections, which are scheduled for publication in late 2025.

18.3. For those sectors who are considered not at risk of carbon leakage, such as the power sector and aviation, a lower total supply of allowances could enable the potential for greater cost-pass through to consumers. However, the extent to which consumers feel those additional costs in significant price increases will depend on the relative size of UK ETS compliance costs as a proportion of that sector's total marginal costs of production. However, our expectation is that the effect on these

sectors would be modest. Given that FA policy is focussed on sectors that are considered at risk of carbon leakage, it was not considered proportionate to further assess the wider market impacts to non-industrial sectors that are not at risk of carbon leakage.

- 18.4. As stated previously, the UK ETS Phase I evaluation report found that carbon leakage risks are expected to be greatest for energy intensity industries (producing globally traded commodities) who have minimal ability to pass on UK ETS costs to customers²⁸. This is because prices are set internationally, with many international competitors facing no or low carbon costs.
- 18.5. The central assessment assumes that producers will absorb the additional compliance cost. However, alternative evidence suggests that some degree of cost-pass through may be possible.
- 18.6. Drawing on modelled estimates from ICICL of sector-specific cost pass-through, factoring in both UK CBAM and global market prices, Figure 15 shows estimated pass-through rates for 2030.

Figure 15: ICICL estimates of potential cost pass-through for FA eligible sectors in the UK ETS



²⁸ [Evaluation of the UK Emissions Trading Scheme: Phase 1 report](#)

- 18.7. The results suggest that most sectors could pass about 80-90% of cost increases to consumers, although there is a large degree of uncertainty associated with the assumptions driving this result. For example, the ICICL model applies the concept of product differentiation to assess whether UK consumers favour domestic products over imports, depending on how differentiated or substitutable they perceive the imported goods to be. It also uses a single representative firm for each country and sector combination, which can simplify internationally market structures and market power.
- 18.8. These factors combined can lead to domestic prices being consistently higher than import prices, enabling substantial price pass-through. Consequently, these results offer a different perspective compared to existing evaluation evidence. These modelled estimates are generally at the upper end of estimates from existing literature and so should be treated with caution.
- 18.9. Section 19 explores the implications of potential changes in market price on the appraisal outcomes, utilising the ICICL model as part of an alternative appraisal methodology.

Uncertainty

19. Risks, limitations and assumptions

- 19.1. The central CBA assumes several uncertain factors, each of which could significantly influence the outcomes of the analysis. To address this, the following section examines the associated risks, limitations, and key assumptions in greater detail.

Post-2030 UK ETS policy

- 19.2. Assumptions regarding the UK ETS's future are highly uncertain, yet fundamental for projecting future allowance demand and supply. For example, the central assessment assumes the cap aligns with Carbon Budget 6 targets, maintains the current industry cap, and keeps unallocated allowances in the flexible reserve.
- 19.3. For simplicity, we centrally assume no expansion to new sectors for the purposes of this analysis. In July 2025, the UK ETS Authority announced that it will be adjusting the level of the total cap for the inclusion of domestic maritime from 2026.²⁹ While this adjustment will change the industry cap as a percentage of the total cap, it will not change the total number of allowances under the industry cap pre-2030. Future policy beyond 2030 is yet to be determined, and as such, it is possible that the inclusion of new sectors may have an impact on the size of the industry cap post-2030.
- 19.4. **These central assumptions should not be considered a definitive indication of the likely policy direction**, and as such, it is proportional to test alternative

²⁹ <https://www.gov.uk/government/consultations/uk-ets-scope-expansion-maritime-sector/uk-emissions-trading-scheme-scope-expansion-maritime-html>

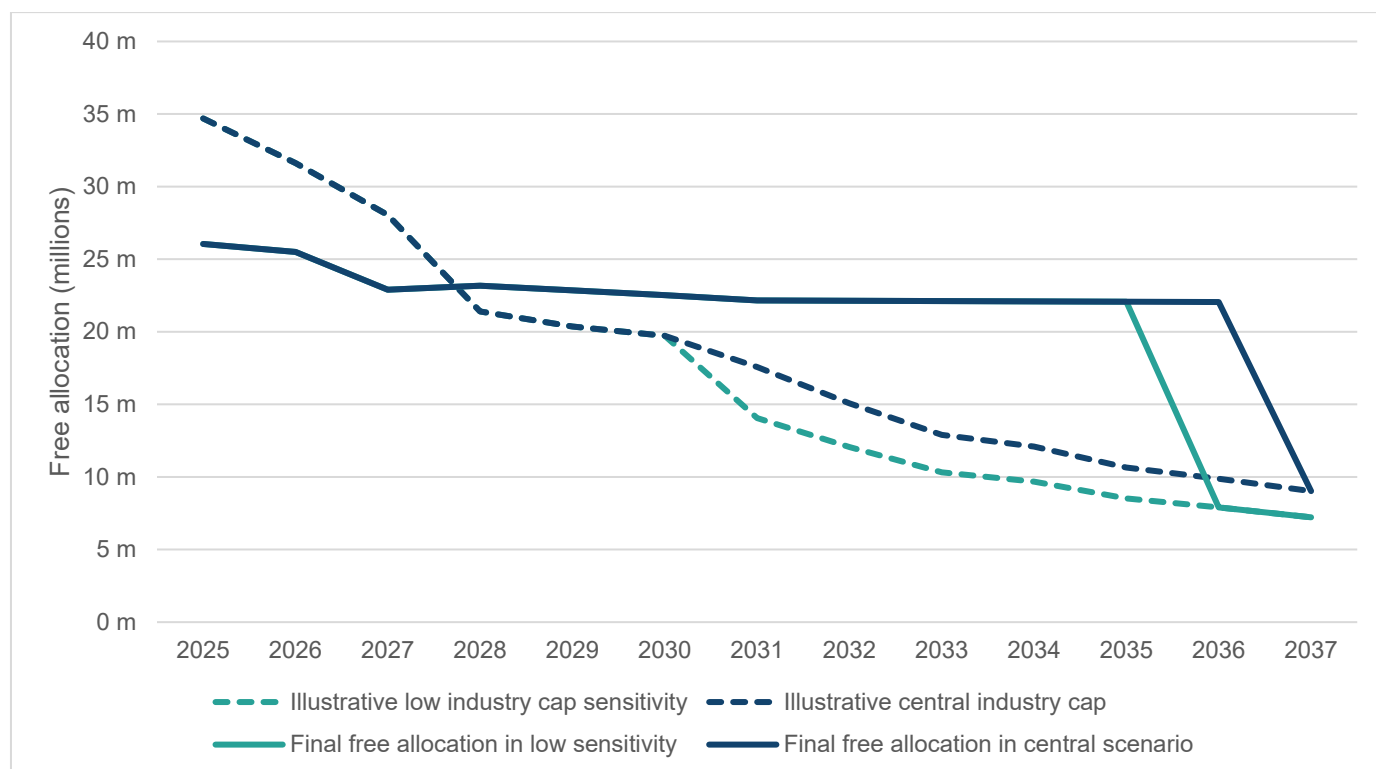
feasible assumptions, such as an alternative number of total allowances set aside for FA as part of the industry cap, or a feasible reduction in the expected size of the flexible reserve. These policy uncertainties will inherently affect the supply of allowances, and with all other things equal, the value of traded allowances.

- 19.5. It should be noted that the sensitivity tests presented here continue to assume that FA rules set under the second allocation period continue to roll on post-2030. In a Net Zero consistent scenario, FA for all sectors will eventually need to be phased out entirely, and doing so in a way that avoids exceeding the post-2030 industry cap would provide greater certainty for industry.
- 19.6. While future changes to FA rules post-2030 are outside of the scope of the FAR, they may have significant implications for the results presented here.

Industry cap

- 19.7. To account for the uncertain supply of allowances under the industry cap, we have considered an alternative sensitivity test, which reduces the size of the industry cap by 20% allowances in each year from 2030. This corresponds to an assumed 19m less allowances for the low industry cap sensitivity between 2030 – 2037.
- 19.8. Under the central assumption, the level of FA within the counterfactual scenario is estimated to be large enough to trigger the CSCF in 2037. Under the low industry cap sensitivity, this outcome still occurs, but a year sooner. As such, FA levels in the year in which the CSCF is triggered are lower than the FA distributed in the final policy scenario (where the CSCF is not triggered). This outcome would not be desirable, reducing FA certainty for eligible participants and draining the flexible reserve for other uses, such as the market stability reserve. This is demonstrated in Figure 16.

Figure 16: The central and low industry cap scenarios and their impact on the counterfactual number of allocated free allowances by 2037



- 19.9. Nevertheless, under both industry cap scenarios, the final policy scenario does not activate the CSCF throughout the appraisal period due to the sufficient reduction in FA, which is a more relevant consideration. Table 28 presents the NPSV for the illustrative low industry cap in comparison with the central assumption.

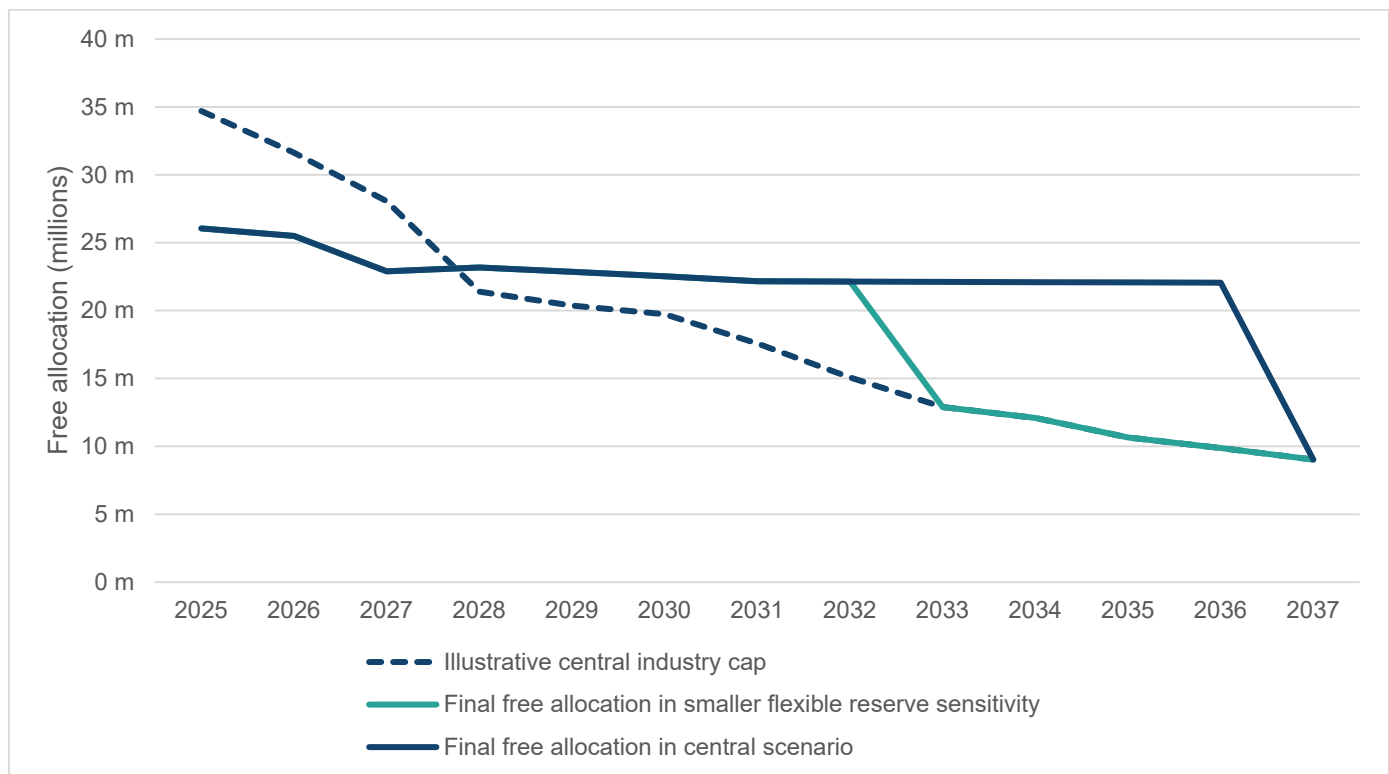
Table 28: The monetised NPSV for the central and low industry cap scenarios

NPSV (£bn)	
Central industry cap scenario	£9.8bn
Low industry cap sensitivity	£7.0 bn

- 19.10. While triggering the CSCF in the counterfactual scenario shows it could significantly influence the appraisal outcomes by reducing the size of the NPSV by approximately £3bn, the long-term uncertainty surrounding FA policy projections, combined with the UK ETS's clear objective to align FA with the declining industry cap, means this scenario is unlikely to be material nor strategically relevant.

Flexible reserve

- 19.11. The other significant post-2030 assumption is on the number of allowances available within the flexible reserve that could be used to avoid triggering a CSCF. In the central assessment, we assume that all of the allowances accrued in the flexible reserve by 2030 are available for use.
- 19.12. However, it is entirely plausible that these allowances may be used for other purposes, such as the market stability reserve or auctioning additional allowances. While analysis related to those decisions fall outside the scope of this assessment, they are important for considering the potential implications of FAR policy decisions. Given this policy uncertainty, we test a scenario in which the number of allowances available for use to avoid triggering a CSCF is reduced by 40m allowances after 2030 (approximately half of the flexible reserve estimated in the counterfactual scenario by 2030).
- 19.13. Similarly to the industry cap scenario, FA in the final policy scenario falls sufficiently such that the CSCF is not triggered before 2037. But as before, the counterfactual relies heavily on the flexible reserve post-2030 to avoid triggering a CSCF. Figure 17 shows the extent to which this sensitivity test changes FA levels in the counterfactual scenario.

Figure 17: The central and smaller flexible reserve scenarios and their impact on the counterfactual number of allocated free allowances by 2037

19.14. As demonstrated, a substantial reduction in the size of the flexible reserve materially increases the likelihood of triggering the CSCF in the counterfactual scenario, which is projected to occur by 2033 in this specific scenario. Table 29 presents the NPSV based on the assumption of a reduced flexible reserve, in comparison to the central flexible reserve scenario.

Table 29: The monetised NPSV for the central and smaller flexible reserve scenarios

NPSV (£bn)	
Central flexible reserve scenario	£9.8bn
Smaller flexible reserve sensitivity	£1.2bn

19.15. This suggests that the NPSV is highly sensitive to the size of the flexible reserve. If the CSCF is triggered in the counterfactual scenario but not in the final policy scenario, the counterfactual may lead to greater emissions reductions from that point onward, ultimately lowering the NPSV of the final policy scenario.

19.16. Draining the flexible reserve could also result in additional opportunity costs, such as limiting its availability for the market stability reserve. If the Authority is unable to use the flexible reserve to respond to market shocks, this could contribute to increased market uncertainty and potentially higher costs for businesses.

- 19.17. Similarly to the previous sensitivity test, we do not consider a counterfactual scenario with significant fewer allowances in the flexible reserve to be a material or relevant do-minimum scenario.

Future abatement technologies

- 19.18. The underlying modelling platform considers detailed assumptions of the marginal abatement costs for each sector (i.e. the marginal cost for each additional unit of emissions abated). The drivers behind these marginal abatement costs are the availability of future technologies, and how quickly costs may reduce overtime, through learning or economies of scale.
- 19.19. These factors are inherently uncertain. Under or overestimating the marginal cost of abatement for a given sector would under or overestimate the carbon price, for which that sector is indifferent between paying the cost or abating their emissions.
- 19.20. For sectors with a wide range of potential abatement technologies distributed across various cost levels, uncertainty may be lower, as the smaller differences between alternatives reduce the likelihood of any single technology significantly altering firm decision-making. This diversification effectively spreads carbon leakage risk. In contrast, in sectors with fewer available abatement technologies, the analysis becomes more sensitive to the assumed performance and cost of individual technologies.
- 19.21. This assessment uses high and low sensitivity tests based on different marginal abatement cost curves within the CMM. Higher marginal costs raise participants' willingness to pay for allowances and hence the traded price, while lower costs have the opposite effect. We apply these to both the final policy scenario and counterfactual scenario.
- 19.22. As such, higher levels of abatement are anticipated under the low-cost scenario, while reduced abatement is expected in high-cost scenario. Figure 18 and Figure 19 show the relative difference in marginal abatement costs and the emission reductions across all UK ETS sectors respectively for each abatement cost scenario, based on CMM outputs.

Figure 18: The change in marginal abatement costs for each abatement cost scenario, relative to the counterfactual

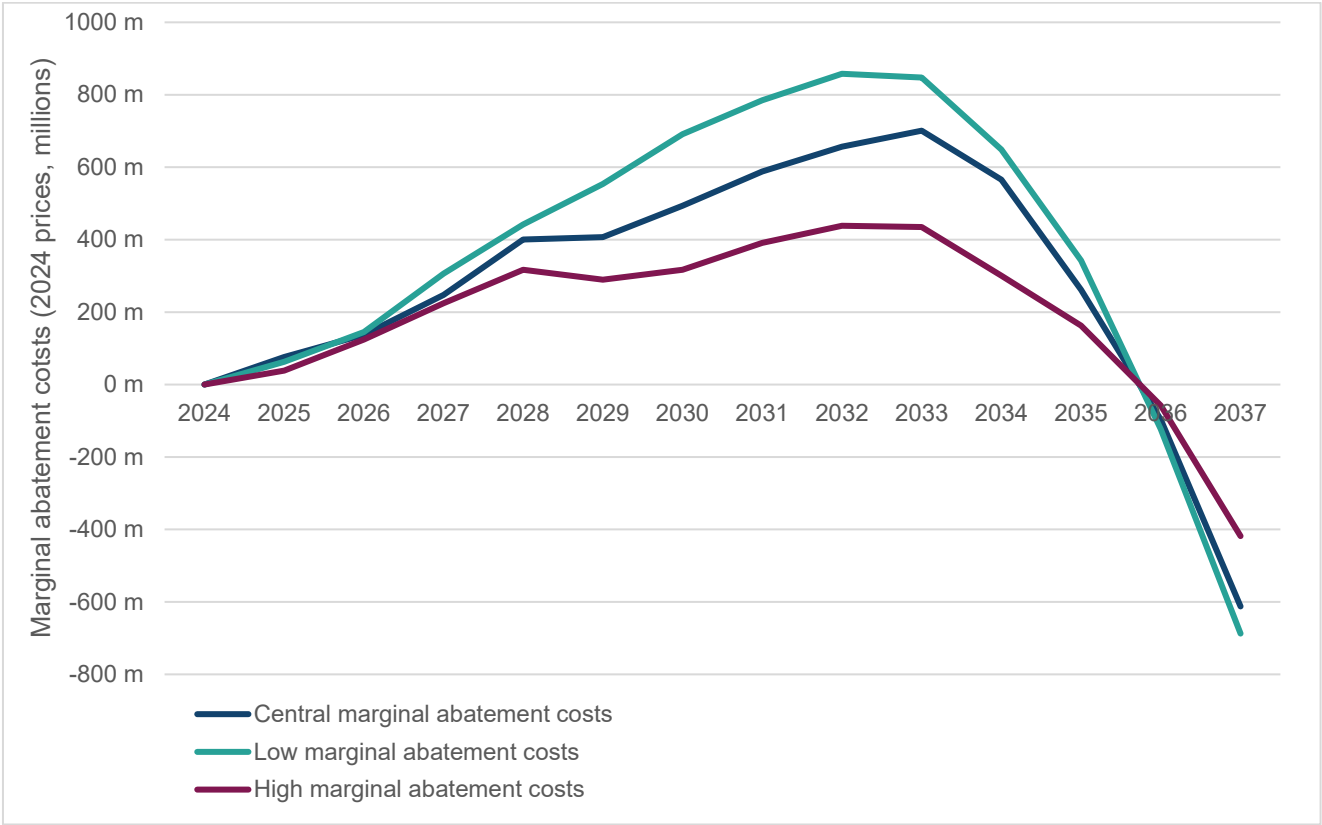
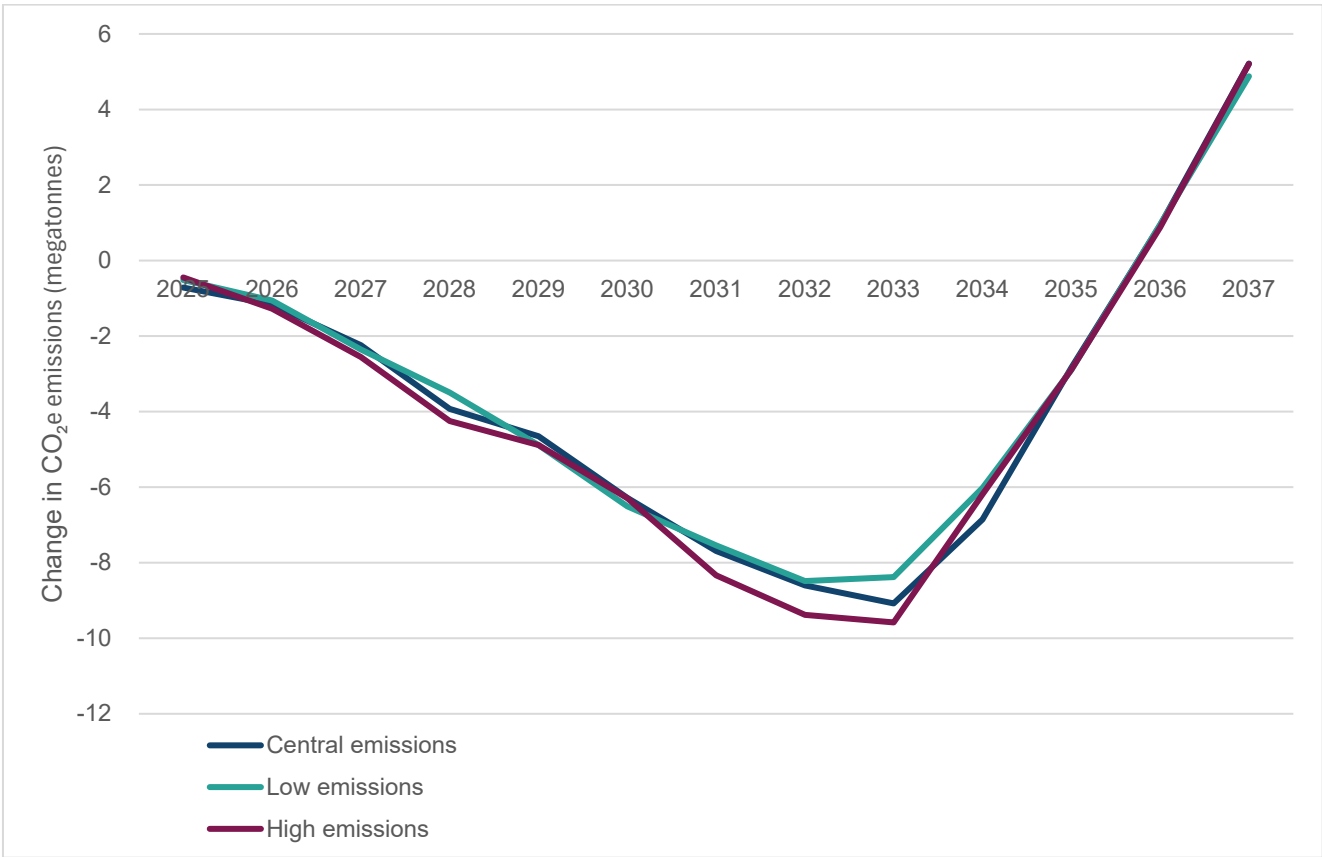


Figure 19: The change in emissions for each abatement cost scenario, relative to the counterfactual



19.23. The impact on emissions is relatively limited, as total system emissions are determined by the UK ETS cap. However, the effect on abatement costs is significantly larger, and this drives the majority of the difference in NPSV.

19.24. Table 30 demonstrates the impacts of higher/lower marginal abatement costs and as such, higher/lower emission reductions on the NPSV.

Table 30: The NPSV under high and low marginal abatement cost curve sensitivities

NPSV (£bn)	
Central marginal abatement cost scenario	£9.8bn
High marginal abatement cost sensitivity	£8.5bn
Low marginal abatement cost sensitivity	£11.4bn

Market uncertainty

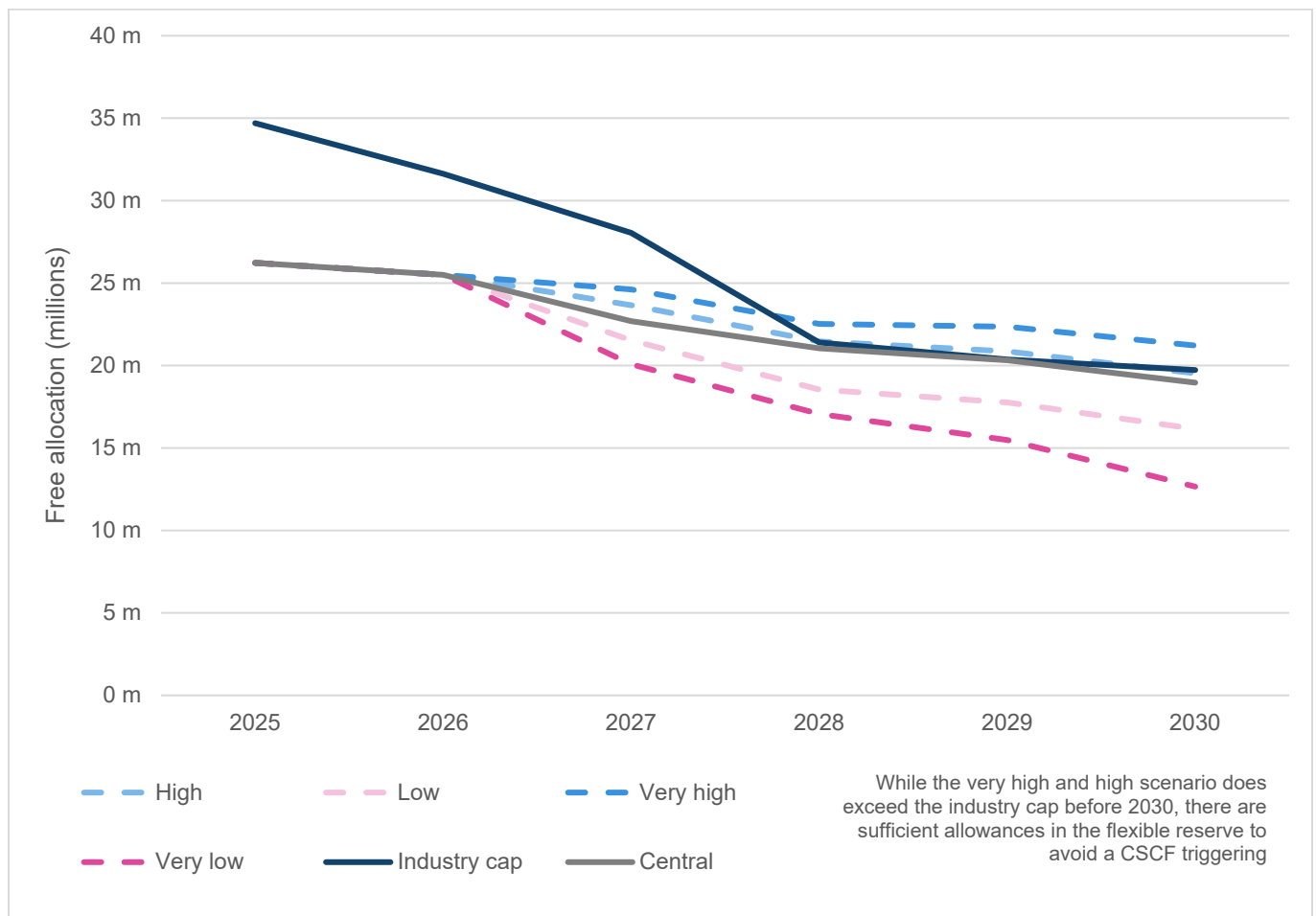
19.25. The analysis for this IA was produced in August 2025, with market assumptions based on the latest available information at the time. Any subsequent developments in market activity since this time have not been reflected in this assessment.

19.26. In the central scenario, we assume that activity levels for each installation remains constant from current levels, implying that activity level changes are not triggered and so FA does not vary based on increased or reduced output.

19.27. Additionally, the central scenario accounts for the closure to the blast furnaces at Port Talbot in 2024, which we assume are replaced by fully operational electric arc furnaces by the end of 2027, in line with the latest public communications.

19.28. Assumptions on the operation of the blast furnaces at Scunthorpe are considerably more uncertain. For simplicity, we centrally assume no change in the operational technology at Scunthorpe in future years, with output activity remaining constant.

19.29. Both sites are anticipated to maintain high relative levels of FA. To account for this uncertainty associated related with planned closures / openings, and the overall level of market activity across sectors, this assessment considers two extreme market activity sensitivity tests. Figure 20 presents the FA impact for both the counterfactual scenario and the final policy scenario.

Figure 20: The FA impact of market activity sensitivities, relative to the central scenario and the industry cap

19.30. As shown, the high and very high scenarios indicate that FA may exceed the industry cap at certain points during the second allocation period. However, since most of this increase in FA is due to rising activity levels, a significant portion is expected to be sourced from the new entrant reserve rather than the flexible reserve. Combined with the Authority's projections of a substantial surplus in the flexible reserve throughout this period, it is anticipated that there will be more than sufficient allowances available to prevent the triggering of a CSCF.

19.31. Given this, we do not produce alternative high and low NPSV estimates.

Appraisal carbon values

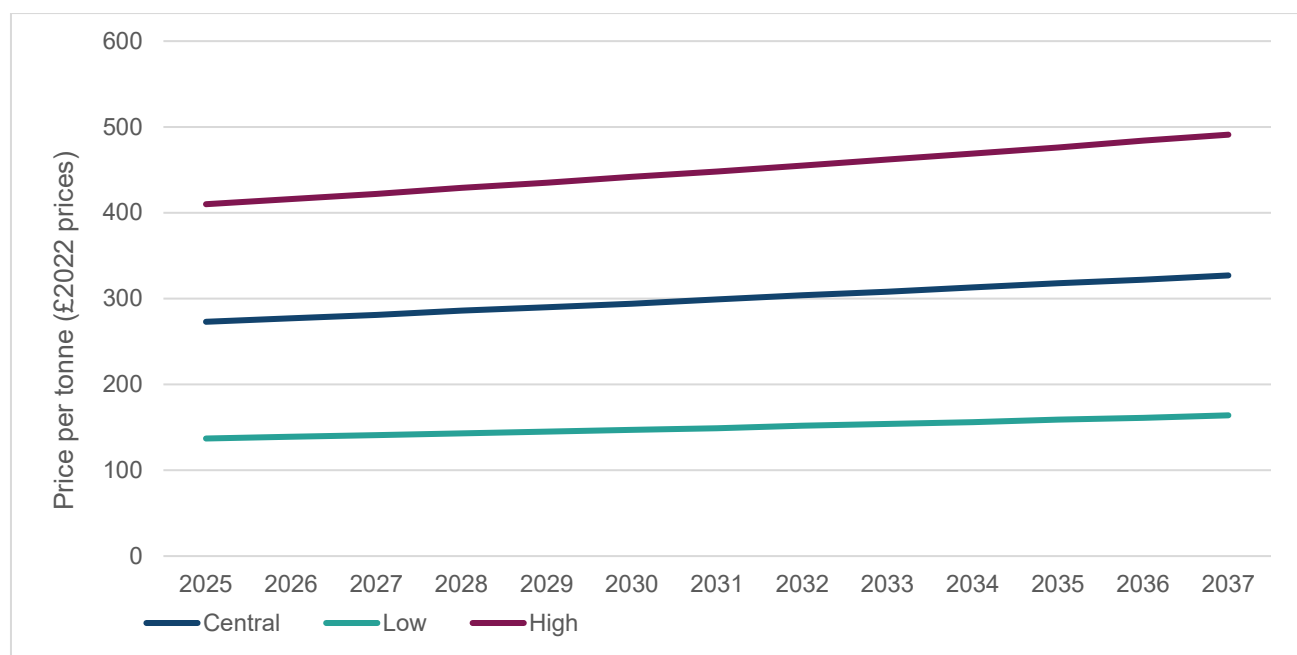
19.32. The central appraisal demonstrates the scale of emission reductions due to the reduction in total supply of allowances to the market. These emission reductions are valued using the DESNZ central appraisal carbon values. These values are estimated by considering the abatement costs incurred to meet the UK Government's Net Zero consistent emission targets.³⁰

19.33. For appraisal purposes, alternative high and low scenarios are used to test the implications of more expensive or cheaper abatement in order to reach those

³⁰ [Valuation of energy use and greenhouse gas \(GHG\) emissions](#)

targets. In essence, they demonstrate alternative societal values for emission reductions. These scenarios are shown in Figure 21.

Figure 21: DESNZ appraisal carbon values



19.34. These alternative values do not affect our assumptions around the functioning of the UK ETS market. They are exclusively used to test the implications of alternative cost of emissions (and therefore benefits of emission savings) to society.

19.35. Under the high sensitivity test, the value of emissions savings increases; conversely, under the low sensitivity test, it decreases. Table 31 provides the implications for the NPSV.

Table 31: The NPSV under high and low appraisal carbon value sensitivities

NPSV (£bn)	
Central appraisal carbon values	£9.8bn
High appraisal carbon values	£16.4bn
Low appraisal carbon values	£3.3bn

Benchmark uncertainty

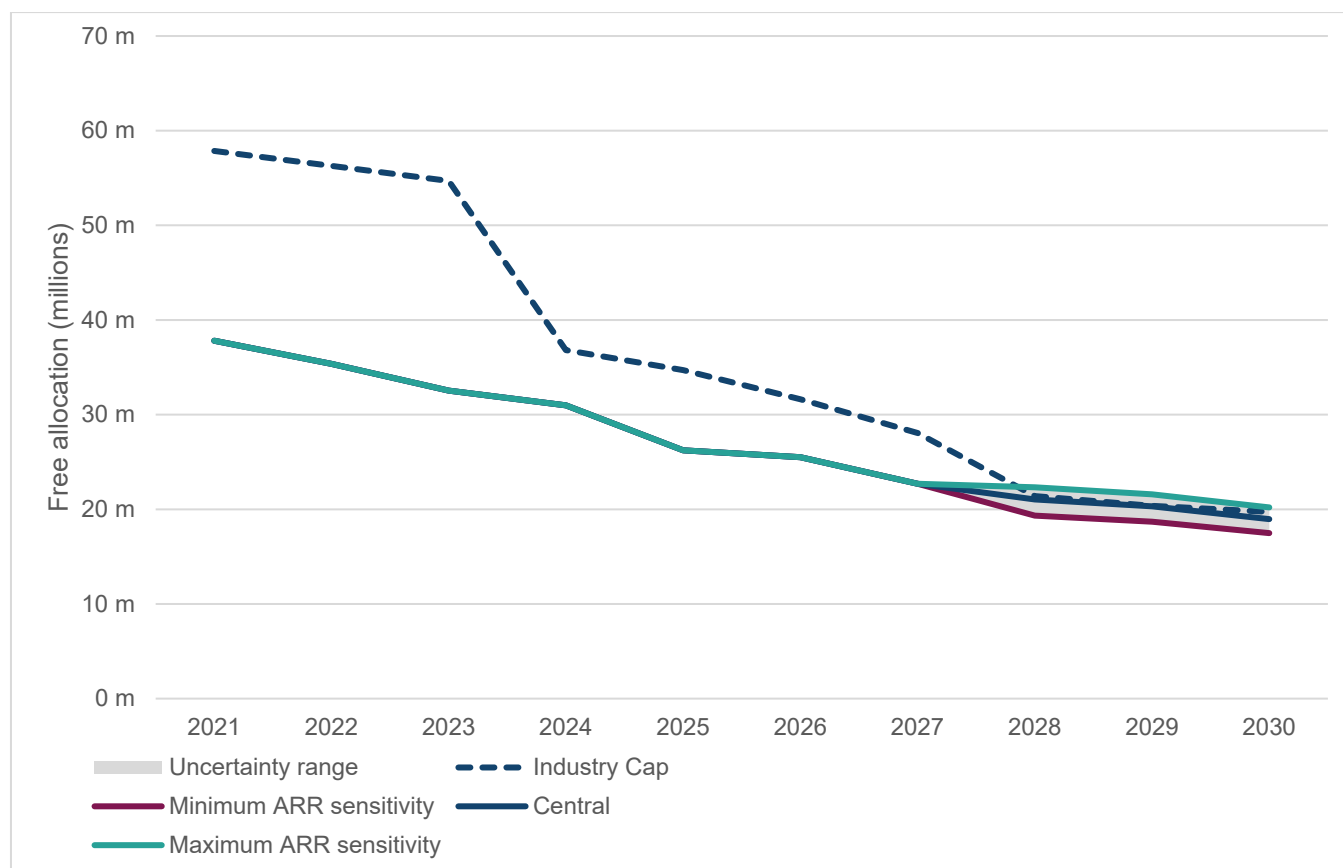
19.36. As outlined in Section 10, EU benchmarks were not publicly available at the time this analysis was conducted; therefore, a UK benchmarking methodology served as a proxy, developed using unchecked Baseline Data Reporting (BDR).

19.37. For the UK benchmarks methodology, UK ARR values were assumed to be based on the emissions intensity improvement of the top UK sub-installation, for each product and fallback benchmark, between 2016/17 and 2022/23, applied to the current benchmark value. This assumes maximum and minimum ARR thresholds of 2.5% and 0.3% respectively, in line with updated EU ETS thresholds.³¹ The full list of assumed UK benchmark values is presented in Annex A.

19.38. Consequently, there remains uncertainty regarding the alignment of modelled benchmark values, and their accuracy in representing the EU benchmarks that inform the intended position from 2028.

19.39. To reflect this uncertainty within the analysis, we have considered two alternative scenarios where benchmark values have been calculated using both the maximum and minimum ARR threshold for benchmarks. This broadly reflects the full possible range of outcomes from using updated EU benchmarks from 2028.³² This is shown in Figure 22.

Figure 22: The impact of the maximum and minimum benchmark sensitivities on projected FA



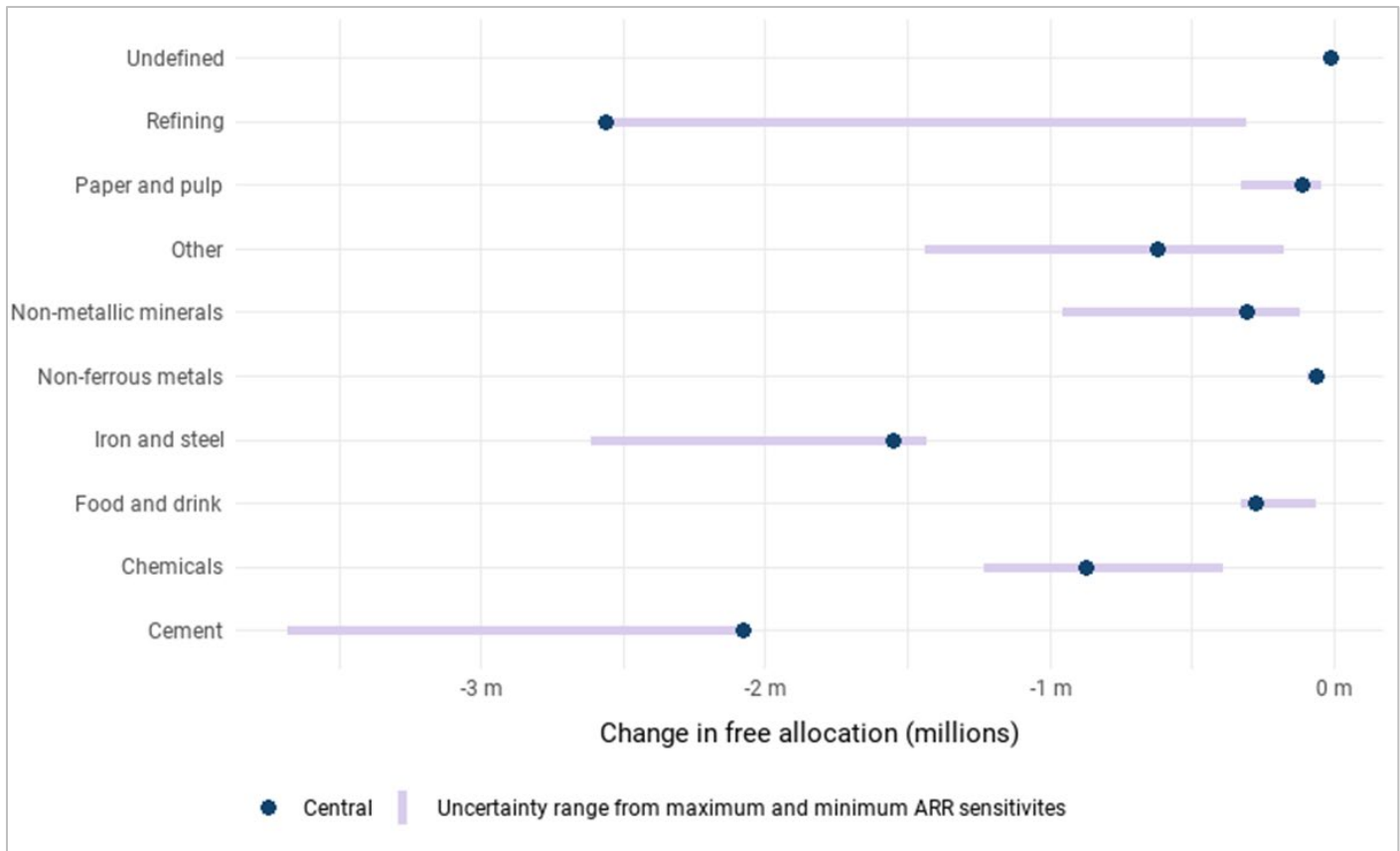
19.40. It shows that in terms of total FA the UK benchmarking methodology used within the central assessment appears to fall broadly in the centre of the feasible range based on maximum and minimum ARR thresholds.

³¹ [EU ETS thresholds](#)

³² The Authority notes that the EU ETS has amended the definitions and system boundaries for a minority of product benchmarks (details on these can found in the Main Authority Response) to strengthen incentives to reduce greenhouse gas emission and improve energy efficiency and to ensure no negative competitive distortions for new and existing technologies. These changes in definitions are not accounted for in this specific analysis.

19.41. However, from a sector perspective, the outcome is highly variable. Figure 23 shows the potential range of FA impact across the second allocation period from the maximum and minimum ARR threshold sensitivities published by the EU of 2.5% and 0.3%.

Figure 23: The impact of the maximum and minimum benchmark sensitivities on projected FA levels by sector



19.42. As such, sectors such as Iron and steel and Cement could see considerably larger reductions in FA, while sectors like Refining and Food and drink could see much lower reductions. Table 32 provides the impact of these alternative benchmark sensitivities on the NPSV.

Table 32: The NPSV under maximum and minimum ARR sensitivities

	NPSV (£bn)
Central UK benchmark methodology	£9.8bn
Maximum ARR sensitivity	£7.1bn
Minimum ARR sensitivity	£12.1bn

Optimism bias

19.43. As noted in HMT Green Book guidance, appraisals are often subjected to systematic optimism bias.³³ This may be due to chosen assumptions, modelling tools, or the evidence base used. As such there should be a consideration of adjusting appraisal impacts to account for the potential impact on VfM.

19.44. This assessment provides a high-level indication of VfM under optimism bias sensitivities, with adjustment descriptions and results presented in Table 33.

Table 33: The NPSV under optimism bias sensitivities

	NPSV (£bn)
Benefits reduced by 20%	£7.2bn
Costs increased by 20%	£9.2bn
Benefits are reduced and costs are increased by 20% respectively	£6.5bn

19.45. This shows that even when accounting for a degree of potential optimism bias, the NPSV of monetised impacts is still likely to be large and positive.

Switching values

19.46. Switching values are used when non-monetised impacts are uncertain, indicating how much benefits must decrease, or costs increase for the appraisal to result in net negative welfare impacts. Table 34 shows both the central assessment results and the sensitivity scenario with the lowest feasible NPSV,³⁴ based on low appraisal carbon values.

Table 34: The NPSV change required for a negative NPSV

	NPSV change (£bn)
Central assessment	- £9.8bn
Low appraisal carbon value sensitivity	- £3.3bn

19.47. If non-monetised impacts, such as international emissions or indirect effects are worth more than £9.8bn, the overall welfare impact will likely be negative. Non

³³ [Microsoft Word - Green Book optimism bias.doc](#)

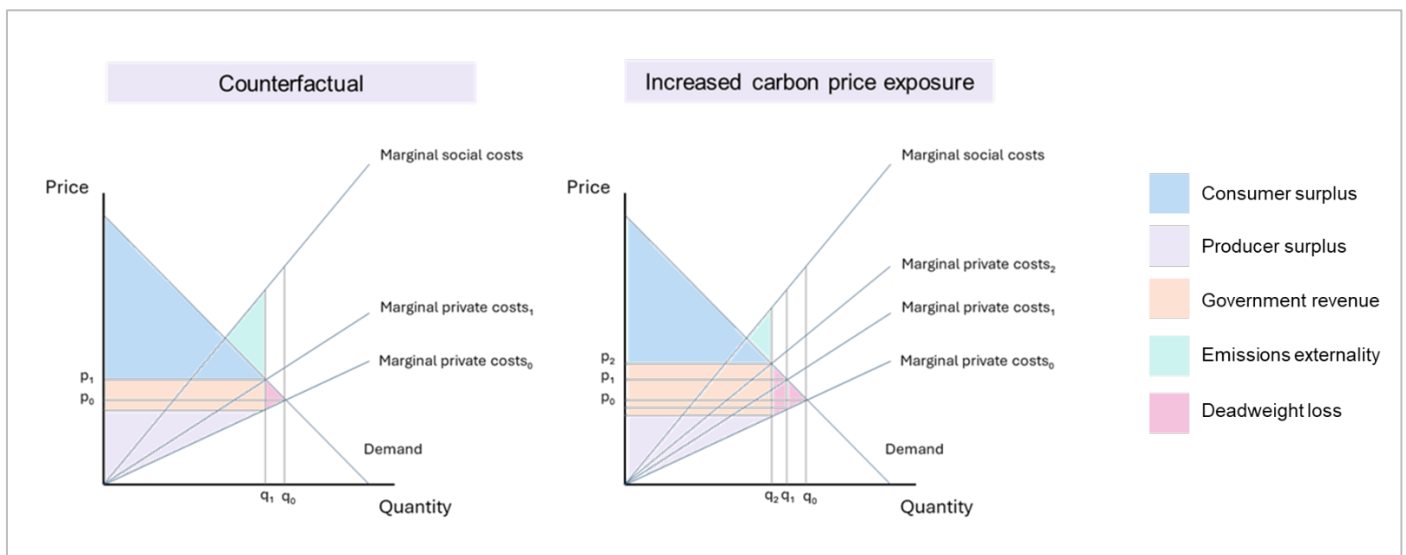
³⁴ While the smaller flexible reserve sensitivity has a lower NPSV, we do not regard the counterfactual scenario used in that sensitivity test as material or strategically relevant

monetised costs above £3.3bn also make this outcome more probable, based on the low carbon value sensitivity.

Indirect impacts and the modelling approach

- 19.48. For the central assessment, the CMM has been used to monetise the impacts of emission reductions and marginal abatement costs. The CMM has the advantage of considering how the allowance market could respond due to a reduction in FA, with the corresponding impact on carbon prices and emission reductions. However, a key limitation with the model is that it is not able to consider sectoral impacts, and the potential impact on the market that the sector supplies.
- 19.49. Noting the uncertainty associated with ICICL modelling, it can offer an alternative perspective on the potential welfare impacts associated with the reduction in FA in each sector, controlling for the impacts of the UK CBAM. It does this by considering the market equilibrium in each sector, both before and after the policy change, estimating the change in quantities and market prices for both UK production and imports.
- 19.50. Through this, we can assess a theoretical welfare impact based on changes in consumer and producer surplus. Figure 24 shows the changes in welfare derived from an increase in carbon price exposure, and therefore an increase in private marginal costs.

Figure 24: The theoretical welfare impacts from an increase in carbon price exposure using a stylised firm supply and demand diagram (not to scale)



- 19.51. For the change in marginal private costs, which is the additional compliance cost, this results in an increase in the market price, and a corresponding reduction in the equilibrium quantity. So, when faced with higher prices, both consumers and producers could in theory lose welfare. However, with that comes a reduction in the size of the negative externality, which is the carbon emissions associated with the production of the market product.
- 19.52. The size of these welfare impacts depends on both the elasticity of demand and supply, and the scale of the negative externality. However, using this framework, it is possible to assess the potential indirect impacts of changes in FA.

19.53. For both the UK domestic market and imports, aggregated for each ICICL sector, we can calculate the corresponding change in consumer and producer surplus, in 2025 prices and discounted to 2025 values. This is shown in Table 35.

Table 35: The consumer and producer surplus impacts associated with estimates from ICICL

NPSV change (£bn)	
Δ Consumer surplus	-£3.5bn
Δ Producer surplus	-£3.2bn

19.54. This demonstrates that the introduction of indirect impacts may lead to a reduction in the NPSV within the billions of pounds as the market adjusts to higher prices for consumers.

19.55. The ICICL results are subject to significant uncertainty and depend on various assumptions about domestic and international markets. Both the central assessment and this alternative methodology have been developed using distinct evidence bases, modelling tools, and scopes of impact. Additionally, abatement costs will almost certainly be double-counted if these results are directly compared to the central assessment, and the emission benefits from lower demand are not accounted for. Consequently, these results should be viewed as illustrative and not directly compared with the central assessment figures. This analysis has been used solely to validate the central assessment conclusions, indicating that considering indirect impacts is unlikely to overwhelmingly negate the economic case.

Additional assessments

20. Small and Micro Business Assessment (SaMBA)

- 20.1. The UK ETS does not collect data on business size directly. It does however collect data on the level of emissions from each UK ETS participant, including those that are eligible for FA.
- 20.2. Currently, there is a minimum threshold for participation in the UK ETS on the basis of certain activities. Under the Greenhouse Gas Emissions Trading Scheme Order 2020 ("the Order"), the threshold for combustion has been set such that only installations where the combustion of fuels in units with a total rated thermal input exceeding 20 megawatts are required to participate in the UK ETS.³⁵
- 20.3. For firms who are low emitters there are different provisions on them, and it may be that these firms are also smaller in labour size. There are simplified provisions for hospitals and installations with emissions lower than 25,000t CO₂e per annum,

³⁵ <https://www.legislation.gov.uk/uksi/2020/1265/schedule/2>

and where the installation carrying out the activity of combustion has rated thermal capacity below 35MW.³⁶

- 20.4. These firms are allowed to opt out of buying allowances. Instead, they monitor and verify their emissions and are given an emissions target which reduces in line with the cap. They pay a price based on the year's average carbon price for their emissions over that target each year.
- 20.5. Similarly, there are special provisions for ultra-small emitters (which again, may be smaller in organisation size). If eligible, installations with emissions lower than 2,500t CO₂e per annum may obtain ultra-small emitter status. They would not be required to hold a permit but are still required to monitor their emissions and must notify their regulator if they exceed the threshold. For firms which opt-out from the UK ETS via this scheme, no data is collected on them.³⁷
- 20.6. Given the existence of these alternative provisions, this would limit the number of small or micro businesses that operate within the main ETS scheme and therefore are impacted by FAR2 changes.
- 20.7. For the purposes of this SaMBA, we have considered FA impacts on any eligible installation which is producing less than 50,000t CO₂e per year, twice the level of the ultra-small emitters (USE) scheme threshold of 25,000t CO₂e per year. While there may be some instances of small and micro businesses producing a greater quantity of emissions than this threshold, we expect this threshold to be sufficient to capture the majority of small and micro businesses. Table 36 presents the total change in FA for these participants.

Table 36: The percentage change in FA for businesses either side of a 50kt CO₂e threshold

Emissions band	Number of eligible participants	Percentage change in FA
High emissions (more than 50,000t CO ₂ e in 2024)	~150	-10%
Low emissions (less than or equal to 50,000t CO ₂ e in 2024)	~270	-7%

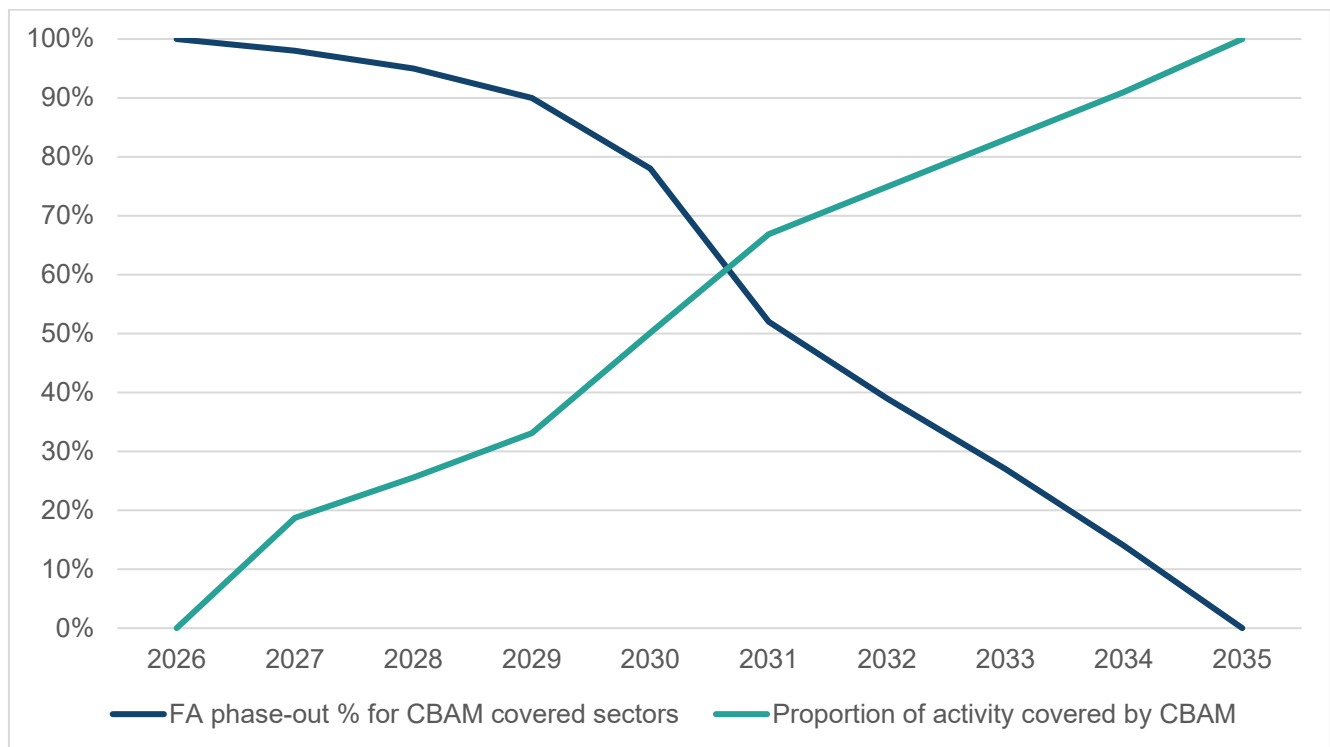
- 20.8. From this analysis, we demonstrate that it is unlikely that small or micro businesses are disproportionately burdened, as the cost of purchasing allowances to cover emissions under the UK ETS scales with emissions, rather than organisation size.

³⁶ <https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets#simplified-provisions-for-hospitals-small>

³⁷ <https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets#simplified-provisions-for-hospitals-small-emitters-and-ultra-small-emitters>

21. Trade Assessment

- 21.1. As noted previously, competition impacts due to a reduction or removal in FA will highly depend on specific sectoral market conditions, the wider policy environment and the existence of any tariff or non-tariff measures in place.
- 21.2. In line with the principles of FA within the UK ETS, protecting those firms that are most at risk of carbon leakage, FA should continue mitigate the distortive international competition effects when domestic firms face a carbon price. Those that will see their FA fall significantly from current levels / removed entirely are mostly either:
 - not on the carbon leakage list and are therefore considered to be not at risk of carbon leakage; or
 - will be covered by the CBAM and will therefore be protected from international competition with limited or no climate regulation
- 21.3. For those sectors that are not considered to be at risk of carbon leakage, the products and services are more likely to have a lower price elasticity of demand, and therefore they have a greater ability to pass on carbon costs to consumers, reducing trade distortions.
- 21.4. The FAR confirms the position that the current EU Phase IV carbon leakage list will be retained for the next allocation period. However, this list may not fully capture the specific carbon leakage risks faced by UK firms. Given differences in sectoral composition and trade exposure between the UK and EU, some UK sectors not included on the list may still be somewhat vulnerable to carbon leakage, and vice versa.
- 21.5. For those sectors covered by the CBAM, annual reductions in FA will be met with annual increase in the effective rate charged on imported competitor products, increasing the contribution of the CBAM for import carbon leakage mitigation up to the point FA is phase-out entirely.

Figure 25: FA phase-out percentage for CBAM sectors and the estimated proportion of activity covered by CBAM³⁸

- 21.6. That being said, while FA lowers carbon costs for UK production regardless of destination, a CBAM levied on imports only supports competitiveness for items covered by the CBAM and bought in the domestic market. However, the CBAM does not necessarily protect UK producers competing on export markets. As such, the impact of the FAR could have a much greater potential impact for export leakage risk for these sectors specifically.
- 21.7. In addition, if CBAM goods face a higher carbon price when purchased in the UK market, these may pass through the supply chain to downstream goods (e.g. steel for automobiles). If costs for these downstream goods increase, relative to international competitors, there is a potential risk of downstream carbon leakage, through lower competitiveness for the downstream product.
- 21.8. All things equal, if the risks of export and downstream leakage exposure are not accounted for, this could create additional trade distortions for UK exporters and value-added UK supply chains.
- 21.9. To understand the potential scale of risk associated with CBAM sector exports, we have considered the overall size of current emissions to export markets.
- 21.10. The European Union (EU), like the UK, is also looking to address carbon leakage risks through the implementation of a CBAM. The UKG CBAM's sectors are all within scope of the EU CBAM. This likely mitigates some of the potential export carbon leakage risks for these sectors. However, for the non-EU destined CBAM sector exports goods, there is still the possibility that there will be increased pressures regarding export carbon leakage.

³⁸ The proportion of activity covered was estimated using projections of free allocation and UK ETS compliance data for emissions covered by in-scope sectors, assuming constant emissions from 2023.

21.11. Table 37 contextualises the scale of the non-EU destined CBAM sector export goods. Combined, the goods not destined for the EU market are worth £3,661m, 35% of total CBAM sector exports, by value. It is worth noting that Iron and Steel alone accounts for 78% of the value of non-EU exports, and 66% of non-EU export emissions for CBAM sectors.

Table 37: Non-EU export statistics, 2022-2024 average³⁹

	Non-EU Export Value (£m)	Non-EU Export Weight (Tonnes)	Non-EU Export Emissions (tCO2)	Proportion of Export Value to Non-EU	Proportion of Export Weight to Non-EU	Proportion of Export Emissions to Non-EU
Iron and steel	£2,868m	880,655	1,993,935	36%	23%	22%
Aluminium	£577m	97,120	731,845	30%	21%	21%
Fertiliser	£96m	80,040	95,108	34%	23%	25%
Cement	£120m	629,906	216,839	49%	47%	35%
Hydrogen	£0m	4	-	4%	0%	-

21.12. Whilst we are not taking forward a UK ETS-based mitigation through the retention of free allowances for export leakage, the UK Government will continue to assess the risk of export leakage, in the context of wider decarbonisation and carbon leakage policy development and the UK's wider objectives and legal obligations.

22. Equalities Impact Assessment

22.1. An equality impact assessment (EIA) is an evidence-based approach designed to help organisations ensure that their policies, practices, events and decision-making processes are fair and do not present barriers to participation or disadvantage any protected groups from participation. This is part of the Public Sector Equality Duty (PSED).

22.2. The EIA ensures that:

- we understand the potential effects of the policy by assessing the impacts on different groups both external and internal
- any adverse impacts are identified, and actions identified to remove or mitigate them
- decisions are transparent and based on evidence with clear reasoning.

³⁹ DESNZ analysis of UK HMRC Overseas Trade Data & the EU JRC Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners report (2023)

- 22.3. Whether an EIA is needed or not will depend on the likely impact that the policy may have and relevance of the activity to equality. Changes to FA policy through the FAR has a clear impact on market participants, altering exposure to the carbon price. However, these changes are unlikely to have an impact on specific individuals with protected characteristics, as the policy adjustments primarily target industrial sectors and associated carbon leakage risk, rather than individual characteristics or demographics.
- 22.4. For this reason, an EIA has not been undertaken.

23. Monitoring and evaluation plan

- 23.1. Under Article 17 of The Greenhouse Gas Emissions Trading Scheme Order 2020, the UK ETS Authority has a statutory requirement to undertake and publish a review by 31st December 2028 on the operation of the UK ETS and make appropriate recommendations for future operations.
- 23.2. The benefits of the UK ETS to be monitored and evaluated are outlined in the theory of change (ToC) published by the UK ETS Authority in the Phase 1 evaluation report (Annex 3).⁴⁰ This was developed by University College London (UCL) and CAG Consultants in collaboration with the UK ETS Authority as a part of the broader UK ETS evaluation programme. The UK ETS benefits, as set out in the ToC, are:
- UK improves comparative advantage in decarbonisation technology and low carbon products;
 - Regulated firms become more carbon efficient;
 - Overall level of economic activity and investment is not adversely impacted by the UK ETS.
- 23.3. In early 2023, the UK ETS Authority commissioned CAG Consultants, in partnership with Winning Moves (WM), University College London (UCL) and Cambridge Econometrics, to deliver a 2-phase evaluation programme to provide evidence on:
- The effectiveness of the scheme's implementation;
 - The early outcomes of the scheme, focusing on the performance of the carbon market;
 - Its longer terms impact, focussing on the high-level specified in the ToC.
- 23.4. This first phase of the evaluation, covering process, outcomes and early impacts, was completed in December 2023. The report findings cover:
- Transition from EU ETS to UK ETS;
 - Effectiveness of UK ETS delivery;

⁴⁰ <https://www.gov.uk/government/publications/evaluation-of-the-uk-emissions-trading-scheme-phase-1>

- Operation of the UK ETS market and assessment of its performance;
 - Early findings on emissions reduction activity;
 - Early finding on carbon leakage.
- 23.5. Findings from the evaluation informed the conclusion of the first statutory review of the UK ETS which was published alongside the evaluation in December 2023.
- 23.6. Early findings, particularly from the UK ETS Evaluation Phase 1 report, indicate that the scheme is likely to be supporting participants to limit or reduce their emissions of greenhouse gases. Therefore, there are initial signs that the UK ETS is achieving its purpose in terms of limiting or encouraging the limitation of the emissions of scheme participants. It is the Authority's view that, based on the current evidence, the scheme is performing in line with expectations and is more likely than not achieving its statutory purpose.
- 23.7. Work is now being done to deliver the second phase of the evaluation focusing on measuring emissions and carbon leakage impacts of the UK ETS scheme. This work is expected to run from 2024 to 2026 and employ a mostly theory-based approach, while drawing on quasi-experimental methods to compare outcomes for UK ETS participants to a counterfactual of industrial installations not covered by the ETS.
- 23.8. As part of this review, the Authority will assess the extent to which emerging evidence indicates that the initial FA in the second allocation period is effectively supporting our objectives of mitigating carbon leakage and supporting decarbonisation incentives. Specifically, it will look to collect evidence on the extent to which the FAR policy outcomes have effectively mitigated carbon leakage.
- 23.9. Separately to this review for the remainder of the second allocation period, we will continue to monitor and evaluate the performance of the UK ETS against its core objective of reducing UK traded sector emissions, whilst mitigating the risk of carbon leakage.
- 23.10. The other SMART objectives of ensuring the CSCF is not triggered, and observing an increasing CBAM rate in line with declining FA for those sectors covered by the CBAM, are observable without specific evaluation plans.

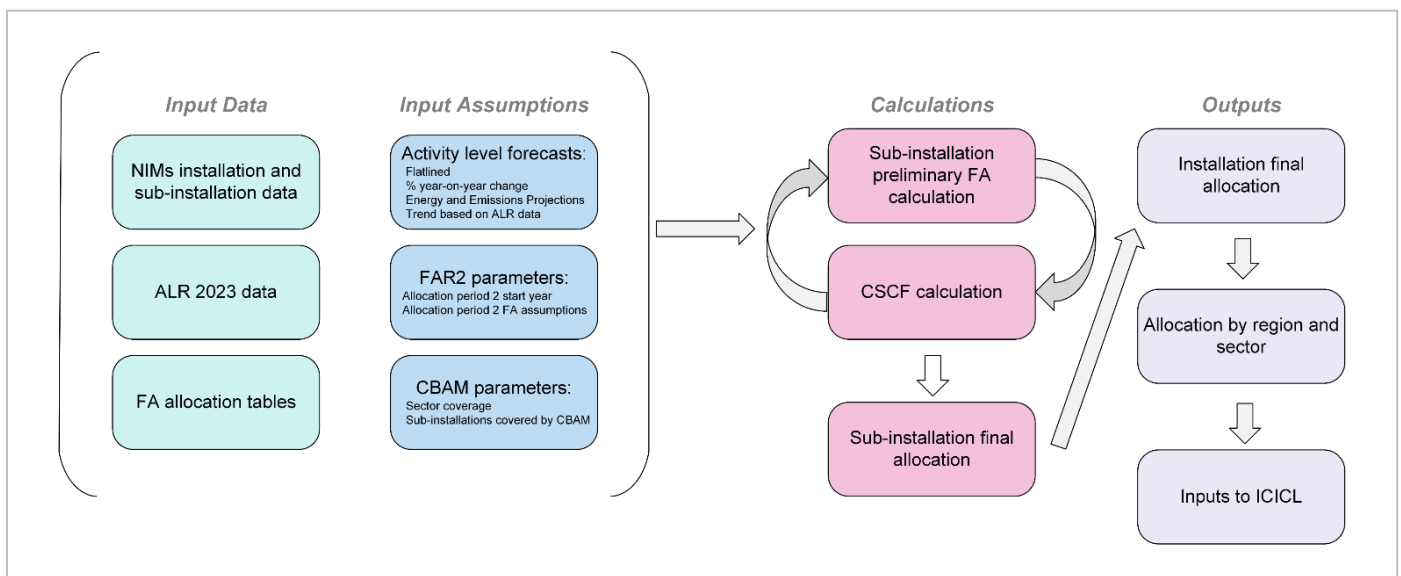
Annex A: Modelling methodology

24. Free Allocation model

Model overview

- 24.1. The FA model forecasts FAs for eligible UK ETS participants for given FAR policy and market parameters. It uses a bottom-up calculation of FA at the sub-installation level, aggregating for each installation, sector and region.
- 24.2. The model uses existing National Implementation Measures (NIMs) data and Activity Level Report (ALR) data on activity levels, emissions, and other sub-installation properties. Data is then extrapolated forward to estimate how variables could change for future years, and the corresponding impact on FA levels for a given scenario.
- 24.3. If in any year, the total amount of estimated FA exceeds the industry cap, and there are insufficient allowances remaining in the flexible reserve, the model will apply the CSCF to reduce FA at the sub-installation level accordingly. Figure 26 shows the model schematic.

Figure 26: FA model schematic



- 24.4. The model was used as both inputs for the ICICL model and the CMM, as well as for the SaMBA assessment.

Model calculations

- 24.5. For each sub-installation, the model calculates FA in each year based on the policy parameters in each model year. For all future years before 2027, the model continues to use policy parameters from the first allocation period. For the year

2027 and beyond, the model switches to using defined policy scenarios for the second allocation period.

24.6. For each future year, the model undertakes the following initial calculation:

Equation 1: The FA model calculation at the sub-installation level

$$FA_{si,period\ x} = HAL_{si,period\ x} \times Benchmark_{si,period\ x} \times CLEF_{si,period\ x} \times CBAM_{si,period\ x}$$

Where:

$FA_{si,period\ x}$: Preliminary annual FA for the sub-installation (si) in period x.

$HAL_{si,period\ x}$: Historical activity level, calculated based on the average 2019 – 2023 activity (with option to exclude 2020 based on policy scenario) or based on previous rolling 2-year average if an activity level change is triggered

$Benchmark_{si,period\ x}$: Emissions intensity benchmark

$CLEF_{si,period\ x}$: Carbon Leakage Exposure Factor for the sub-installation

$CBAM_{si,period\ x}$: Carbon Border Adjustment Mechanism Factor for the sub-installation in year y, if relevant (only for 2027 onwards)

- 24.7. The model then aggregates the sum of all preliminary FA for all sub-installations, and checks whether the total amount exceeds the industry cap for that year. If exceeded, the model then checks whether there are sufficient allowances remaining in the flexible reserve.
- 24.8. If so, then the CSCF is not triggered, and preliminary FA becomes final. If there are not, then each sub-installation's FA is reduced by a proportional amount. Final FA is then aggregated for each installation, sector and region.

Data inputs and assumptions

- 24.9. The FA model calculations are based on 2023 operator activity data from ALRs and base NIMs data from 2021, UK ETS compliance data and historic FA calibrated to the published FA tables to ensure accurate alignment.
- 24.10. As such, the FA model includes all currently active sub-installations currently receiving FA and can account for those sub-installations that have ceased activity and operators who have surrendered permits since 2021.
- 24.11. In addition, input data is also used to form future policy parameters. Table 38 provides the full list of data inputs which are used within the FA model.

Table 38: The list of relevant data inputs for the FA model

Data source	Notes
NIMs installation and sub-installation data	National Implementation Measures (NIMs) contains information on all installations within the UK that are covered by the UK ETS. Each sheet in NIMS contains different information related to the installations. It includes

	information on the name of the installations, operators, type of operations, whether an installation is covered by article 10A of the ETS directive and a preliminary FA for the first allocation period. Sub-installation data contains information relating the different activities taking place at each site including the type of activity HAL between 2014 and 2018, carbon leakage status allocation period 1 benchmarks.
ALRs installation and sub-installation data	Activity Level Reports (ALRs) contain the latest information for each sub-installation, reported to regulators. This includes annual activity, electricity exchange factors, energy consumption and all other variables which determine FA provision.
UK ETS compliance data	Contains the latest data on ETS participants, including primarily whether installations are open/closed, in main scheme or otherwise, primary industry and associated NACE code (installation level), FA and emissions for which allowances were surrendered, and geographical location.
FA published tables	Published FA tables which show the latest allocation for each operator, standard or new entrant reserve, from 2021 to 2025.
Energy and emission projections (EEP)	Output projections are variable. An option is for future installation activity to be based upon the latest DESNZ EEP publication. ⁴¹
2025 preliminary unchecked Baseline Data Reporting (BDR)	Similar to the NIMs data but updated to cover historical data from the period 2019 – 2023. Preliminary unchecked data was used to construct the option of UK benchmark values, using the latest activity and emissions data at the sub-installation level.
CN to PRODCOM mapping	The UK CBAM covers goods using the Combined Nomenclature (CN) system, which is commonly used for customs declarations, import dues and trade statistics. As part of operator reporting, the UK ETS captures production of goods using NACE / PRODCOM systems, which are classifications for industrial activity and production. European Commission DG CLIMA guidance on the relevant mapping has been published and has been used within this analysis to determine whether a sub-installation is covered by the CBAM. ⁴²

24.12. The FA model is configured to incorporate recent UK ETS data. Data is regularly updated and reviewed where proportionate to the analytical objectives. However, the use of the most up-to-date information is not always feasible at the time of analysis, due to inherent publication lags and the timing constraints associated with model runs.

24.13. The model also utilises a number of user-inputted assumptions to calculate future FA for each sub-installation. Table 39 provides the full list of user-inputted assumptions.

⁴¹ [Energy and emissions projections: 2023 to 2050 - GOV.UK](#)

⁴² [a4c0cb40-35f9-4705-882d-b55382d03e9a_en](#)

Table 39: The list of relevant assumptions for the FA model

Assumption	Notes																						
Output projections	Output projections can be assumed as flatlined from current levels, to increase / reduce at a flat percentage year-on-year, to align with trends from activity level reports, or based the latest EEP. For the central model runs, we assume that output projections are flatlined from current levels. This assumption is flexed as part of sensitivity testing.																						
Installation activity	We assume that all stationary installations currently operating within the UK ETS continue to be fully operational, with a few notable exceptions. The blast furnaces at Port Talbot closed at the end of 2024, and in line with the latest public communications, we centrally assume their planned electric arc furnaces will be fully operational by the end of 2027, with an annual capacity of 3m tonnes. Assumptions on the operation of the blast furnaces at Scunthorpe are considerably more uncertain. Noting the significant uncertainty associated with these assumptions, we have tested alternative blast furnace closure dates for Scunthorpe, as well as electric arc furnaces opening dates for both Port Talbot and Scunthorpe as part of sensitivity testing. Based on the cessation of activity at both Grangemouth refinery and Lindsay Oil refinery in 2025, we no longer assume they will receive FA in the second allocation period.																						
Industry cap pre-2030	The total and industry caps are aligned with the latest legislative position as set out by The Greenhouse Gas Emissions Trading Scheme Order 2020.⁴³ <table><tr><td>Millions of allowances</td><td>2021</td><td>2022</td><td>2023</td><td>2024</td><td>2025</td><td>2026</td><td>2027</td><td>2028</td><td>2029</td><td>2030</td></tr><tr><td>Industry cap</td><td>58</td><td>56</td><td>55</td><td>37</td><td>35</td><td>32</td><td>28</td><td>21</td><td>20</td><td>20</td></tr></table>	Millions of allowances	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Industry cap	58	56	55	37	35	32	28	21	20	20
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Industry cap	58	56	55	37	35	32	28	21	20	20													
Industry cap post-2030	The total and industry caps for the post-2030 period are highly uncertain and are subject to further policy development. For simplicity, we assume that the total cap is aligned to the UK Government’s Net Zero Strategy, and the carbon savings necessary for the traded sector to achieve Carbon Budget 6. In the industry cap remains at the current percentage of the total cap. Assumptions assumed for the purposes of this assessment should not be treated as an indication of likely policy direction. <table><tr><td>Millions of allowances</td><td>2031</td><td>2032</td><td>2033</td><td>2034</td><td>2035</td><td>2036</td><td>2037</td></tr><tr><td>Industry cap</td><td>18</td><td>15</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td></tr></table>	Millions of allowances	2031	2032	2033	2034	2035	2036	2037	Industry cap	18	15	13	12	11	10	9						
Millions of allowances	2031	2032	2033	2034	2035	2036	2037																
Industry cap	18	15	13	12	11	10	9																
Flexible reserve	The number of future allowances within the flexible reserve depends on the chosen policy scenario, determining the difference between the industry cap and the number of free allowances allocated. In 2026, we estimate the flexible reserve will be approximately 70m allowances, which is expected to grow if FA remains below the industry cap.																						

⁴³ [The Greenhouse Gas Emissions Trading Scheme Order 2020](#)

UK / EU
benchmark
values

Based on the latest BDR data, the Authority has calculated provisional UK benchmarks for each product, heat, fuel and process benchmark. For the UK benchmarks methodology, UK ARR values were assumed to be based on the emissions intensity improvement of the top UK sub-installation, for each product and fallback benchmark, between 2016/17 and 2022/23, applied to the current benchmark value. This assumes maximum and minimum ARR thresholds of 2.5% and 0.3% respectively, in line with updated EU ETS thresholds. At the time of producing this analysis, EU benchmark values for the 2026-2030 period were not published. As such, this analysis uses UK benchmark values as a proxy for EU benchmarks where applicable as an option within a policy package.

BM	Name	Allocation period 1 value	Illustrative value from 2028
1	Refinery products	0.023	0.019
2	Coke	0.217	0.213
3	Sintered Ore	0.157	0.133
3	Sintered ore	0.157	0.133
4	Hot Metal	1.288	1.265
4	Hot metal	1.288	1.265
5	EAF carbon steel	0.215	0.211
6	EAF high alloy steel	0.268	0.261
9	[Primary] Aluminium	1.464	1.341
10	Grey cement clinker	0.693	0.681
12	Lime	0.725	0.712
14	Sintered dolime	1.406	1.381
15	Float glass	0.399	0.343
16	Bottles and jars of colourless glass	0.290	0.285
17	Bottles and jars of coloured glass	0.237	0.202
18	Continuous filament glass fibre products	0.309	0.269
19	Facing bricks	0.106	0.104
20	Pavers	0.146	0.134
21	Roof tiles	0.120	0.110
22	Spray dried powder	0.058	0.053
23	Mineral wool	0.536	0.526
24	Plaster	0.047	0.044
25	Dried secondary gypsum	0.013	0.013
26	Plasterboard	0.110	0.108
30	Recovered paper pulp	0.030	0.029
31	Newsprint	0.226	0.222
32	Uncoated fine paper	0.242	0.238
33	Coated fine paper	0.242	0.222
34	Tissue	0.254	0.216
35	Testliner and fluting	0.188	0.184
36	Uncoated carton board	0.180	0.177
37	Coated carton board	0.207	0.190
39	Nitric acid	0.230	0.213
41	Ammonia	1.570	1.542
42	Steam cracking	0.681	0.624
43	Aromatics	0.023	0.021

	<table><tr><td>48</td><td>S-PVC</td><td>0.066</td><td>0.056</td></tr><tr><td>49</td><td>E-PVC</td><td>0.181</td><td>0.166</td></tr><tr><td>50</td><td>Hydrogen</td><td>6.840</td><td>6.717</td></tr><tr><td>52</td><td>Soda ash</td><td>0.753</td><td>0.739</td></tr><tr><td>91, 92 and 93</td><td>Heat benchmark sub-installation</td><td>47.300</td><td>40.205</td></tr><tr><td>94 and 95</td><td>Fuel benchmark sub-installation</td><td>42.600</td><td>41.833</td></tr><tr><td>96 and 97</td><td>Process emissions sub-installation</td><td>0.970</td><td>0.953</td></tr></table>	48	S-PVC	0.066	0.056	49	E-PVC	0.181	0.166	50	Hydrogen	6.840	6.717	52	Soda ash	0.753	0.739	91, 92 and 93	Heat benchmark sub-installation	47.300	40.205	94 and 95	Fuel benchmark sub-installation	42.600	41.833	96 and 97	Process emissions sub-installation	0.970	0.953																																																								
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Conditionality thresholds	For all product benchmarks, the EU has introduced a conditionality threshold. For any sub-installation which has a higher emissions intensity than this threshold – set at the 80% percentile – will be required to submit a climate neutrality plan. Values for the period 2026 – 2030 were not published at the time of producing this analysis, and so this analysis uses the conditionality thresholds published for the 2021-2025 EU ETS allocation period.⁴⁴ For the future allocation period, it is reasonable to expect that many will be lower, with improvements in emissions intensity overtime. However, despite this, we would not expect a significant change in the number of sub-installations required to submit a decarbonisation plan. <table><tr><th>BM</th><th>Name</th><th>P80-value</th></tr><tr><td>1</td><td>Refinery products</td><td>0.0342</td></tr><tr><td>2</td><td>Coke</td><td>0.2956</td></tr><tr><td>3</td><td>Sintered ore</td><td>0.2779</td></tr><tr><td>4</td><td>Hot metal</td><td>1.5215</td></tr><tr><td>5</td><td>EAF carbon steel</td><td>0.3763</td></tr><tr><td>6</td><td>EAF high alloy steel</td><td>0.4403</td></tr><tr><td>7</td><td>Iron casting</td><td>0.4724</td></tr><tr><td>8</td><td>Pre-bake anode</td><td>0.4582</td></tr><tr><td>9</td><td>[Primary] Aluminium</td><td>1.8279</td></tr><tr><td>10</td><td>Grey cement clinker</td><td>0.8557</td></tr><tr><td>11</td><td>White cement clinker</td><td>1.1807</td></tr><tr><td>12</td><td>Lime</td><td>1.1403</td></tr><tr><td>13</td><td>Dolime</td><td>1.2988</td></tr><tr><td>14</td><td>Sintered dolime</td><td>1.577</td></tr><tr><td>15</td><td>Float glass</td><td>0.5514</td></tr><tr><td>16</td><td>Bottles and jars of colourless glass</td><td>0.5516</td></tr><tr><td>17</td><td>Bottles and jars of coloured glass</td><td>0.4511</td></tr><tr><td>18</td><td>Continuous filament glass fibre products</td><td>0.5647</td></tr><tr><td>19</td><td>Facing bricks</td><td>0.1961</td></tr><tr><td>20</td><td>Pavers</td><td>0.2153</td></tr><tr><td>21</td><td>Roof tiles</td><td>0.2238</td></tr><tr><td>22</td><td>Spray dried powder</td><td>0.0919</td></tr><tr><td>23</td><td>Mineral wool</td><td>0.9798</td></tr><tr><td>24</td><td>Plaster</td><td>0.0657</td></tr><tr><td>25</td><td>Dried secondary gypsum</td><td>0.0284</td></tr><tr><td>26</td><td>Plasterboard</td><td>0.162</td></tr><tr><td>27</td><td>Short fibre kraft pulp</td><td>0.129</td></tr></table>	BM	Name	P80-value	1	Refinery products	0.0342	2	Coke	0.2956	3	Sintered ore	0.2779	4	Hot metal	1.5215	5	EAF carbon steel	0.3763	6	EAF high alloy steel	0.4403	7	Iron casting	0.4724	8	Pre-bake anode	0.4582	9	[Primary] Aluminium	1.8279	10	Grey cement clinker	0.8557	11	White cement clinker	1.1807	12	Lime	1.1403	13	Dolime	1.2988	14	Sintered dolime	1.577	15	Float glass	0.5514	16	Bottles and jars of colourless glass	0.5516	17	Bottles and jars of coloured glass	0.4511	18	Continuous filament glass fibre products	0.5647	19	Facing bricks	0.1961	20	Pavers	0.2153	21	Roof tiles	0.2238	22	Spray dried powder	0.0919	23	Mineral wool	0.9798	24	Plaster	0.0657	25	Dried secondary gypsum	0.0284	26	Plasterboard	0.162	27	Short fibre kraft pulp	0.129
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⁴⁴ https://climate.ec.europa.eu/document/download/736f02c1-20a2-4337-a49f-c52ab898e6db_en?filename=policy_ets_allowances_conditionality_cnp_values_en.pdf

28	Long fibre kraft pulp	0.1095
29	Sulphite pulp, thermo-mechanical and mechanical pulp	0.0991
30	Recovered paper pulp	0.0318
31	Newsprint	0.2475
32	Uncoated fine paper	0.3938
33	Papier fin couché	0.3418
34	Tissue	0.441
35	Testliner and fluting	0.3095
36	Uncoated carton board	0.2823
37	Coated carton board	0.2758
38	Carbon black	2.1937
39	Nitric acid	0.3427
40	Adipic acid	1.492
41	Ammonia	2.0627
42	Steam cracking	1.0101
43	Aromatics	0.0449
44	Styrene	0.7011
45	Phenol/ acetone	0.3703
46	Ethylene oxide/ ethylene glycols	0.702
47	Vinylchlorid-Monomer (VCM)	0.3917
48	S-PVC	0.1329
49	E-PVC	0.3052
50	Hydrogen	13.007
51	Synthesis gas	0.3084
52	Soda ash	1.0331

25. Industrial Competitiveness and International Carbon Leakage model

Model overview

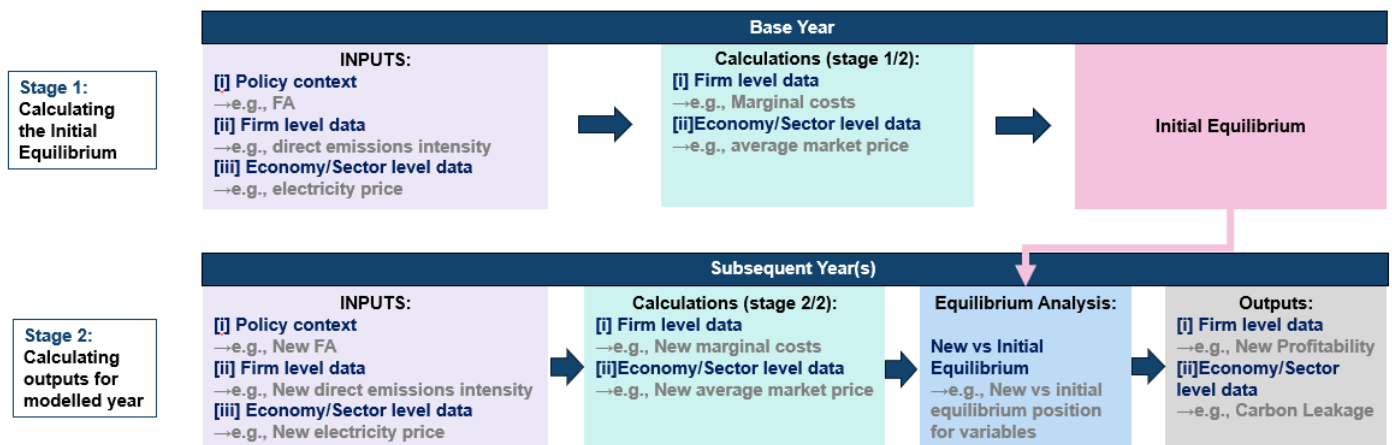
- 25.1. The Industrial Competitiveness and International Carbon Leakage (ICICL) model (previously under the name FIMM) was initially developed by Vivid Economics for the Department for Business, Energy and Industrial Strategy (BEIS) in 2021.
- 25.2. It analyses interactions between rival firms and consumers within emissions-intensive industries in the context of market changes. It uses microeconomic theory and real-world data to estimate the competitiveness impacts of changes in carbon pricing and wider climate policies.
- 25.3. At a basic level, it creates an initial market equilibrium which is calibrated and based on market and policy data, and then forecasts alternative scenarios based for given policy inputs to create a new market equilibrium.
- 25.4. Specifically in the context of FA, it allows us to assess how changes in FA received by domestic firms changes their competitiveness within the UK domestic market relative to international firms from a maximum of 60 countries. CBAM policy

can be modelled, but it cannot assess the impact of competitiveness in UK export markets.

25.5. The model covers every year from 2020 to 2030 and every fifth year between 2030 and 2050. It covers 15 UK ETS industrial sectors:

- Aluminium
- Cement
- Extraction of crude petroleum
- Fertilisers and nitrogen compounds
- Flat glass
- Hollow glass
- Industrial gases
- Iron and steel
- Lime and plaster
- Other inorganic basic chemicals
- Other organic basic chemicals
- Paper and cardboard
- Plastics in primary forms
- Refined petroleum products
- Sugar

25.6. In each model year, ICICL estimates the new equilibrium by (1) estimating firm marginal costs for a given policy or market change, based on marginal abatement curves (2) estimating the market size based on firm exit and entry and then (3) estimating the corresponding new market price and quantity. The high-level model schematic is presented in Figure 27.

Figure 27: ICICL model schematic

Model calculations

- 25.7. Given the complexity of ICICL as a partial equilibrium model covering various sectors and countries, we present only a high-level explanation of its computational framework and do not cover specific calculation details.
- 25.8. For each firm within the model, micro-economic theory is used to determine new market equilibriums. For a reduction in FA, relative to the base year, this will increase firm exposure to the carbon price, increase abatement costs (or costs of purchasing allowances), and increasing overall marginal costs. This pushes the supply curve up, with the new equilibrium settling at the intersection between market demand and the new market supply.

Model uncertainty and limitations

- 25.9. Care is required in using the ICICL model due to its complex nature. This is because it is a highly specialised tool that draws upon microeconomic theory and emissions modelling, and it is necessary to understand the key drivers of results when calibrating model runs. In this vein, it is important to understand key, but sensitive inputs in the modelling, such as the carbon pricing inputs, the levels of Free Allocation, and the marginal abatement cost curves (which essentially are used to determine given levels of abatement under certain carbon cost conditions). In addition to this, some aggregation must be applied to more disaggregated inputs before feeding them into the model.
- 25.10. The model solely looks at the UK domestic market (UK production for UK consumption plus imports) within modelled sectors and does not consider cross-sectoral impacts. Additionally, regarding competitiveness impacts, it should be noted that there is an outsized impact from larger operators within markets in ICICL.

Data inputs and assumptions

25.11. Table 40 below outlines the key data inputs and assumptions for the ICICL model.⁴⁵

Table 40: The list of relevant data inputs and assumptions for the ICICL model

Data source / assumption	Notes
Domestic production quantities, from NIMs	National Implementation Measures (NIMs) is a dataset that provides a comprehensive picture of UK ETS participants. The coverage of NIMs effectively dictates the overall model scope. Model should be considered as representing of those firms captured by NIMs.
Trade quantities, from Comext	Estimates using import values adjusted down to match NIMS coverage.
Market growth from NGFS climate modelling	Uses Vivid's intellectual property based on NGFS inputs, which is confidential. DESNZ only has access to market growth as a percentage figure.
Market prices from Comext	Prices for imports taken directly from Comext. Domestic prices estimated based on price of products imported and exported from the UK: - Local production exported at prices similar to domestic market. - Within a sector product imported to the UK are similar to those exported from the UK - Modelled sectors are competitive meaning local production and imports are sold at similar prices.
Price elasticity from external literature	Taken from a combination of Vivid in-house modelling and literature.
Profit margins from Eurostat SBS	Calculated as the annual average of gross operating surplus over turnover for the period 2005-2018. For rest of the world (ROW), EU and UK data is used. ROW importers (including imports from non-EU countries) are assumed to have the average profit margin of the EU and UK firms.
Direct domestic emissions from NIMs	If firm level data unavailable sector average used. If sector average unavailable, literature value used. Modelled emissions for 2021 are calibrated to 2021 UK ETS compliance data.
Direct RoW emissions from OECD and NIMs	Use carbon embodied in international trade to estimate emissions intensities of RoW countries. Indexes from OECD then combined with NIMs data.

⁴⁵ There are vast number of data inputs and assumptions that are used within ICICL. Table 40 presents a series of the key non-exhaustive inputs

Electricity intensity from NIMs and NGFS	If firm level data unavailable sector average used. If sector average unavailable, literature value used.
Electricity prices from DESNZ and IEA	Current ROW prices from IEA energy price statistics, future prices taken from NGFS. UK prices are a model input.
Carbon intensity of electricity grid from NGFS climate modelling	2018 & 2019 values from IEA World Energy Outlook. Future Carbon intensities are estimates from forecasted values from NGFS.
Abatement costs, from Enerdata	MACC curves (central level) from DESNZ produced by Enerdata.
Product differentiation from external literature	Re-weighted Rauch (1999) classification.
Total factor productivity from Penn World Table	Averaged for OECD and Non-OECD members across 1990-2019. Total factor productivity is used in ICICL to calculate an endogenous reduction in other marginal costs.
Traded carbon values from DESNZ 2024	The model utilises the central DESNZ 2024 carbon values
UK CBAM calculation	The carbon costs from the UK's CBAM depends on multiple factors. The explicit CBAM rate, represented by the carbon price, depends on the UK's domestic carbon price, and it will likely be reduced if the country of origin has a domestic carbon pricing scheme. The CBAM's emissions base is the emissions intensity charged, which could be, for example, the importers' emissions intensity, or the UK average emissions intensity in a sector. Additionally, the share of free allowances in the UK and the country of origin affects the marginal CBAM carbon costs. The marginal CBAM carbon costs per unit of output (£/t of production) for a firm is defined as: $\text{marginal CBAM carbon costs}^i =$ $\text{CBAM rate} * (\text{CBAM base} - \text{free allowance adjustment}) =$ $(\text{explicit CBAM rate} - \text{importer carbon price})$ $* (\text{CBAM direct emissions intensity} - \text{effective UK allowance benchmark})$ Where: <i>explicit CBAM rate</i> is the carbon price charged on imports, typically the explicit carbon price on direct emissions of the destination country such as the UKA price;

	• <i>importer carbon price</i> is the domestic explicit carbon price in the country of origin; • <i>CBAM direct emissions intensity</i> is the direct emissions intensity used as a base for the CBAM charge. The default has been chosen as an importer average emissions intensity for all sectors. • <i>effective UK allowance benchmark</i> is the free allowance benchmark UK firms receive in a sector. Any free allowances that are maintained under a CBAM are deducted from the CBAM charge, as outlined in the above equation. Since foreign firms within the model are only represented through their production to the UK market, all their production in the model is affected by the CBAM. In reality, foreign firms might react less to a CBAM that only affects part of their production and/or might sell their less emission-intensive production to the UK and sell production from installations with higher emissions intensities to other markets ("resource shuffling"). Neither of those effects are accounted for within the model, which is a limitation.
EU ETS assumptions	Assumes that EUA FA is phased-out overtime in line with announced EU regulations.

26. Carbon Markets Model

Model summary

- 26.1. The Carbon Markets Model (CMM v1, previously referred to as UK CPM/UK BCPM) is a model held by DESNZ for the purposing of assessing how changes to the UK ETS can impact on carbon values and emission reductions. Carbon values are estimated in the CMM as the equilibrium point where demand for abatement (the required effort) is matched by the supply of abatement through use of carbon abatement technologies.
- 26.2. This model was used extensively in the *Developing the UK ETS* IA. As such, further information on the assumptions, limitations and model calculations is presented there. Further information can be found [here](#).

Model assumptions

- 26.1. This analysis has used bespoke CMM runs, formed using a series of assumptions about both pre-2030 and post-2030 UK ETS policy. Table 41 presents the full list of ad-hoc CMM assumptions used for this analysis.

Table 41: The list of relevant assumptions for the FAR CMM runs

Data source / assumption	Notes																																								
The total cap out to 2037	The total and industry caps for the post-2030 period are highly uncertain and are subject to further policy development. For simplicity, we assume that the total cap is aligned to the UK Government’s Net Zero Strategy, and the carbon savings necessary for the traded sector to achieve Carbon Budget 6. In the industry cap remains at the current percentage of the total cap. Assumptions assumed for the purposes of this assessment should not be treated as an indication of likely policy direction. <table><tr><td>Millions of allowances</td><td>2024</td><td>2025</td><td>2026</td><td>2027</td><td>2028</td><td>2029</td><td>2030</td></tr><tr><td>Total cap</td><td>92</td><td>87</td><td>79</td><td>70</td><td>53</td><td>51</td><td>49</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Millions of allowances</td><td>2031</td><td>2032</td><td>2033</td><td>2034</td><td>2035</td><td>2036</td><td>2037</td></tr><tr><td>Total cap</td><td>18</td><td>15</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td></tr></table>	Millions of allowances	2024	2025	2026	2027	2028	2029	2030	Total cap	92	87	79	70	53	51	49									Millions of allowances	2031	2032	2033	2034	2035	2036	2037	Total cap	18	15	13	12	11	10	9
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Flexible share, NER and HSE	We assume that the flexible share, the NER and the HSE pots continue at the same proportion of the total cap from 2030 onwards. <table><tr><td>Scheme pot</td><td>Proportion of total cap</td></tr><tr><td>HSE</td><td>1.6%</td></tr><tr><td>Flexible share</td><td>3%</td></tr><tr><td>NER</td><td>2.2%</td></tr></table>	Scheme pot	Proportion of total cap	HSE	1.6%	Flexible share	3%	NER	2.2%																																
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Auction share and total supply of allowances	We assume that the number of auctioned allowances is set by the following formula: $\text{Number of auctioned allowances}_{period\ x} = \text{Total cap (after accounting for HSE, FS and NER)} - \text{industry cap}$ We assume that the total supply of allowances is set by the following formula: $\text{Total supply of allowances}_{period\ x} = \text{Auctioned allowances}_{period\ x} + \text{Free allowances}_{period\ x}$																																								

27. Cost Benefit Analysis model

Model overview

27.1. The CBA model has been constructed specifically for the appraisal of FAR outcomes. It takes projected emission and carbon price outputs directly from the CMM, and monetises them for each scenario considered in this IA.

27.2. The modelling process is in line with HMT Green Book guidance.

Model calculations

- 27.3. For each appraisal year, the model takes the total level of projected emissions and the carbon price in each year. For each year, the policy scenario is compared against the counterfactual scenario to estimate the change in emissions and the change in carbon value.
- 27.4. To estimate the total value of emission reductions, the emission change in each year is multiplied by the selected appraisal carbon value. For the marginal abatement cost, this is estimated by calculating the area underneath the marginal abatement cost curve, between the two levels of effort required by ETS participants. This area is shown in Figure 10.
- 27.5. This area is calculated as an approximate, assuming a linear slope between the two equilibrium levels of marginal abatement.

Equation 2: The CBA model calculation for changes in marginal abatement cost in each year between two scenarios

$$\begin{aligned} \Delta \text{Marginal abatement cost}_{\text{period } x, \text{ scenario } 1,2} \\ = \left(\frac{1}{2} \times \Delta \text{carbon value}_{\text{period } x, \text{ scenario } 1,2} \times \Delta \text{emissions}_{\text{period } x, \text{ scenario } 1,2} \right) \\ + \left(\Delta \text{emissions}_{\text{period } x, \text{ scenario } 1,2} \times \text{carbon value}_{\text{period } x, \text{ scenario } 2} \right) \end{aligned}$$

- 27.6. The model then considers the defined appraisal period and appraisal values, such as price year and discount rate, and uses the monetised emission benefit and marginal abatement costs to calculate the NPSV.

Data inputs and assumptions

- 27.7. Table 42 states the data sources and assumptions used within the model.

Table 42: The list of relevant data inputs and assumptions for the CBA model

Data source / assumption	Notes
Emissions and carbon price projections for each scenario	These have been taken from bespoke CMM v1 runs, which were conducted in August 2025.
GDP deflator	The GDP deflator series is in line with published DESNZ data tables .
Appraisal carbon values	As above.
Appraisal values	2025 prices deflated using the latest GDP deflator series. Impacts are discounted from 2025 using the standard HMT Green Book discount rate of 3.5%
Appraisal period	2025 – 2037, 12 years

Compliance data	UK ETS compliance 2024 data is used to calculate the proportion of UK ETS emissions in each region of the UK. This has been used for the regional analysis.
UK population data	ONS population data has been used to estimate the benefit of emission reductions attributable to each region of the UK. ⁴⁶

⁴⁶ [Estimates of the population for the UK, England, Wales, Scotland, and Northern Ireland - Office for National Statistics](#)