Department for Energy Security & Net Zero

Analytical Annex to the Free Allocation Review

Annex to the joint consultation of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland

December 2023

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Contents

This Annex outlines analysis conducted to inform proposals in the free allocation review consultation. This is intended to demonstrate the principles and approach taken to shape policy proposals and provide additional information to support chapters. The stage of development of proposals varies, with level of analysis presented here proportionate to this. Some sections of the consultation are initial calls for evidence, so are not analysed in detail in this Annex.

Purpose of this document

This Annex is intended to provide an overview of the analysis underpinning the Government free allocation review consultation. Where possible, we explain the approach to options generation and assessment of proposals within the consultation. It is not intended to reflect the full evidence base on which decisions will be taken, nor all evidence on which proposals were developed, and we seek further evidence as part of this consultation.

Primarily, this Annex focuses on each component of the free allocation process separately, assessed in the sections below. The initial assessment of options focuses on impact against:

1. The overarching principles for the free allocation review and objectives for the UK ETS
2. Technical and operational feasibility within the UK ETS and free allocation process
3. Key impacts of options, such as on targeting carbon leakage support, where feasible

In the Government Response (GR) to consultation, the UK ETS Authority will set out impacts of combined proposals, considering the interaction of proposed options and overall scheme impacts, including regional and sectoral impacts where feasible and appropriate. Where we identify specific risks of options, we will set out the actions we will take to appropriately mitigate any such impacts where it is necessary to do so.

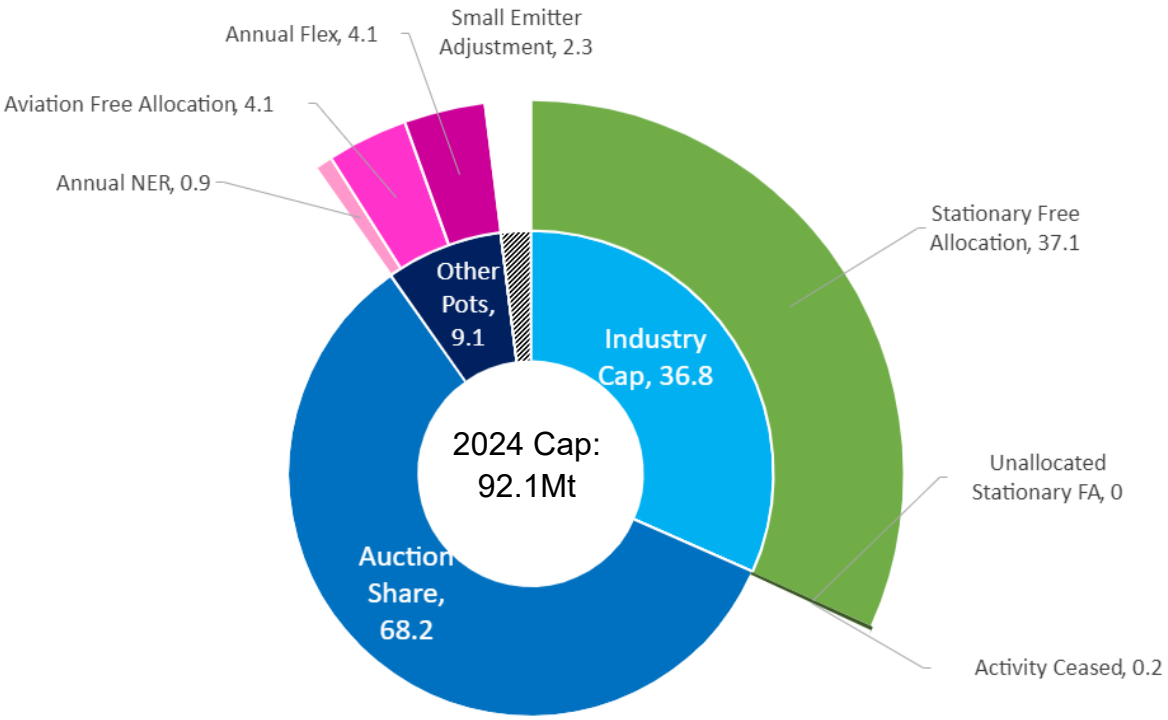
Introduction, assumptions, and principles

As noted in the Consultation, the UK ETS Authority ('the Authority') is seeking stakeholder views on proposals to amend the process for distributing free allocations in the UK ETS. The UK ETS is based on a 'cap and trade' principle. This sets a cap on total greenhouse gas emissions for emissions-intense industries, set to fall over time, and allows emissions allowances to be bought and traded by participants. The carbon price emerging from the scheme gives participants a signal and an incentive to decarbonise their production. The scheme therefore creates an incentive to decarbonise, aims to provide certainty to industry, and supports efficient, low-cost decarbonisation.

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.[1]

[1] 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: UK ETS overview of different allowance pots for 2024



Illustrative breakdown of the 2024 base value: does not necessarily reflect volume of allowances made in 2024. Free allocation volume is the published value in the initial UK ETS published allocation table. Updates may change the eventual volume of allowances. To note, free allocation may exceed the industry cap in a scheme year, if there are unallocated allowances available to 'top-up' the industry cap to meet preliminary free allocation demand.

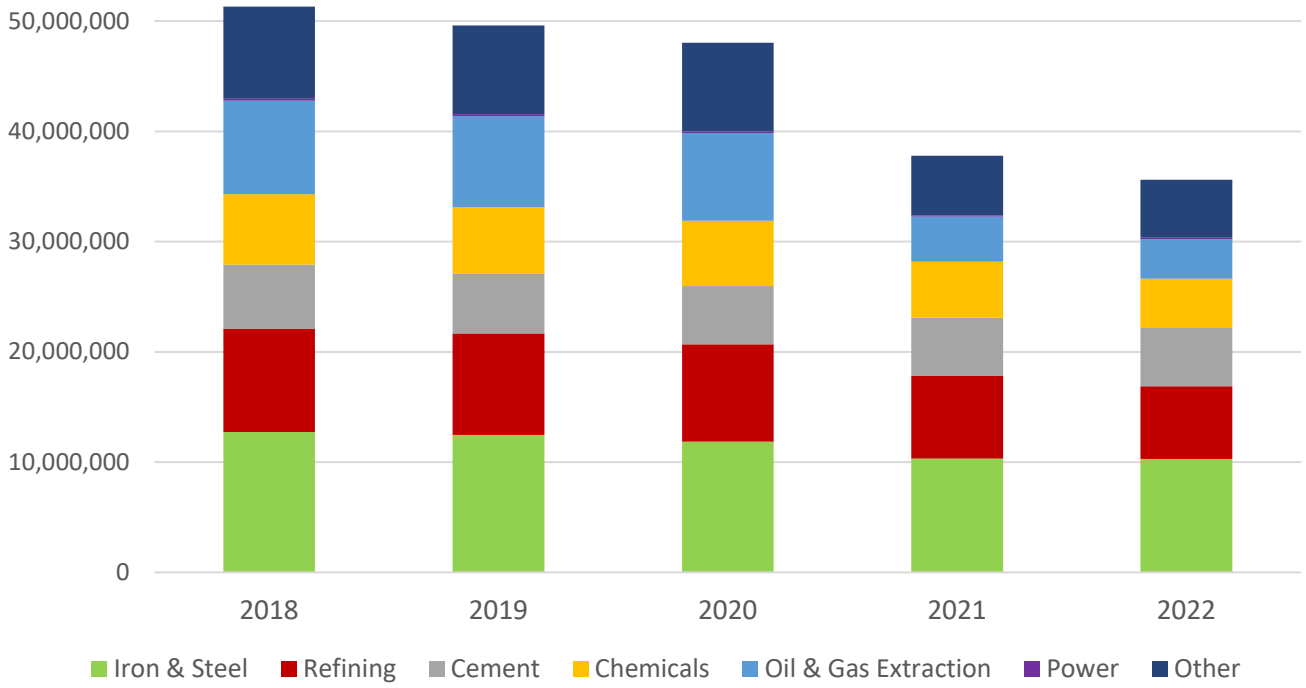
The process to determine how many free allocations each participant receives is known as the free allocation methodology (FAM),[2] using the preliminary formula: *historic activity level (HAL) x benchmark (BM) x carbon leakage exposure factor (CLEF) = preliminary free allocation*.[3]

This equation seeks to answer a series of questions to distribute allowances. Firstly, free allocation accounts for an installation's production quantity (typically tonnes of output), and emissions efficiency for its product or process (or benchmark).[4] The method then assesses extent of carbon leakage risk, based on an indicator reflecting trade and emissions intensity. Sectors at significant carbon leakage risk are placed on the Carbon Leakage List (CLL), receiving 100% of their free allocation if on the List, or currently 30% otherwise. If preliminary free allocation exceeds 40% of the total scheme cap (the industry cap)[5] in a scheme year and

[2] As outlined in Commission Delegated Regulation (EU) 2019/331, henceforth the 'Free Allocation Regulation'. Other relevant pieces of legislation are the Commission Implementing Regulation (EU) 2019/1842, or 'Activity Level Changes Regulation', and The Greenhouse Gas Emissions Trading Scheme Order 2020.
[3] Before final adjustments.
[4] Reflects the average emissions intensity of the 10% most efficient installations for a sub-sector, as an attainable target.
[5] As outlined in Developing the UK Emissions Trading Scheme: main response (3 July 2023), the industry cap will be reset in 2024 to align with the introduction of the net zero consistent cap, at 40% of the overall cap. However, from 2024 if preliminary allocation exceeds the industry cap, additional pots of allowances can be used to prevent

if there are no available unallocated allowances, a Cross Sectoral Correction Factor (CSCF) is applied, reducing participants' free allocation by an equal percentage. Figure 2 outlines the distribution of free allowances by sector in previous scheme years.

Figure 2: Free allowances by sector, 2018-2022



The policy objectives for free allocation are outlined in the consultation. While the first step of the Authority's free allocation review set the industry cap at 40% of the scheme cap, this step of the review focuses on the free allocation methodology. We assess options in terms of their technical and operational feasibility, and how well they meet the overarching principles outlined in the Consultation:

1) To ensure that the UK ETS effectively mitigates carbon leakage risk by the carbon price it sets, ensuring a true reduction to global emissions.
2) To take into consideration the availability and accessibility of decarbonisation technologies for UK ETS sectors.
3) Future changes to free allocation policy will align with our wider climate targets.

In particular, the central goal of free allocation is to mitigate the risk of carbon leakage. Carbon leakage is 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. We therefore assess options according to how well they support and enable free allocation to meet its goal of addressing carbon leakage risk, focusing on support for sectors at the greatest risk.

a CSCF being applied: around 2.5m allowances from the reserve to prevent a CSCF between 2024-2026, and around 29.5m allowances in reserve for uses including CSCF mitigation post-2026, amongst other uses.

Changes to activity level changes

Proposal one in the consultation considers how the free allocation methodology accounts for activity levels. We assess the options against the principles and objectives outlined in the consultation, that the process and activity level changes (ALCs) accurately reflect activity, provide certainty to industry, and avoid excessive administrative burden.

Under the current approach, changes to average activity which are below the 15% threshold will not trigger an ALC. Under this approach, free allocation does not respond to such changes in production levels and may lead to cases of over- or under-allocation for individual operators. Additionally, a sharp threshold may create perverse incentives or market distortions, whereby operators may have an incentive to deliberately alter production to a sub-optimal level to receive more free allocation.

Proposal 1: Updating activity level changes.

Through an assessment of the principles outlined above and preliminary analysis conducted using historic UK ETS data, we have assessed the following options in the consultation:

Activity level options tested for consultation:
Option 1.1 Counterfactual: Retain current methodology for historic activity level (HAL) and activity level changes (ALCs) **Option 1.2 Dynamic Allocation:** Activity calculated using average of two most recent years of data for activity, such as 2023 and 2024 for 2026 allocation.[6] This would replace the historic baseline approach and remove thresholds for triggering activity level changes

Option 1.1 Counterfactual

This represents the current method for calculating activity level. There are no changes to the way activity levels are considered, other than updating the baseline period, in keeping with the current method. This would form the counterfactual scenario when conducting an impact assessment at the point of the Government Response.

[6] E.g., at the start of scheme year 2026, the most recent available activity level will relate to 2024. The average of 2023 and 2024 is used to estimate provisional free allocation for 2026. After 2026 activity is reported, a readjustment is applied if this differs from preliminary activity.

Current approach to historic activity level (HAL) in the FA Methodology

HAL is defined as the average (mean) of annual production in the baseline period (2014-2018 for the 2021-2025 allocation period, and 2019-2023 for the 2026-2030 allocation period).

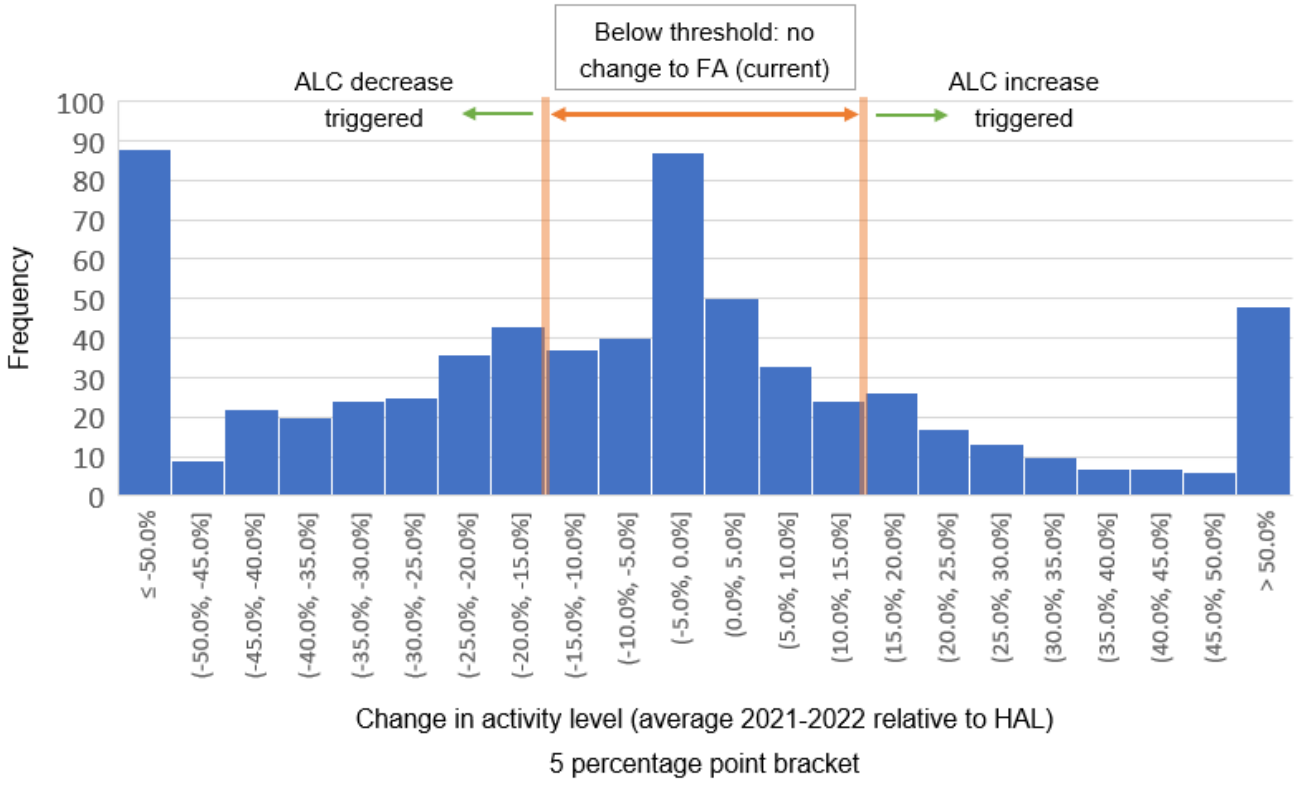
After the end of each scheme year, each operator must submit a verified Activity Level Report (ALR) covering their activity level for that year.

If an operator's ALR shows an increase or decrease of more than 15% from the HAL baseline in any two-year period, an activity level change (ALC) is triggered, and free allocation is recalculated from the HAL by this change.

If the activity level (2-year average) changes by less than 15% from the HAL baseline, or the change to free allocation would be 100 allowances or less, free allocation is not changed.

We assess historic Activity Level Reports (ALRs) to assess frequency of activity level changes using 2021-2022 activity level data to assess if the mechanism would be operationally feasible and provides intuitive results. In total, around 38% of ALRs show a two-year average increase or decrease in activity below 15% threshold relative to baseline historic activity level. In these cases, operators would retain their HAL value as an ALC is not triggered in preliminary free allocation calculation. Available ALR data spans 2019 – 2022 with significant fluctuation. In 2022, an estimated 45% of sub-installations triggered an ALC. Of these, around two-thirds were a decrease in activity and one-third were an increase in activity.[7] Figure 3 below shows the number of sub-installations across brackets of reported activity level changes.

Figure 3: 2021-22 activity level change (frequency of observation) vs HAL baseline



[7] The statistics illustrated here do not account for energy efficiency which may affect the rates of heat and fuel sub-installations whose activity falls outside of the threshold.

Option 1.2 Dynamic Allocation

With Dynamic Allocation, free allocation (FA) would provisionally be calculated based on the most recent two years of reported activity. This value would then be readjusted, if necessary, after the end of the scheme year to reflect reported activity. This method removes any threshold for ALCs and the requirement for a baseline HAL. Our assessment of option 1.2 for consultation consisted of preliminary analysis based on historic data to test feasibility and illustrative impact of changing methods.

One of the factors considered to assess the feasibility of the option is the availability of up-to-date activity level data. To access this data for operational purposes, the simplest option would be to use current annual reports that operators submit to regulators each year, thus preventing any new administrative burden of collecting additional data for each scheme year. However, the removal of a threshold would increase the frequency of activity level changes, potentially increasing regulatory costs, although removing checks and decisions around the application of the threshold may simplify some elements of the process.

Figure 4 shows a simple illustration of what the Dynamic Allocation mechanism could look like in any given scheme year. This is a simplified illustration to demonstrate design principles rather than final design of the option.

Figure 4: Illustration of Dynamic Allocation (Option 1.2) methodology

Preliminary assessment of this option used Activity Level Reports submitted by operators up to the end of scheme year 2022, the most recent year available at the point of testing. This analysis involved using activity levels taken from 2019-2022 ALRs and estimating a rolling 2-year average activity level for each scheme year. We assessed the impact on free allocation, in terms of frequency of changes and aggregate levels.

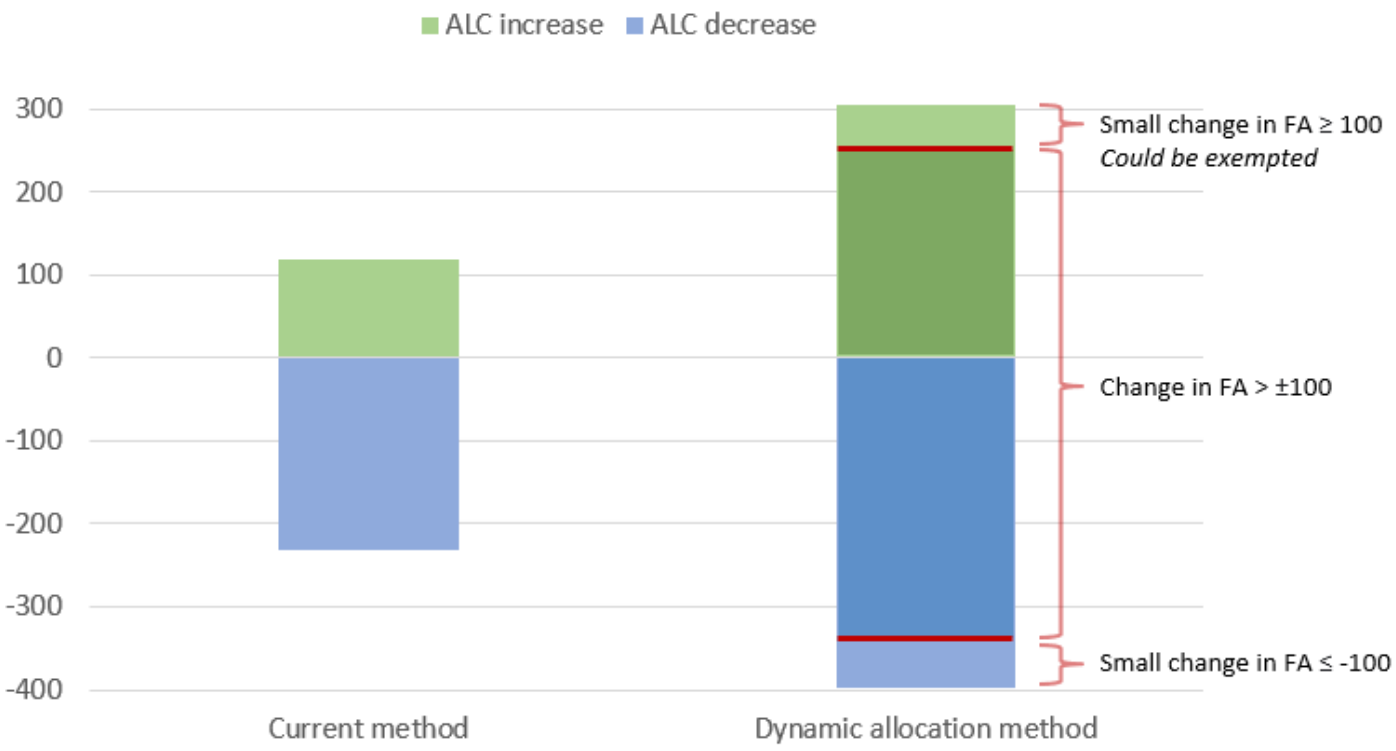
We compare the impact of applying a comparable approach to Dynamic Allocation to the current ALC methodology on a sub-installation level. This uses historic data, and applies a slightly different methodology to proposed Dynamic Allocation: as in Figure 4, proposed Dynamic Allocation requires preliminary activity level to be set from 2 years of most recent activity, and then readjusted if necessary, in order to be operationally feasible. Analysis presented here uses a similar approach, but due to limited years of UK ETS data, we cannot precisely implement a Dynamic Allocation method on historic data. Results should therefore be considered as illustrative comparing current ALC rules to a more dynamic system, based on the 2 years of most recent activity and removing any threshold.

Implementing a dynamic, or output-based allocation method increases the frequency with which activity level changes are triggered. Using activity levels for scheme years 2021 and 2022, a dynamic allocation approach results in changes to activity levels for around 700 sub-installations studied (98% of total), around 300 increases and around 400 decreases. The total amount of ALCs is more than double the frequency of the 350 sub-installations (45%) that receive ALCs under the current approach. Overall, this approach would have resulted in around 9% fewer free allocations in the scheme year 2022 than under the current approach, but this does not indicate a general finding for dynamic approaches.

However, if we were to implement a similar exemption to ALCs if the change to FA would be 100 allowances or less, fewer sub-installations would trigger an activity level change. In this case, dynamic allocation is applied only when FA will increase by more than 100. To note this analysis does not represent a policy position. Using activity level for scheme years 2021 and 2022, around 590 sub-installations would trigger an activity level change, 250 increases and 340 decreases. When introducing this minimum, activity level changes occur for roughly four-fifths (82%) of sub-installations.

Figure 5 represents the total number of sub-installations receiving ALCs under these approaches. It also depicts a 100 FA minimum threshold, and the proportion of ALCs affected. This is intended to illustrate methods and provide an overview of historic activity level change scheme data, rather than an assessment of impact of any method.

Figure 5: Number of sub-installations with changes to activity level under different illustrative approaches, based on scheme years 2021 and 2022



These figures are presented to give an overview of general trends from ETS data to contextualise the policy options. We can expect that dynamic allocation leads to an increased

frequency of ALCs, but the net impact on free allocation (to individual providers, sectors, or in total) is uncertain: if there is an increase in activity within an allocation period, free allocation will increase and vice versa. Additionally, activity level data analysed was highly affected by Covid-19, causing increased shutdowns to industry and fluctuations in activity, and this should be considered when interpreting results.

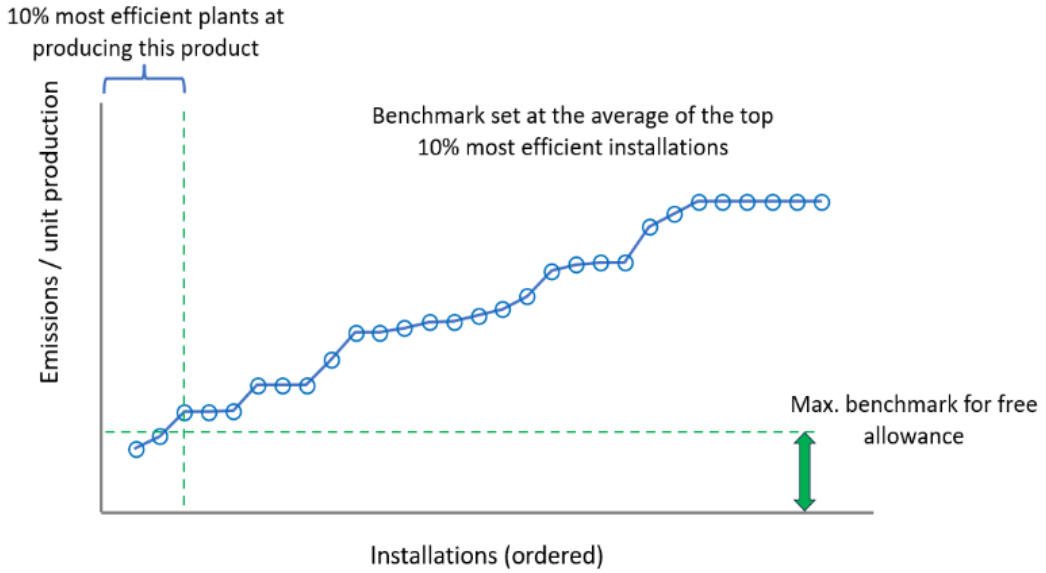
We also describe consider some of the key benefits and limitations of option 1.2:

Benefits	Limitations
Free allocation more closely reflects changes in activity levels, free allocation will be more targeted and may mitigate carbon leakage risk more effectively. Eliminates perverse incentives to reduce production and ensures FAs are better targeted at where activity is occurring. Simplicity of design requires only the most recent output values available to calculate activity component of methodology, which may offer some certainty to operators. All data to conduct Dynamic Allocation is available, and changes should be operationally feasible with current reporting requirements to operators.	May increase administrative burden on regulators and the Authority as changes would need to be processed for more sub-installations. With Dynamic Allocation, allowances outlined at the start of each 5-year allocation period would be highly provisional and liable to change, potentially decreasing certainty for operators. Higher frequency of FA changes and fluctuations in annual level of FAs may make it challenging for operators to forecast which could require additional resource for planning and management of FAs.

Changes to Benchmarks

Proposal 2 of the consultation considers benchmarks within the free allocation methodology. Benchmarks are used to assess relative emissions efficiency of installations. As outlined in the consultation, the free allocation methodology applies each installation a product benchmark (where possible), representing the average of the 10% most efficient installations for that product (Figure 6 below). More efficient installations (closer to benchmarks) receive more free allowances per unit of emissions, and vice versa, intended to provide an attainable target for operators and an incentive to improve efficiency.

Figure 6: Illustration of current product benchmark methodology

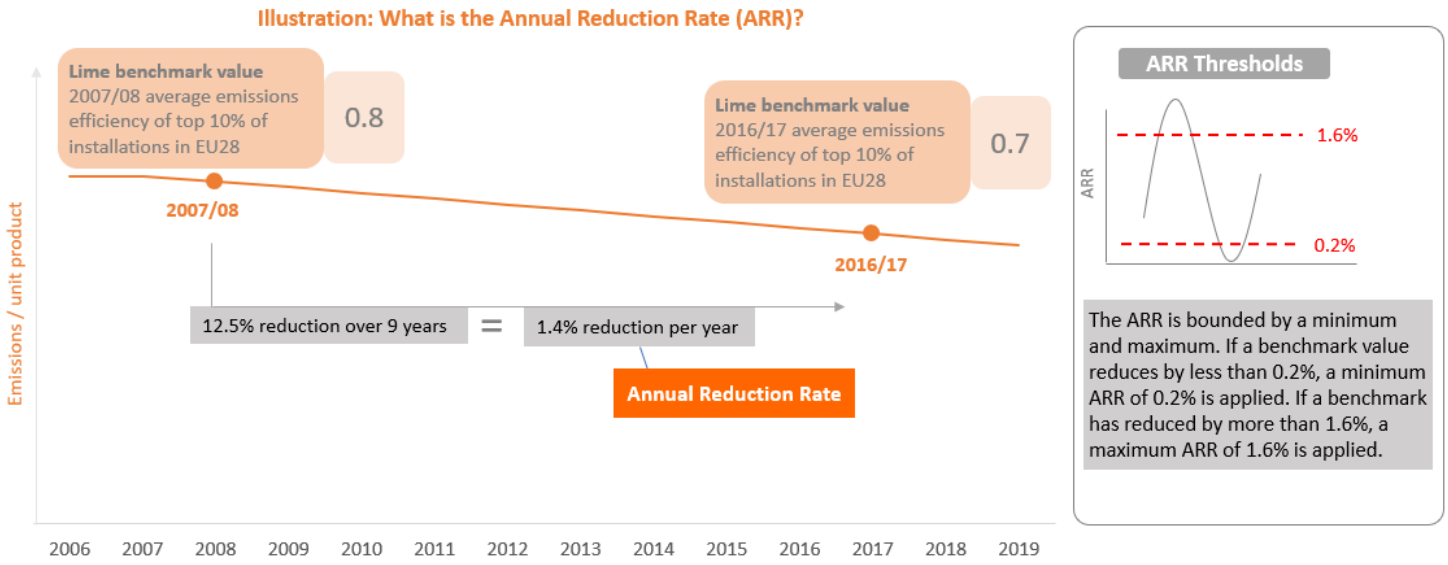


The rationale for changing the benchmark methodology is that currently UK ETS benchmarks do not include data from UK operators and may reflect efficiencies different to those attainable in the UK. Furthermore, in the absence of legislative changes, current benchmarks would carry over, and not reflect expected improvements in energy efficiency.

Proposal 2: Updated Benchmarks

Current benchmarks for UK ETS Phase 1 were set to equal Phase 4 EU ETS benchmarks and account for improvements in emissions intensity by the top performing installations using Annual Reduction Rates (ARRs), as outlined in the consultation. Figure 7 illustrates how ARRs are determined, with a minimum and maximum ARR of 1.6% and 0.2% respectively, limiting the change over time. For Phase 4 benchmark values, EU ETS sources were used to determine the emissions intensities of sub-sectors. 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.

Figure 7: Illustration of Annual Reduction Rate calculation



The following options are presented at consultation:

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

For the consultation, we undertook a feasibility analysis of the options below to assess if the methodology is technically and operationally feasible.

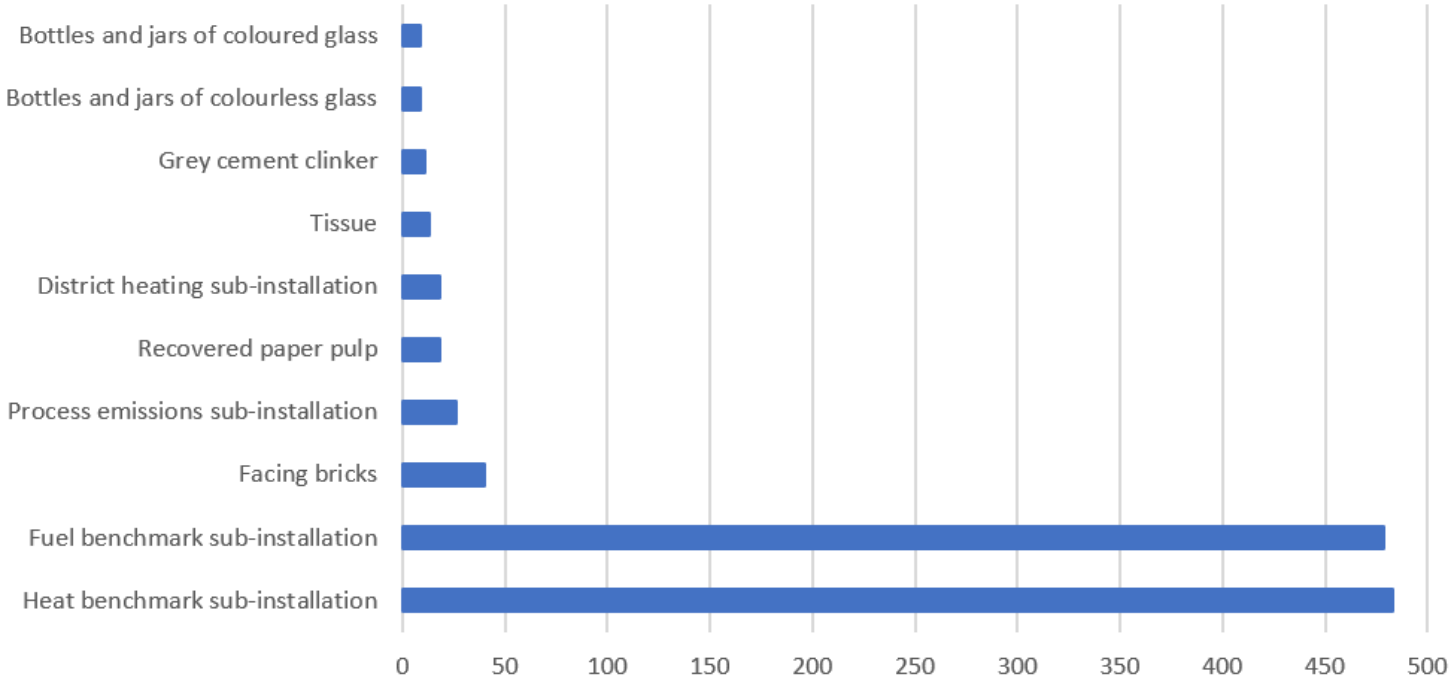
2.1 Counterfactual: no reduction in benchmarks for next allocation period

This option would mean the benchmark values used to 2021-2025 allocation period would continue to be in use for 2026-2030 allocation period. Assessing this option, we considered alignment with stated principles of this consultation, as well as providing descriptive analysis of current benchmarks.

The most common current benchmarks cover heat and fuel, applied to around 480 sub-installations each within the scheme. In total, there are 54 benchmarks. In addition to 52 product benchmarks (output-based), two benchmarks for heat and fuel consumption (input-based) were introduced as fall-back for products and processes not covered by the product benchmarks. The benchmark methodology assigns a product benchmark first to a sub-installation, and if this is not available, and heat inputs are measurable then the heat benchmark is used. If there is no product benchmark available, heat is not measurable, and fuel is combusted then the fuel benchmark is given. Lastly, a process emission benchmark is used if none of the previous benchmarks are available. This is equal to 97% of historical emissions. The most common product benchmarks are for bricks, recovered paper pulp, tissue, and grey cement.

For the current allocation period 2021 – 2025, of the 45 current product benchmarks, 58% had the maximum ARR threshold applied and 11% held the minimum threshold.

Figure 8: Number of sub-installations for ten most common benchmarks, current policy



We identify several key limitations to the counterfactual option:

1. Retaining the counterfactual would mean retaining the 2021-2025 allocation period benchmark values. As this is equal to EU ETS Phase 4 values, this means UK operators would continue to be subject to benchmarks which were determined by EU installations and may reflect efficiencies different to those attainable in the UK
2. This would also mean the Authority have no control over benchmarks values, and therefore it will prove difficult to provide any additional context or rationale if benchmark values are challenged
3. Retaining the option would mean the UK ETS Authority have no ability to design benchmarks in a way that responds to innovation in production technologies in the UK

2.2 Use updated 2026 EU ETS benchmarks

Option 2.2 would result in keeping the same benchmark values as the EU for 2026-2030. This approach is expected to use EU data on average emissions intensity for the 10% most efficient EU installations from Phase 3 (2016-17) to Phase 4 (2021-22), to calculate an EU ARR. This ARR will be used to adjust EU benchmark from 2021/22 to 2028, the mid-point of the second allocation period. The max ARR threshold would also be increased to 2.5% per year. It was not feasible to conduct any quantitative analysis on this option before updated benchmarks are published, but we undertook a qualitative approach to assessing its benefits and limitations.

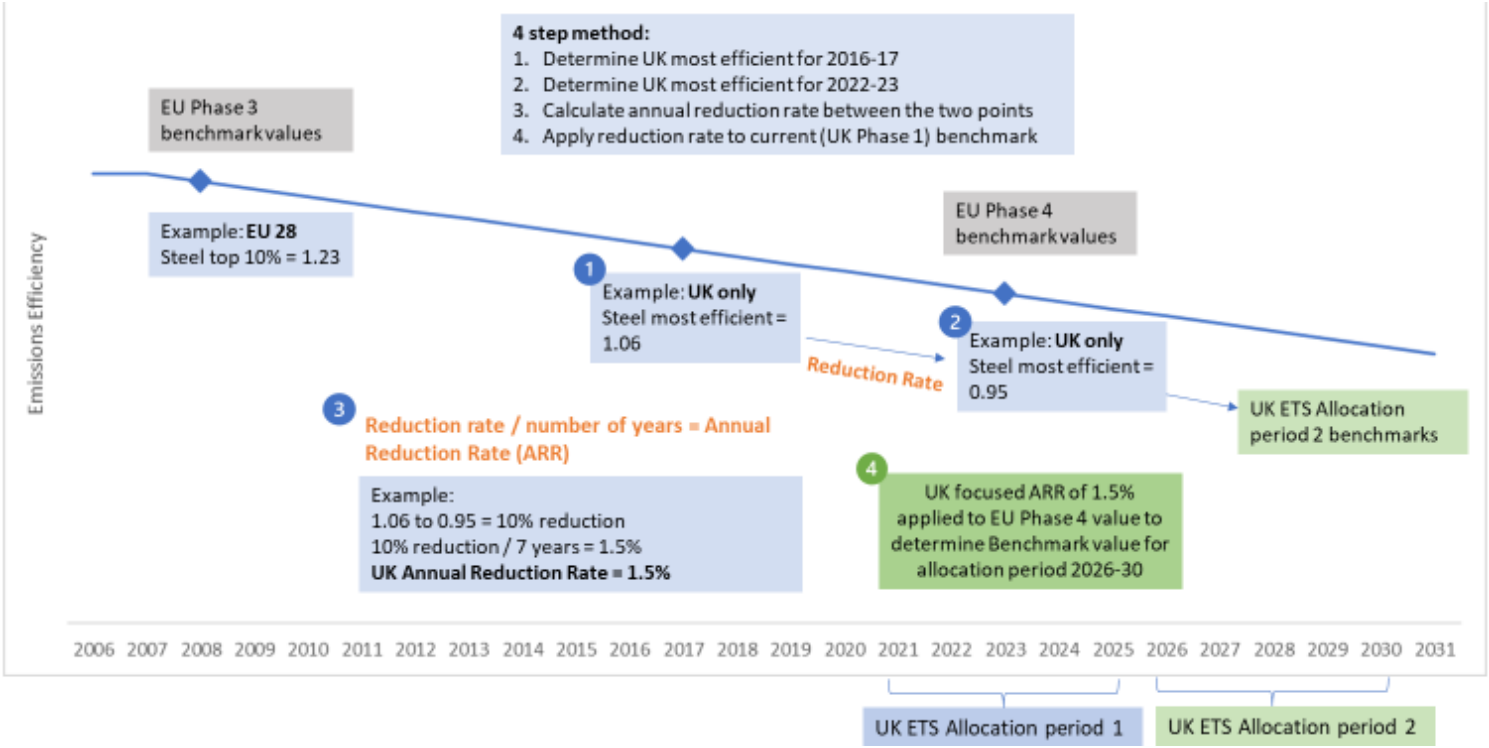
Benefits	Limitations
Relatively simple and well understood by participants as it is the current methodology. The benchmark values will be reliable and robust due to greater number of sub-installations in the EU ETS. Increased maximum ARRs (2.5%) in the EU may result in increased incentives for improving emissions intensity (although this could also be implemented for UK ARRs).	EU benchmark values do not include any UK data, and may reflect efficiencies and technologies different to those attainable in the UK. If UK and EU installations diverge in technology or attainable efficiencies, this method cannot account for such changes over time. The UK ETS Authority has limited visibility on what the updated benchmarks for 2026–2030 will be until they are published, which limits certainty for operators. The EU has announced plans increase the maximum annual reduction rate to 2.5%,[8] which should not be automatically adopted for UK ETS participants without consultation. The increase in the maximum reduction may result in fewer allowances than with current thresholds.

2.3 Update benchmark with a UK focused ARR

This option uses UK data to update the ARR from current values. This ARR would be determined by comparing the most efficient UK installations (for each product category) between two points in time. Proposal two in the consultation outlines the UK ARRs methodology, illustrated in Figure 9 below.

[8] Review of the EU ETS - European Parliament (2022)

Figure 9: Illustration of UK benchmark (Option 2.3) methodology



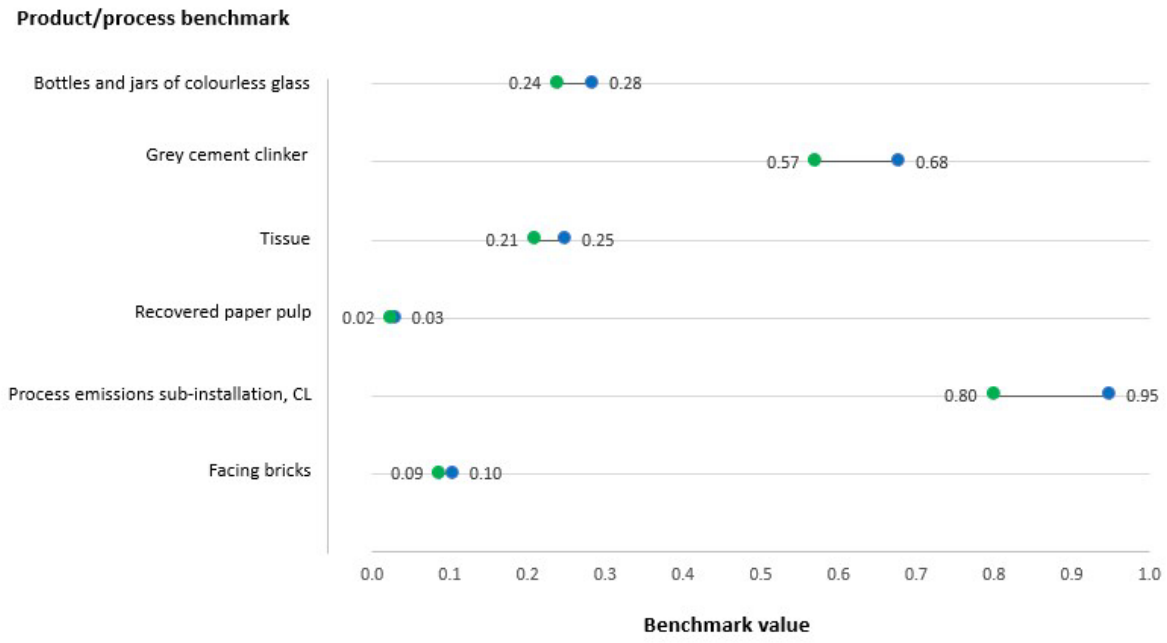
Values purely illustrative and are not representative of scheme values. This differs from the testing below as 2022-23 data is not available at the time of writing.

As the Baseline Data Reporting (BDR) exercise has not been carried out, data is not available for 2022-2023 to test this method formally and derive new benchmark values for the next allocation period. Until this data is available, we instead analyse this option using historic data, to test feasibility of the method.

Analysis was carried out comparing the most efficient installation in 2014 and 2018, as the two points in time to estimate UK focused ARRs. For example, if a product benchmark saw a 5% reduction over these five years, an ARR of 1% would be applied for the next allocation period from current benchmark value. This preliminary analysis indicated sufficient data availability and coherent results to support feasibility of the methodology.

Although we cannot precisely forecast future benchmarks under Option 2.3 (UK ARRs), we can outline the minimum and maximum values for individual benchmarks, based on current bounds (0.2% and 1.6%, depicted in Figure 7). We can therefore outline that future benchmark values will sit within a range, as shown in Figure 10.

Figure 10: Future UK benchmarks bounds – minimum and maximum values based on current ARR policy (selected 6 products & processes) for 2026-2030 allocation phase

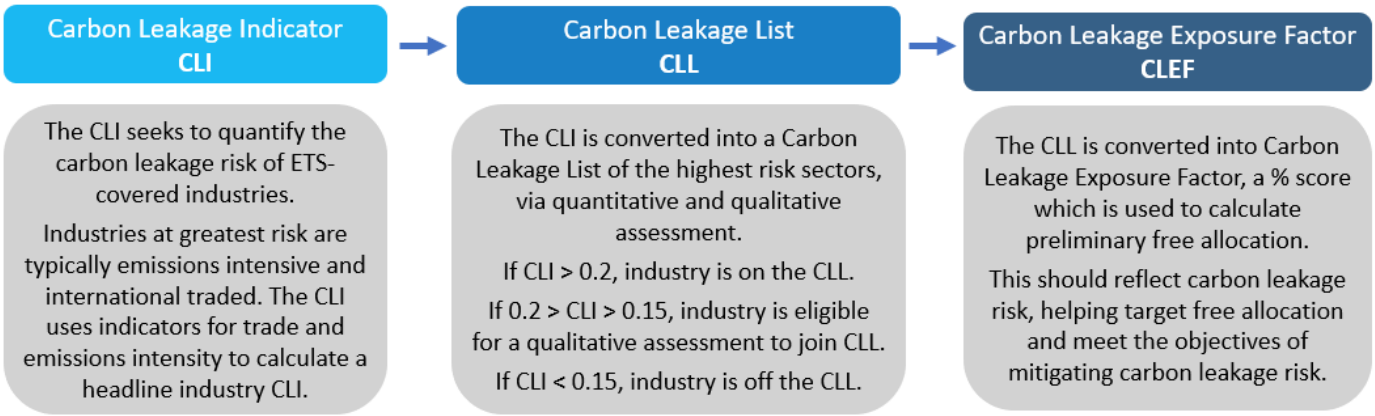


We are yet to consider the full impact of implementation on specific industries or regions in combination with other proposals. Subject to the Baseline Data Reporting (BDR) exercise being completed, and with data available and verified at the point of Government Response, we will analyse the impact of new benchmark values on the level of FAs sub-installations receive alongside the other options being explored in this consultation.

Changes to the Carbon Leakage List

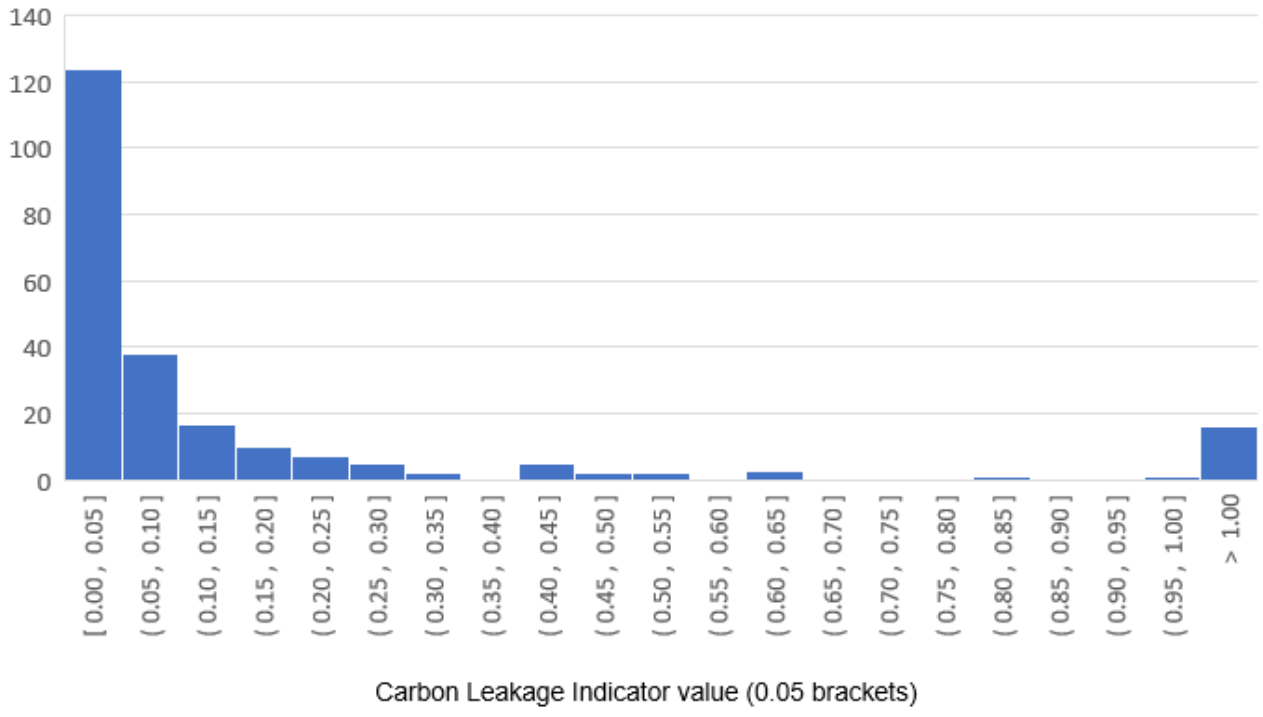
Proposals 3-5 of the Consultation review the Carbon Leakage List within the free allocation methodology. This component seeks to identify sectors with higher risks of emissions displacement due to the UK ETS, to ultimately target free allocation to sectors at greatest risk. This calculation takes place in several stages, as presented in Figure 11 below, and each component of the carbon leakage calculation has been considered as part of the consultation. We detail the options assessment underpinning these proposals. Within this analysis, the current free allocation rules as applied in Phase 1 of the UK ETS are taken as the counterfactual.

Figure 11: Elements of the carbon leakage methodology



The current Carbon Leakage List and Carbon Leakage Indicators cover around 250 industries (at NACE 4 level).[9] Current CLI scores for Phase 1 UK ETS range from 0 to a maximum of around 20 (although this is a significant outlier). The majority of industry CLI values (around 170 of 250) lie between 0 and 0.1; around 30 industries lie between 0.1-0.2; 30 industries lie between 0.2-1; and 15 industries lie between 1-4, as presented in Figure 12 below.

Figure 12: UK Phase 1 Carbon Leakage Indicator values: frequency by industry

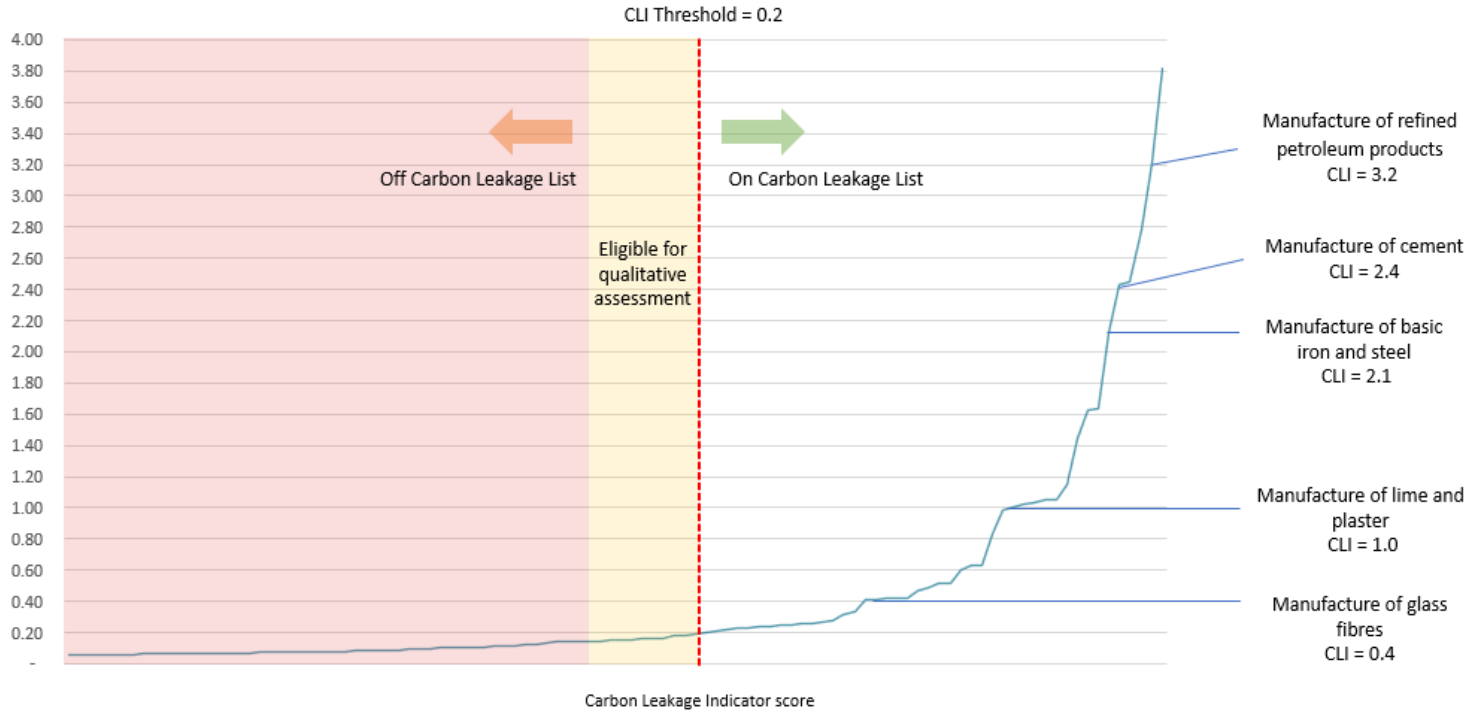


These CLI scores are used to produce the Carbon Leakage List (CLL). Industries with a CLI above the threshold of 0.2 are automatically placed on the CLL and are eligible to receive free allowances equivalent up to 100% of their relevant benchmark. Those off the CLL will receive

[9] As published by the European Commission (2018). See: Carbon leakage indicator, trade intensity and emission intensity

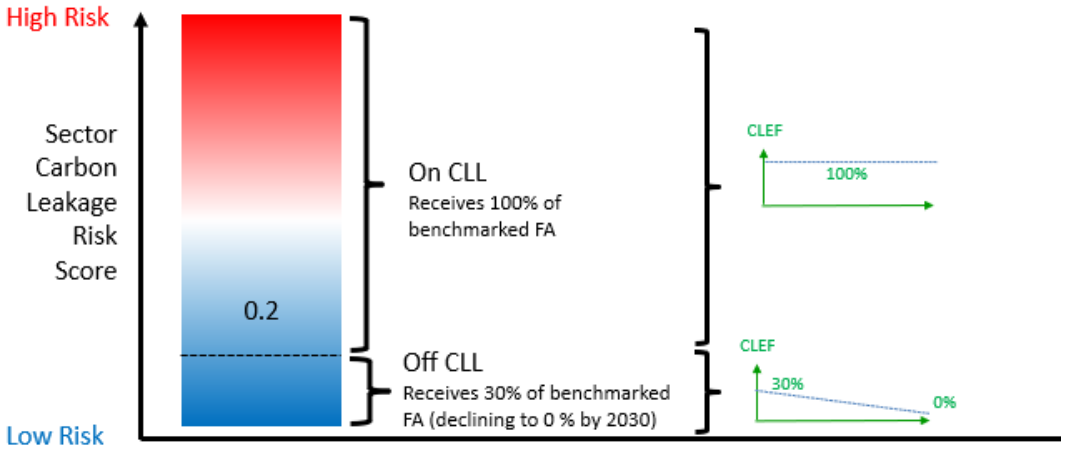
free allocation amounting to 30% of their relevant benchmark up to 2026, phased out to zero by 2030 under current scheme rules,[10] as in Figure 13 and Figure 14 and below.

Figure 13: EU Phase 4 / UK Phase 1 Carbon Leakage Indicator values by industry (ordered)*



** Removing outliers with a Carbon Leakage Indicator below 0.05 (140 NACE codes) and above 4 (1 NACE code)*

Figure 14: Carbon Leakage Indicator to Carbon Leakage Exposure Factor conversion (current rules)

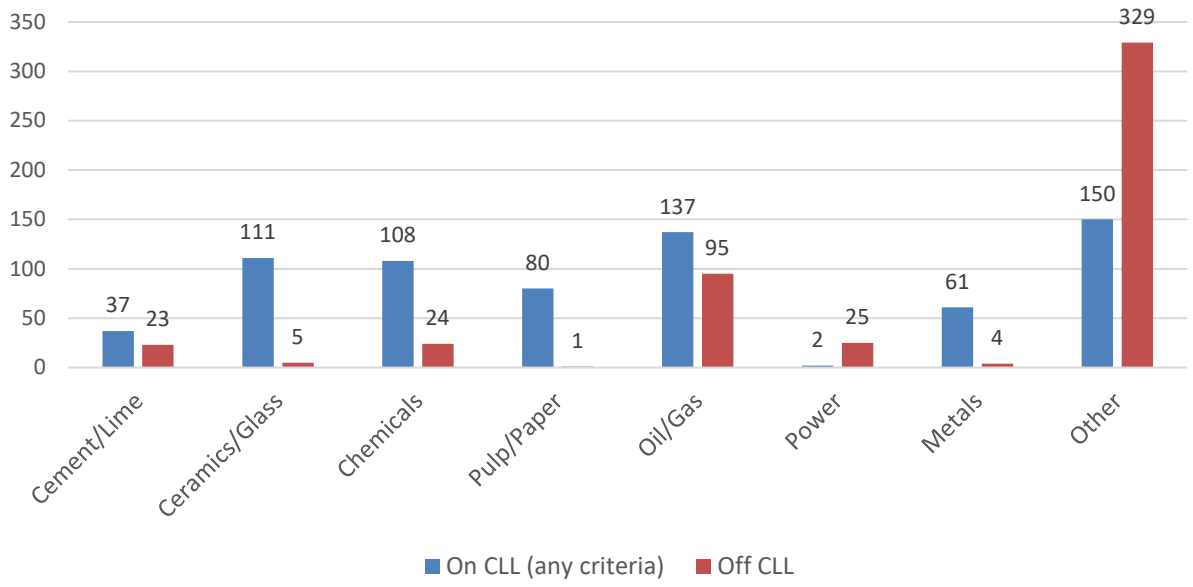


We also analyse the distribution of free allowances and emissions for participants with different CLI scores, and those on and off the Carbon Leakage List, as presented in Figure 15. Each industry (at a 4-digit NACE code level) receives a single Carbon Leakage Indicator score, and there are additional criteria for joining the List, so different industries within a sector may be

[10] There are also other criteria for joining the Carbon Leakage List. In cases where the carbon leakage indicator was between 0,15 and 0,2, a qualitative assessment may have been requested by that sector. In addition, sectors with an emission intensity exceeding 1.5 were also eligible to apply for either a qualitative assessment or a quantitative assessment at disaggregated level. Sectors and subsectors for which free allocation is calculated based on the refineries benchmarks were also eligible to apply for both types of assessments.

'on' or 'off' the Carbon Leakage List. The sectors with the highest proportion of industries on the current List are Metals, Ceramics / Glass, and Pulp / Paper.

Figure 15: Number of sub-installations by sector on and off Carbon Leakage List



Proposal 3: how to assess the risk of carbon leakage

Proposal 3 considers the methodology to assess the risk of carbon leakage for scheme participants. The counterfactual is to retain the current methodology and maintain the Carbon Leakage List as published by the European Commission in 2019 for EU ETS Phase 4 (2021-30).[11] The UK ETS adopted the same List and the same factors for the 2021-2025 allocation period, using the equivalent Carbon Leakage Indicators. These indicators are based on trade intensity and emissions intensity from EU trade, turnover, and emissions data.[12]

The consultation considers the options of either retaining the current Carbon Leakage Indicators (CLIs) for the 2026-2030 allocation period, or updating CLI data whilst retaining a similar method. A complete revision of the CLI methodology would require significant consultation and technical development and was not considered feasible in time for updated values required for the 2026-2030 allocation phase.

We assess both retaining the current CLI and updating the data, against the overarching principles and technical feasibility considered within this review.

Retaining the current CLI for the 2026-2030 allocation period would offer greater certainty and continuity for UK industry, requiring no change to assessment or values for carbon leakage

[11] European Commission Carbon Leakage List
[12] As detailed in the EC Framework for disaggregated quantitative assessments. Variables include trade value or volume - Eurostat Europroms database; sold production - Eurostat Europroms database; and direct C02 emissions per installation

risk. Results from this method would also retain high statistical confidence, given large samples and strong data quality from EU-wide datasets.

However, there are significant issues with this option. Current Carbon Leakage Indicators are based on EU trade and emissions data, using an EU sample to infer characteristics about UK participants, which may result in different results than those from UK specific data. For example, current trade intensity accounts only for imports and exports between the EU and non-EU countries, meaning UK trade intensities are currently based on EU trade flows. This overlooks UK-EU trade, which makes up 42% of total UK exports and 48% of total UK imports.[13] Similarly, current emissions intensity values are based on average EU emissions intensities. This accounts only partially for UK industrial characteristics, which may differ to European counterparts, such as due to different production methods or energy mix used.

As a result, updating the CLI using new UK-focused data for the 2026-2030 allocation period has several benefits:

a) Using UK-only data aims to be more specific and representative of UK ETS participants, particularly in trade openness and emissions intensity

b) Updating the data to capture UK firms allows more control over the choice of specific datasets and calculations, enabling potential improvements to the accuracy of indicators

c) Updated data may help align and consider carbon leakage workstreams across government

d) Using updated data from more recent periods can account for recent changes in trade or emissions, compared to using historic EU data

e) This methodology provides some continuity to participants, with the principles of the methodology retained between allocation periods

Overall, this option will allow free allocation to meet its policy intent of mitigating carbon leakage risk more accurately, through use of representative, accurate data. As a result, the Authority is minded to progress with development of updated CLI data.

Assessing options for updating the data underpinning the CLI

We assess potential options for updating the data underpinning the CLI, whilst maintaining a similar methodology to capture trade and emissions intensity for a sector, for the UK ETS 2026-2030 allocation period. This aims to capture key determinants of carbon leakage risk, ensure continuity for participants, and ensure technical feasibility within UK ETS parameters and time constraints. Our assessment of potential datasets focused on several phases:

1. Generating a list of potential options for the Carbon Leakage Indicator data, alongside the counterfactual
2. Multi-criteria assessment of these options, to assess quality and coverage of datasets

[13] Based on 2022 trade. Statistics on UK-EU trade (Commons Library, May 2023)

3. Preliminary testing of the outputs from these options, as a feasibility study into whether potential options can produce valid UK CLI results, and consideration of next steps

We have considered several alternative data sources to enable us to better reflect UK carbon leakage risk in an updated List, as below:

CLI data options tested for consultation:
3.1 Counterfactual: This option would retain current EU data, combining EU trade, output, direct emissions, and indirect (electricity) emissions data for the UK ETS 2026-2030 allocation period **3.2 OECD TECO2**: This option would use the OECD's Trade in embodied CO2 (TECO2) dataset, which produces several indicators on CO2 emissions by industry and country **3.3 ONS emissions and trade data**: This option would use available ONS datasets on trade[14] and emissions intensity[15] **3.4 Combined UK data**: This option would use a combination of UK data including ONS emissions data, output data from the Annual Business Survey (ABS) and HM Revenue & Customs trade data

Each data option was assessed against several criteria, to reflect the relevance and quality of data to accurately assess carbon leakage risk. The following criteria were used:

a) Accuracy: Data reflects carbon leakage likelihood and should capture intensity of emissions for each industry and extent to which it is exposed to trade and international competition

b) Defensible: Data is produced to robust standards, with high confidence in estimates and limited lag in publication

c) Coverage: Includes all key ETS-covered subsectors

d) UK focused: Data is based on UK firms and is representative of participants

e) Transparency: Data should be easily accessible, transparent and available for scheme participants

f) Longevity: High confidence that datasets will be produced in future phases

For each data option, we assess each criterion on a 3-score red/amber/green (RAG) scale. This assessment included investigation of each data source, and discussion with the publishing authority. The principles for assessing each criterion are outlined in the appendix. This multi-criteria assessment found several differences across options, summarised below:

Option 3.1 (counterfactual EU data) is methodologically robust and transparent but with lower rating in terms of accuracy (trade relates to EU), UK focus (UK no longer submits data), and

[14] ONS dataset: UK trade in goods by industry, country and commodity, exports
[15] ONS dataset: Atmospheric emissions: greenhouse gas emissions intensity by industry

longevity, with risks that outputs are not representative of UK industries' trade exposure and emissions intensity.

Option 3.2 (OECD TECO2) had strong scores for UK specificity and longevity, but significant issues were found for coverage, given high levels of sector aggregation, leading to key industries missing specific values; and lower scores for accuracy, given that no clear variables were available to capture both trade and emissions intensity as previously assessed.

Option 3.3 (ONS data) had strong scores in terms of UK specificity and longevity, but with lower ratings in terms of coverage (some data gaps due to suppression) and transparency.

Option 3.4 (combined UK data) produced the highest rating from this assessment, with strong ratings in terms of accuracy, longevity, and UK specificity, with strong data availability for all key industries and elements of the carbon leakage methodology. Nonetheless, there were some issues with data suppression, in cases where there are few observations.

This multi-criteria assessment found significant issues for several options. Given strong scores across all criteria are necessary to produce robust, accurate outputs, we progressed only with option 3.4 in the next phase, noting feasibility analysis is not required for the counterfactual.

The feasibility testing of option 3.4 involved combining all input datasets, producing preliminary Carbon Leakage Indicator values, and assessing coverage and quality of results. We were able to replicate a comparable methodology to the current CLI process, with defensible, transparent values for trade and emissions data for a large proportion of industries. This supported presenting this option within the consultation. Nonetheless, there remain further decisions and areas for development in this methodology, which we intend to progress in the Government Response.

Proposal 4: application of the carbon leakage exposure factor

Proposal four considers the CLEF, the value applied to different industries to target carbon leakage support in the free allocation methodology. This proposal concerns both the CLL and the CLEF of the carbon leakage methodology,

Potential parameters which can be varied in the CLL and CLEF methodology include the number of CLL tiers, threshold values, CLEF score given to tiers, and how CLEF may change over time. Each of these have been considered within Proposal 4 of the consultation.

CLEF options considered at consultation:
4.1 Counterfactual: Current application of the CLL and CLEF rules **4.2 Four balanced tiers**: Creating four tiers, balanced in terms of frequency of industry in each tier. Three tiers on the List would relate to 'high-' 'medium-' and 'low-risk' industries, with CLEF values proportionate to risk, with a 'no-risk' tier off the List

4.3 Large high-risk tier: As above, with tiered CLL levels relating to different risks, with unequal sized tiers to prioritise covering more sectors in the high-risk tier

4.4 Tiering on a continuum: Instead of distinct tiers (grouped industries with the same CLEF value), industries would be given individual CLEF scores based on their position in the distribution of all CLI values (from 0%-100%)

The counterfactual, applying a single CLL with two CLEF values (around a single cut-off value of 0.2, as in Figure 13) does not differentiate between relative levels of carbon leakage risk and apply free allocation proportionately. This provides equal carbon leakage support for industries with different Carbon Leakage Indicator values. For example, an industry with a CLI of 0.2 receives the same support as the highest carbon leakage risk industries with CLI above 2. It is likely that carbon leakage likelihood, or rate, increases with greater trade intensity and emissions intensity, and vice versa. Therefore, leakage support could be better targeted to reflect this increased risk. This could be done through varying the CLEF value, to enable more targeted support.

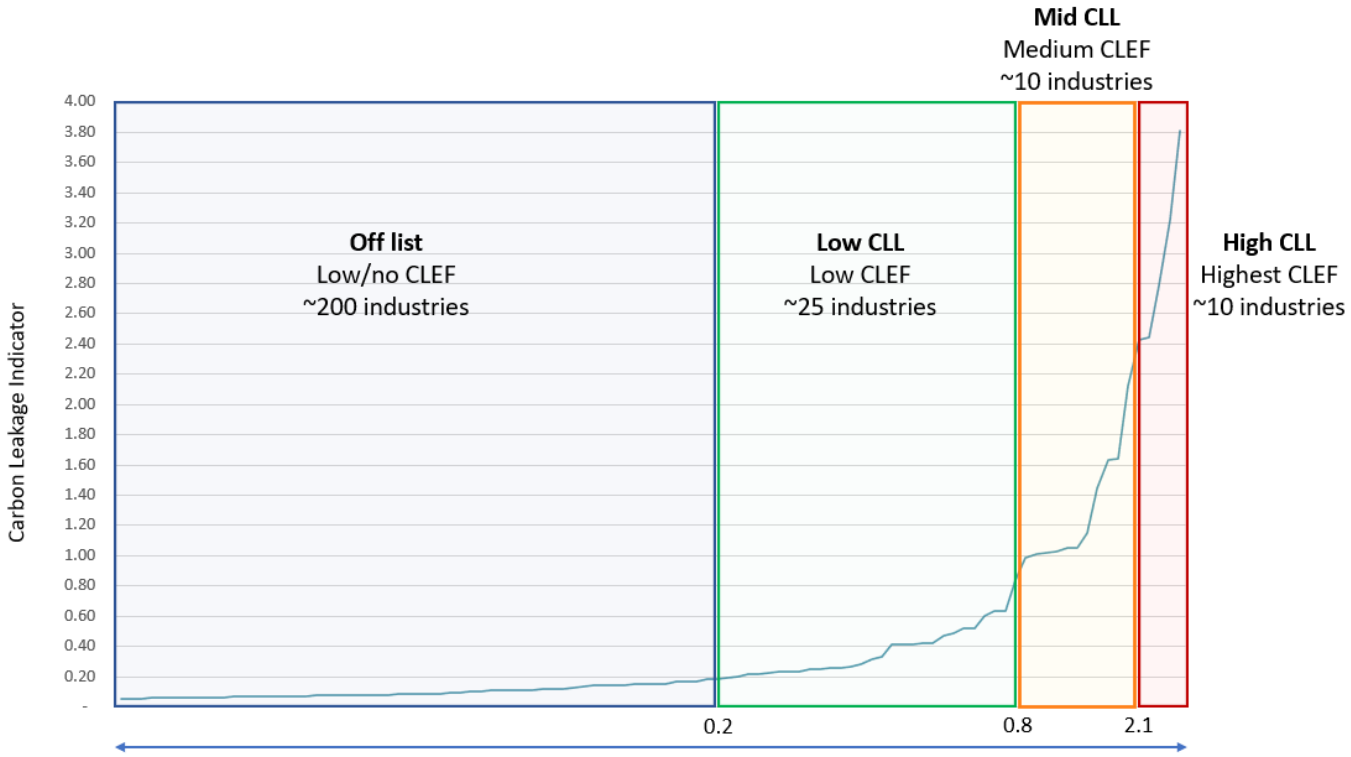
We have considered the potential theoretical fit and considerations of each of these tiering scenarios, as presented below. These are intended to illustrate potential designs to stakeholders but do not represent preferred policy positions. As with other components within free allocation calculation, tiering design will respond to other elements of the methodology. Therefore, assessment and design of tiering will depend on future policy decisions, and the below analysis should be considered as an initial test feasibility and as indicative.

Table 1: Illustrative Tiering Scenarios

CLI Value	Carbon Leakage Indicator (CLI)	Carbon Leakage List Tier
2.1 ≤ CLI	2.1	High
0.8 ≤ CLI < 2.1	0.8	Medium
0.2 ≤ CLI < 0.8	0.2	Low
CLI < 0.2	0	Off List

Applying such tiering boundaries would create a 4-tier Carbon Leakage List, with four CLEF values, as presented in Figure 16. This maintains the current CLI threshold of 0.2 for industries ‘on’ and ‘off’ the CLL but introduces three tiers for industries on the List.

Figure 16: Potential tiering applied to UK Phase 1 CLI

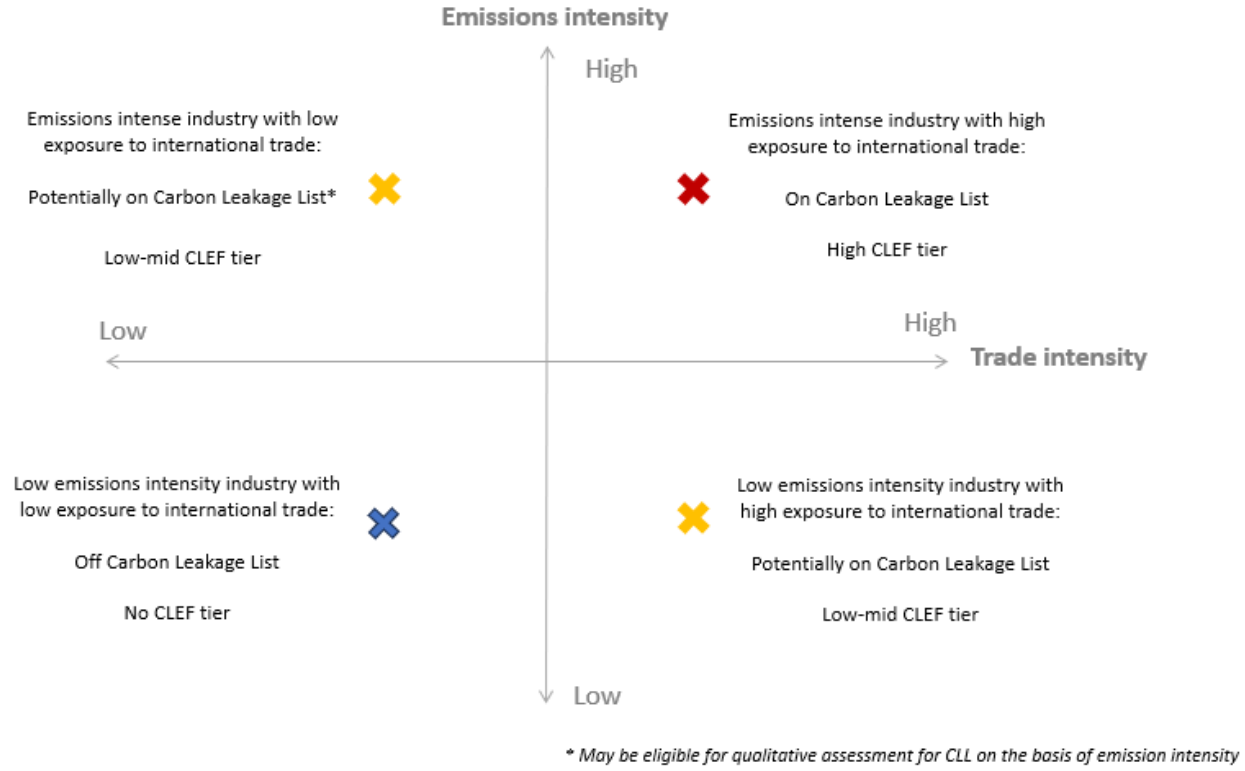


** Based on illustrative tiers, and not a representation of policy positions*

Using such tiers results in approximately 200 industries off the Carbon Leakage List (as with the current List), around 25 industries considered 'low CL risk', and around 10 each in 'medium' and 'high risk' categories. While exact values for thresholds could be changed and would be subject to further analysis, this indicates sufficient variation from the current CLI values to be able to implement a tiered approach. We do not present potential CLEF values although this could be determined through assessing optimal carbon leakage support and scheme objectives.

While the eventual tier of each industry and operator cannot be confirmed until all scheme parameters are determined, the principle underpinning tiering is to provide improved targeting of support to operators with greater carbon leakage risk. As such, CLI values increase proportionally to increased emissions intensity and trade intensity, as outlined in the current methodology. Therefore, industries' eventual tiers will correspond to these two variables, as illustrated in Figure 17 below.

Figure 17: Illustration of carbon leakage tiers based on industry characteristics



Further development will be required to confirm the most effective mix of CLEF parameters. We will seek to design tiers and CLEF to be representative of participants' carbon leakage risk, in order to provide proportionate, effective mitigation. This seeks to improve accuracy and targeting of FA compared to the counterfactual and will seek to fully assess the impacts and feasibility of each option at Government Response. The UK Government has announced plans to implement a UK Carbon Border Adjustment Mechanism (CBAM). As a result, free allocation policy could be adjusted subject to future UK ETS Authority decisions, to measure and reflect changes to carbon leakage risk for given sectors.

Proposal 5: Tiering the Cross Sectoral Correction Factor

Another way that the Authority has considered better targeting those most at risk of carbon leakage is to tier the Cross Sectoral Correction Factor (CSCF) in the event of its application.

Instead of applying an even reduction in FAs across all installations, the reduction could be weighted based on sectors' carbon leakage risk, as determined by tier. This proposal is being considered in conjunction with tiering of the CLL. In the instance of a CSCF being triggered, those at the highest risk of carbon leakage would receive a proportionately lower reduction in their FAs than those at lower risk. These potential options are described below:

Options for tiering the CSCF considered at consultation:

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.[16] This applies an equal percentage reduction to each participant's free allocations, a uniform reduction independent of carbon leakage risk.

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.

Option 5.2 may have several potential impacts:

a) Improved targeting of free allocation to those at greater risk of carbon leakage, as their FA could be better protected, albeit at the potential cost to those at lower levels of risk

b) Additional control of the CSCF mechanism, which could be applied in a nuanced, informed process, rather than as a uniform reduction

c) However, this may result in additional complexity, to the calculation of a CSCF and to regulators, which may provide less certainty and clarity to scheme participants

We will seek to fully assess the feasibility of these options, and their impact on overall and sectoral free allocation, at Government Response.

Additional Factors for free allocation calculation

Consideration of Availability of Decarbonisation Technology

The availability of decarbonisation technology to scheme participants is also considered at consultation. This would differentiate between installations with and without access to large-scale decarbonisation technologies, to address potential market distortions caused by government support.

The options assessment method is outlined within the main consultation text, alongside principles for this process. No supplementary analysis is presented within this Annex on this component, but potential considerations which we will consider at Government Response are the accuracy of the current benchmark system in identifying the relevant product or process benchmark, potential provision of government support and whether these could cause market distortions, technical feasibility, and consequences of updating benchmarks. We will also analyse any potential regional impacts or distortions in assessing this proposal.

[16] An exception is when unallocated allowances are available to meet to preliminary free allocation demand, effectively topping-up the industry cap. This unallocated amount is accrued in previous years: if free allocation in a scheme year are lower than the industry cap, these allowances are reserved, and can be used in future years to mitigate against a CSCF.

Conditionality

Applying conditionality is considered in the consultation, whereby free allocation would be dependent on, or adjusted by, additional criteria. This may be either positive conditionality (rewards for desired behaviour) or negative conditionality (reducing FA if criteria or behaviour is not met). Specifically, the Authority has considered conditionality that aims to encourage installations to invest in emissions reduction or resource efficiency measures.

The options assessment method is outlined within the main consultation text, alongside principles for this process. No supplementary analysis is presented within this Annex on this component, but we aim to present further analysis where feasible at a later stage.

Analytical considerations for the Government Response

Following the consultation, the Government Response will assess the feasibility and impact of options in depth. As well as assessing each proposal individually, the GR analysis will assess interaction of components of the free allocation methodology and their combined impact. In this section, we consider several factors and impacts which may be assessed at GR.

Societal impacts: changing free allocation distribution

This section summarises potential costs and benefits to society associated with changing free allocation compared to the counterfactual. As this consultation focuses on changes to take effect in the 2026-2030 allocation period, we will primarily consider impacts in this period in the analysis, whilst considering longer-term impacts when relevant and feasible.

The GR will consider the impact of the changes on the distribution of free allowances across sectors and regions, including results comparable to the historic free allocation distribution by region and sector for 2022,[17] as presented in Table 2 and Table 3 below.

Table 2: 2022 Emissions as a percentage of all traded sector emissions and free allocation by region

Region	Emissions Share 2022	Free allocation Share 2022
England	66%	60%
Wales	17%	24%
Scotland	7%	8%

[17] Data taken from UK Emissions Trading Scheme regulator reports (2023). Note, different definitions of sectors used in other contexts may give different results.

Northern Ireland	1%	1%
Offshore	10%	7%

Table 3: 2022 Emissions as percentage of all ETS-covered emissions; free allocation by sector as a proportion of total free allocation

Sector	Emissions Share 2022	Free allocation Share 2022
Iron & Steel	10%	29%
Refining	11%	19%
Cement	6%	15%
Chemicals	4%	12%
Oil and Gas Extraction	11%	9%
Power	47%	0%*
Other	11%	15%

**Electricity generation is generally not eligible for free allowances. However, a small number of sites within the broader power sector have some activity eligible for free allowances.*

In England and Scotland, activity is generally spread across multiple sectors, with Refining and Iron & Steel constituting the largest shares of free allocation in England, and Refining and Chemicals in Scotland. Wales and Northern Ireland are more concentrated in key sectors. In Wales, the majority (73%) of free allocation was given to the Iron & Steel sector. The majority of free allocation in Northern Ireland (66%) was distributed to the Cement sector.

Lower carbon leakage and emissions reductions

The primary aim of free allowances is to mitigate carbon leakage and lower total emissions. Carbon leakage lessens the overarching goal of the ETS, reducing scheme efficacy through displacement of emissions. Therefore, the primary expected benefit of more a targeted, accurate free allowance methodology is the societal benefit of emissions reductions (or abatement) through the UK ETS. Relative to the counterfactual, we expect a reduction in the carbon leakage rate in ETS-covered sector emissions through more targeted free allowance

distribution. This is expected to result in lower aggregate global emissions, which we will analyse at Government Response.

Compliance costs

Compliance costs reflect the costs incurred by operators through purchasing allowances necessary to meet their obligations under the UK ETS. These are also expected to be a key impact of the policy. In general, higher carbon prices will tend to increase compliance costs, although carbon prices respond to several complex factors including abatement quantity and costs. Compliance costs constitute a social transfer from participants to government. Free allocation reduces the total amount of allowances operators must purchase, and therefore affects the size of this transfer between industry and government.

However, as the ambition of the overall UK ETS cap is not affected by free allocation, and participants can sell any allowances in secondary markets, free allocation is not expected to significantly affect compliance costs via the carbon price channel.

Resource costs to operators

A key cost of this policy is expected to be resource costs to UK ETS participants associated with reducing their emissions in line with changes to free allocation. It is expected that permanent abatement and efficiency measures will take place, relative to the counterfactual. Where a change in free allocation distribution could drive greater reductions in emissions, we would also expect greater costs, as additional investment is required, and as relatively cheaper abatement is used up. The nature and cost of this abatement and associated costs will be influenced by several other policies alongside the UK ETS. We would also expect the cost of abatement to fall over time through technology improvement and deployment at greater scale.

Industry Impacts

A change in compliance costs for industrial operators could impact their competitiveness. This may take place directly, through costs of direct emissions of industrial processes, and indirectly, where ETS costs in one sector are passed through to other firms, such as ETS costs in the power sector passing through to industrial operators through electricity prices. Both channels may affect overall industrial competitiveness. However, we note there are also current government support schemes available to Energy Intensive Industries (EIIS), seeking to mitigate these impacts.

In some sectors, some or all carbon costs may be passed through to their customers. The capacity for this depends on many factors, including the timeframe of cost increases, market conditions, exposure to international trade and carbon costs faced by competitors. In some sectors, firms may also be able to make use of product differentiation, marketing, or innovation to mitigate impacts. In the longer term, carbon pricing could also increase the demand for some products, expanding or opening new consumer markets.

Administrative costs

Administrative costs to participants are the costs incurred from complying with the obligations in the UK ETS or administrative requirements for receiving FAs. These include costs associated with monitoring, reporting and verification, and the administration associated with managing, planning, and surrendering allowances for compliance. Participants are already familiar with the scheme, so the FA proposals are not expected to have significant additional familiarisation costs. However, the introduction of additional conditions or requirements for operators may result in additional costs, which government will assess.

The potential impacts of the changes, such as higher carbon prices, and changes in FA may lead some operators to engage in additional compliance planning, for example in the form of hedging.

Proposals outlined in this consultation may also result in changes to administrative costs to government and regulators, which we will assess at Government Response.

Indirect impact: wider economic impacts and economic transfers

More targeted free allowance allocation could aid in the deployment of abatement measures and improvements to energy efficiency. Higher carbon prices may also contribute to increased technological innovation, for example through more R&D spending. This could lead to positive spillovers, reducing the cost of, or accelerating, future abatement. Additionally, this decarbonisation will support jobs and investment in the green economy across the UK.

A change in FAs may impact UK ETS revenues which are a social transfer from compliance operators to government. Higher prices at auctions would tend to increase the size of the transfer, while reductions in total allowances sold would tend to reduce it. Free allocations also constitute a transfer from government to operators. Allowances have a market value which operators can benefit from, such as by selling allowances. Trading of allowances between market participants are also transfers.

Firm behaviour

All the potential impacts listed above depend primarily on how operators engage with the UK ETS and compliance markets. Compliance costs will also depend on operators' UK ETS market behaviours, such as banking, hedging and the use of future FAs. Where possible and known, we will analyse the impacts of these behaviours. Where the extent or impact of these behavioural factors are unknown, we will highlight this uncertainty.

Appendix

Multi-criteria assessment for Proposal 3: principles for assessing each criterion

Accuracy

- Green: Variables available for all key determinants of carbon leakage risk, including trade and emissions intensity
- Amber: Some variables available representing carbon leakage risk, with some issues or variables missing
- Red: Significant issues with available variables; unlikely to be an accurate assessment of carbon leakage risk

Defensible

- Green: Data is produced to high statistical standards; method is clear and established
- Amber: Data produced to reasonable standards but with some issues e.g., wide confidence intervals, untested methodology, sampling issues, unclear methodology or accompanying notes
- Red: Significant issues with data or unclear methodology

Coverage

Green: Variables are available for all NACE4 codes covered by the UK ETS; or very few gaps to smaller industries
Amber: Variables are available for most NACE4 codes covered by the UK ETS, with some key gaps (e.g., large ETS free allocation recipients have data gaps or require fall-backs)
Red: Variables are not available for several key NACE4 codes, are aggregated (and may be unrepresentative) or entirely missing sectors

UK-focused

Green: Data entirely provided by UK participants, or UK-specific results can be precisely isolated
Amber: Data partially provided by UK participants, but may contain other geographies
Red: Data not provided by UK participants, requiring assuming the proxy sample is equal to UK firms

Transparent

Green: All data is publicly available, and outputs are easily comprehensible to non-expert audience; operators or other stakeholders can independently understand determinants of their score
Amber: Some data or outputs are publicly available, and results are partly comprehensible, with some potential issues
Red: Data is not available to the public; outputs or methods are opaque and cannot be independently reviewed by either scheme participants or other stakeholders

Longevity

Green: Data will be produced annually (or regularly) for many periods into the future, to consistent standards
Amber: Data is likely be produced into the future, with some uncertainty or potential changes to methods or outputs
Red: Low confidence or assurance that data will be produced in future periods; or significant changes expected

Table 4: Multi-criteria assessment of Proposal 3

Criteria / Option	A: EU	B: OECD	C: ONS	D: Combined UK data
Accuracy: reflects carbon leakage likelihood	No UK firm data from 2018	Emissions indicators unusual; no clear trade intensity variable	Data uses surveys for industry estimates; some suppression	Variables available (both emissions and trade intensity) but a simple methodology
Defensible: methodology clear	Methodology is clear and rationale accepted	International source data/methodology but opaque variables	Methodology established but with gaps	Source data national/government statistical agencies; robust methodologies
Coverage: includes all ETS traded sectors	Covers all sectors at NACE 4-digit level of aggregation	Sectors are highly aggregated (metals); some missing (cement)	Missing steel and refinery sectors; aggregated compared to current EU data	Broad sectors are all available; some output data is suppressed; trade/industry matching required
UK-focused: UK data on emissions & trade intensity	UK no longer submitting data post-Brexit	UK data is available	Data based on UK firm data	All data relate to UK firms
Transparent: data publicly available; outputs clear	All variables for emissions and trade available on EU platforms	Data available, published, but lack of indicator transparency	Some data suppressed for publication (access deemed unlikely); but published	Data is clear and variables are transparently explained, some survey data
Longevity: Assured future release	UK no longer submitting data post Brexit	OECD confirmed future (annual) releases with a 3 year lag	Data is published annually	Data is published annually (or more frequently)

This publication is available from: www.gov.uk/government/consultations/uk-emissions-trading-scheme-free-allocation-review

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