European Commission

Combined retrospective evaluation and prospective impact assessment support study on Emission Trading System (ETS) State Aid Guidelines

Final report

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Glossary

Abbreviation	Definition
Consortium	ADE and Compass Lexecon
CWE	Central and Western Europe
EC	European Commission
EEAG	Environmental and Energy State Aid Guidelines
ETS	Emissions Trading Scheme
EU	European Union
GVA	Gross Value Added
ICLI	Indirect Carbon Leakage Indicator
IED	Industrial Emissions Directive
LCPD	Large Combustion Plant Directive
LME	London Metal Exchange
Phase IV	Trading phase of ETS from 2021 to 2030
PPA	Power Purchase Agreement
RAG	Red Amber Green

Executive Summary

ADE and Compass Lexecon (the Consortium) have been commissioned by the European Commission (EC) to provide support in the combined retrospective evaluation and prospective impact assessment study of the European Union (EU) Emission Trading System (ETS) State Aid Guidelines.

This report aims to present our final results on the evaluation workstream as well as our conclusions for the impact assessment workstream. This report also presents the approach used during the study to derive those conclusions as well as the limitations of the methods used.

The report is structured in three sections:

- Section 1 presents the policy context and the objectives of the study.
- Section 2 presents the analysis and conclusions of the evaluation workstream.
- Section 3 presents the analysis and conclusions of the impact assessment workstream.

In Section 2, we present our work to support the EC in its **evaluation of the 2012 Guidelines**. Our analysis provides inputs in particular to the Sections 4 and 5 of the evaluation report prepared by the EC. We provide deliverables in the form of **three memos**: i) a literature review on carbon leakage risk; ii) an analysis of the factors explaining why Member States did or did not implement compensation schemes; and iii) a review of the public consultation responses.

Our **literature review** suggests that to date there is no hard evidence of carbon leakage caused by the EU ETS. This result is consistent with the findings of the literature review performed by the EC in 2015 and relies on a limited set of studies. Although hard evidence cannot be established, several factors (e.g. the impact of the low level of carbon prices, potential over-allocation of emission allowances, the lack of a long enough assessment period) still need to be considered before drawing final conclusions on carbon leakage. Also, the fact that carbon leakage did not happen in the past, when carbon prices were relatively low, does not mean that it will not happen in the future. Therefore, further research on more recent historical data could change the conclusions.

The **review of the public consultation responses** shows that most respondents acknowledge the effectiveness of the EU intervention as well as the value added of the compensation Guidelines, but a few criticise some of the characteristics of the Guidelines, e.g. the list of eligible sectors and the level of compensation received. Many respondents claim that there are examples of carbon leakage, in particular in the form of investment leakage and that higher compensation levels with no degressivity would be required to limit the risk of carbon leakage of the electro-intensive industries. Most respondents point out that the main risk of market distortion is between the EU and extra-EU countries, therefore the level of compensation should not be considered as a risk for intra-EU market distortions. Most respondents, however, advocate a harmonisation of the compensation mechanism. Finally, the efficiency benchmarks or degressivity principle are not perceived to be parameters relevant to the incentives to become more efficient as the sectors argue that investments in energy efficiency measures would be made regardless of the compensation received in order to maintain their competitiveness. Most respondents argue that it is the lack of compensation or a reduced compensation level that could prevent the adoption of decarbonisation (via electrification) measures.

In Section 3, we first present the scope of work for the **impact assessment** by outlining the set of questions set by the EC. Second, we detail our conclusions on the three tasks covered in this workstream:

i) **eligibility**, which considers which sectors identified as potentially at risk of indirect carbon leakage should be eligible for compensation for indirect carbon costs.
Our qualitative assessment of individual sectors confirms that the quantitative indicator (the indirect carbon leakage indicator, ICLI) used to assess eligibility appears to be a good indicator to determine whether there is exposure to carbon leakage. With the ICLI below 0.2, there is no sector deemed at risk (overall RAG ratings equal to and above medium). Out of the twelve sectors deemed at risk, seven sectors deemed at medium risk have an ICLI between 0.2 and 0.5, and the remaining five deemed at medium-high risk have an ICLI above 0.5. However, this metric presents some limitations, considering that between 0.2 and 0.5, the picture is more mixed, with a possibility that a compensation based on the ICLI metric will compensate sectors deemed at low/low-medium risk of carbon leakage.

ii) **aid intensity and degressivity**, which consider the level of compensation to give to eligible sectors in order to reduce their risk of carbon leakage to a manageable level and the option for a degressive aid over the period of compensation.
In terms of aid intensity, our results show that the minimum level of compensation to bring all the sectors deemed at risk to the lowest level would be an aid intensity set at 75%. With an aid intensity below 75%, the risk is partially reduced for four out of the 12 sectors at risk.
Even with compensation at 75%, some sectors bear indirect costs representing more than 0.5% of their GVA (and with higher carbon prices even more than 1.0% and 1.5%). A compensation mechanism with an aid intensity at 75% plus extra compensation to bring the share of indirect carbon costs over GVA to 0.5% could be considered for those sectors in order to further reduce their risk, without overcompensating sectors that are already at low risk after 75% compensation. A higher GVA cap at 1.0% or 1.5% could also be considered.
In terms of degressivity, our analysis is inconclusive for a majority of the analysed sectors, as information was missing for an important number of sectors. It was also inconclusive for the sectors deemed at risk of carbon leakage.
Therefore, there is not enough evidence to confirm whether the situation of the sectors pleads for a stable aid intensity at 75% or a degressive aid intensity in the revised Guidelines.

iii) **the emission factor** used in the aid amount calculation should reflect the pass-through of ETS costs into the electricity generated in a given area.
Based on our analysis, we conclude that retaining the current methodology, i.e. looking at the carbon content of electricity produced by fossil-fuel generation plants, and amending regional CO_2 factors based on modified geographical areas seems to be the most appropriate approach to approximate the actual pass-through of ETS carbon costs into the electricity generated in a given area.
Our analysis of price convergence indicates that some of the existing zones would still remain relevant (Iberia and the Czech Republic + Slovakia) while two new ones could be considered, one for the Baltics and the other as an extension of the existing Czech Republic and Slovakia zone, including Hungary and Romania. Price convergence in the Central and Western Europe (CWE) and Nordic zones has decreased.

Synthèse

ADE et Compass Lexecon (le Consortium) ont été mandatés par la Commission Européenne (CE) pour soutenir la mission conjointe d'évaluation rétrospective et d'évaluation prospective d'impact des lignes directrices concernant certaines aides d'Etat dans le contexte du système d'échange de quotas d'émission de gaz à effet de serre (SEQE).

Ce rapport présente nos résultats sur la partie évaluation rétrospective ainsi que nos conclusions sur la partie évaluation prospective d'impact de la mission. Ce rapport présente également l'approche utilisée pour cette étude ainsi que les limites des méthodes employées.

Ce rapport est structuré en trois sections :

- La Section 1 présente le contexte ainsi que les objectifs de l'étude.
- La Section 2 présente l'analyse et les conclusions de la partie évaluation rétrospective.
- La Section 3 présente l'analyse et les conclusions de la partie évaluation prospective d'impact.

Dans la Section 2 de ce rapport, nous présentons notre travail dans le cadre de **l'évaluation des lignes directrices** publiées en 2012. Notre analyse fournit des éléments pour les sections 4 et 5 du rapport d'évaluation préparé par la CE. Notre travail s'articule autour de **trois mémorandums** : i) une revue de littérature sur le risque de fuite de carbone ; ii) une analyse des facteurs contribuant à la mise en place ou non d'un système de compensation par les Etats membres ; et iii) la revue des réponses des différents acteurs à la consultation publique lancée par la CE.

Notre **revue de littérature** suggère qu'il n'y a pas, à ce jour, de preuves confirmant le lien entre le risque de fuite de carbone et le SEQE. Ce résultat est cohérent avec les conclusions de la revue de littérature conduite par la CE en 2015 mais est basé sur un nombre d'études assez limité. Bien que des preuves solides n'aient pas été établies, de nombreux facteurs (par exemple l'impact des prix bas du carbone, la potentielle surallocation des quotas d'émission, le manque d'une période d'étude suffisamment longue) doivent tout de même être pris en compte avant de tirer des conclusions définitives sur le risque de fuite de carbone. Par ailleurs, le fait que des fuites de carbone ne se soient pas produites par le passé, quand les prix du carbone étaient bas, n'empêche pas le risque de fuites dans le futur. De ce fait, de nouvelles études basées sur des données historiques plus récentes pourraient changer ces conclusions.

La **revue des réponses à la consultation publique** montre que la plupart des participants reconnaissent l'efficacité de l'intervention de l'UE ainsi que la valeur ajoutée de l'UE dans la mise en place du système de compensation, mais quelques participants critiquent certaines caractéristiques du système, par exemple la liste des secteurs éligibles ainsi que le niveau de compensation reçu. De nombreux participants soutiennent qu'il existe des exemples de fuite de carbone, en particulier sous la forme de fuite d'investissements, et que des compensations plus élevées sans dégressivité seraient requises pour limiter le risque de fuite de carbone des industries électro-intensives. La plupart des participants indiquent que le risque principal de distorsion de marché est présent entre l'UE et les pays hors-UE (non soumis au SEQE), donc la compensation aujourd'hui en place ne devrait pas être considérée comme créant un risque de distorsion de marché dans le marché intra-européen. La plupart des participants soutiennent en revanche une harmonisation du mécanisme de compensation parmi les Etats membres. Enfin, la consommation d'électricité de

référence ou le principe de dégressivité ne sont pas perçus comme des paramètres adaptés pour inciter les industries à être plus efficaces d'un point de vue énergétique étant donné que les secteurs soutiennent que ces investissements se feraient indépendamment du niveau de compensation reçue, dans le but de maintenir leur compétitivité. La plupart des participants soutiennent que le manque de compensation ou une compensation réduite pourraient empêcher l'adoption de mesures pour la décarbonation (via l'électrification).

Dans la Section 3, nous présentons d'abord le périmètre de travail pour la partie d'étude d'impact en nous basant sur les questions posées par la CE. Deuxièmement, nous détaillons nos conclusions sur les trois tâches couvertes dans cette partie :

i) **Eligibilité,** qui considère quels secteurs identifiés comme potentiellement à risque de fuite de carbone devraient être éligibles pour une compensation des coûts indirects des émissions.
Notre évaluation qualitative des différents secteurs confirme que l'indicateur quantitatif *ICLI*[1] (l'indicateur de fuite de carbone due au coût indirect des émissions) est le paramètre approprié pour déterminer si un secteur est exposé au risque de fuite de carbone. Notre analyse indique qu'avec un *ICLI* en dessous de 0,2, il n'y a pas de secteur identifié à risque de fuite de carbone (score *RAG*[2] final supérieur ou égal à moyen). Sur les douze secteurs identifiés à risque, sept secteurs estimés à un risque moyen ont un *ICLI* entre 0,2 et 0,5, et les cinq restants estimés à un risque haut-moyen ont un *ICLI* supérieur à 0,5. En revanche, ce paramètre présente des limites étant donné qu'entre 0,2 et 0,5, les résultats sont mitigés, avec la possibilité qu'une compensation basée sur ce paramètre surcompense des secteurs inclus dans ce segment alors qu'ils ont été estimés à un risque bas/bas-moyen de fuite de carbone.

ii) **Intensité de l'aide et dégressivité**, qui considèrent le niveau de compensation à attribuer aux secteurs éligibles afin de réduire leur risque de fuite de carbone, et l'option pour une aide dégressive au cours de la période de compensation.
En ce qui concerne l'intensité de l'aide, nos résultats montrent que le niveau minimum de la compensation nécessaire pour réduire le risque des secteurs à risque au niveau le plus bas serait une intensité de l'aide à 75%. En effet, avec une intensité de l'aide en-dessous de 75%, le risque ne serait que partiellement réduit pour quatre des douze secteurs estimés à risque.
Même après une compensation à 75%, certains secteurs portent des coûts indirects du carbone dont la part est supérieure à 0,5% de leur valeur ajoutée (avec des prix du carbone plus élevés, cette part est même supérieure à 1,0% et 1,5% de leur valeur ajoutée). Un mécanisme de compensation avec une intensité de l'aide à 75% combinée à une compensation supplémentaire qui ramènerait la part des coûts indirects du carbone par rapport à la valeur ajoutée à 0,5%, pourrait être envisagé pour ces secteurs afin de réduire d'avantage leur risque et sans surcompenser les secteurs dont le risque serait déjà ramené à un niveau bas après une compensation à 75%. Un plafond de valeur ajoutée fixé à 1,0% ou 1,5% pourrait être envisagé.
En ce qui concerne la dégressivité, notre analyse est peu concluante pour une majorité de secteurs analysés à cause d'un manque d'informations pour un nombre important de secteurs, de même que pour les secteurs estimés à risque de fuite de carbone.

[1] ICLI en anglais, *indirect carbon leakage indicator*
[2] RAG en anglais, *Red Amber Green*

De ce fait, il n'y a pas assez de preuves pour confirmer si la situation des secteurs plaide pour une intensité de l'aide stable à 75% ou pour une intensité de l'aide dégressive dans la révision des lignes directrices.

iii) **Le facteur d'émission de CO_2** utilisé dans le calcul du montant d'aide devrait représenter la part du coût de l'ETS répercutée dans le prix de l'électricité générée dans une zone donnée.
A partir de notre analyse, nous concluons que maintenir la méthodologie actuelle qui consiste à prendre en compte la part de carbone de l'électricité produite par les centrales thermiques, et mettre à jour les facteurs d'émission régionaux à partir de zones géographiques modifiées, apparaît comme l'approche la plus appropriée afin d'estimer la répercussion réelle des coûts de l'ETS dans l'électricité générée dans une zone donnée. Notre analyse sur la convergence des prix indique que certaines des zones mentionnées dans les lignes directrices seraient toujours appropriées (péninsule Ibérique et région tchèque et slovaque) tandis que deux nouvelles zones pourraient être envisagées, une pour la région baltique et l'autre en tant qu'extension de la région tchèque et slovaque existante qui inclurait la Hongrie et la Roumanie. La convergence des prix dans les zones Europe Centre Ouest et du bassin Nordique a décru.

Zusammenfassung

ADE und Compass Lexecon (im Folgenden das „Konsortium“) wurden von der Europäischen Kommission beauftragt, die Kommission bei der Evaluierung und Folgenabschätzung der Leitlinien für Beihilfemaßnahmen im Zusammenhang mit dem Europäischen Emissionshandelssystem (EU EHS) zu unterstützen.

Ziel dieses Berichts ist es, endgültige Ergebnisse in Bezug auf die Evaluierungsarbeit sowie die daraus folgenden Erkenntnisse für die Folgenabschätzung zu präsentieren. Dieser Bericht enthält auch den in der Studie verwendeten Ansatz zur Herleitung dieser Erkenntnisse sowie die Grenzen der angewandten Methodik.

Der Bericht gliedert sich in drei Abschnitte:

- Abschnitt 1 stellt den politischen Kontext und die Ziele der Studie vor.
- Abschnitt 2 enthält die Analyse und die Schlussfolgerungen der Evaluierung.
- In Abschnitt 3 werden die Analysen und Schlussfolgerungen der Folgenabschätzung vorgestellt.

In Abschnitt 2 wird die Arbeit zur Unterstützung der Europäischen Kommission bei **der Bewertung der Leitlinien von 2012** erläutert. Die Analyse bezieht sich insbesondere auf die Abschnitte 4 und 5 des von der Kommission erstellten Evaluierungsberichts. Insgesamt werden drei Berichte in Form von **drei Vermerken** vorgelegt: I) eine Auswertung der Fachliteratur zum Risiko einer Verlagerung von CO_2-Emissionen (sog. ‚carbon leakage‘); II) eine Analyse der Faktoren, aus denen hervorgeht, warum die Mitgliedstaaten Kompensationsmaßnahmen eingeführt haben oder nicht; sowie III) eine Zusammenfassung der Ergebnisse der öffentlichen Konsultation.

Aus der **Auswertung der Fachliteratur** geht hervor, dass es bis heute keinen eindeutigen Nachweis für *carbon leakage* durch das EU-EHS gibt. Dieses Fazit steht im Einklang mit den Ergebnissen der von der Kommission im Jahr 2015 durchgeführten Literaturauswertung. Auch wenn hierfür keine stichhaltigen Beweise erbracht werden können, müssen dennoch mehrere Faktoren (z. B. Die Auswirkungen der niedrigen CO_2-Preise, die überobligatorische Zuteilung von Emissionszertifikaten, das Fehlen eines ausreichend langen Bewertungszeitraums) berücksichtigt werden, bevor endgültige Aussagen über *carbon leakage* getroffen werden können. Auch kann aus der Tatsache, dass es in der Vergangenheit nicht zu einer Verlagerung der Produktion ins EU-Ausland kam, obgleich die CO_2-Preise relativ niedrig waren, nicht geschlussfolgert werden, dass dies in Zukunft nicht passieren wird. Daher könnten weitere Untersuchungen zu aktuelleren historischen Daten zu weiteren Ergebnissen führen.

Die **Überprüfung der Antworten auf die öffentliche Konsultation** zeigt, dass die meisten Teilnehmer die Wirksamkeit der EU-Intervention sowie den EU-Mehrwert der Kompensationsregelung anerkennen, dennoch äußern einige Teilnehmer auch Kritik an einigen Eigentümlichkeiten der Regelung, bspw. die Liste der förderfähigen Sektoren sowie auch die Höhe des erhaltenen Ausgleichs. Viele der Teilnehmer sagen aus, dass es Beispiele für *carbon leakage* gibt, insbesondere in Form von Investitionsverlagerungen, und dass ein höheres Kompensationsniveau ohne Degressivität erforderlich wäre, um das Risiko von *carbon leakage* in der stromintensiven Industrie zu verringern. Die meisten Teilnehmer weisen darauf hin, dass das größte Risiko für Marktverzerrungen zwischen EU- und Drittländern besteht, weshalb die Höhe des Ausgleichs nicht als Risiko für Wettbewerbsverzerrungen innerhalb der EU eingestuft werden sollte. Die meisten Teilnehmer sprechen sich jedoch für eine Harmonisierung des Kompensationsmechanismus aus. Schließlich werden die Effizienz-Benchmarks oder das Degressivitätsprinzip nicht als Parameter angesehen, die

für Anreize zu mehr Effektivität relevant sind, da die Sektoren argumentieren, dass Investitionen in Energieeffizienzmaßnahmen unabhängig von einem erhaltenen Ausgleich getätigt würden, um ihre Wettbewerbsfähigkeit zu erhalten. Die meisten Teilnehmer der Befragung geben an, dass die fehlende Kompensation oder ein ungleich geringes Kompensationsniveau die Umsetzung von Dekarbonisierungsmaßnahmen (durch Elektrifizierung) verhindern könnten.

In Abschnitt 3 wird zunächst der Arbeitsrahmen für die **Folgenabschätzung** dargelegt, indem der von der Europäischen Kommission festgelegte Fragenkatalog skizziert wird. Anschließend werden unsere Schlussfolgerungen zu den drei in diesem Kontext behandelten Themen dargestellt:

i) **Förderfähigkeit**: Hier wird definiert, welche Sektoren für einen Ausgleich für indirekte CO_2-Kosten in Frage kommen sollten, da bei ihnen ein erhöhtes Risiko für *carbon leakage* gegeben ist.
Unsere qualitative Bewertung einzelner Sektoren bestätigt, dass der quantitative Indikator (indirekter Carbon-Leakage-Indikator, ICLI), der zur Bewertung der Förderfähigkeit herangezogen wird, ein guter Indikator dafür ist, um festzustellen, ob ein Risiko für *carbon leakage* besteht. Bei einem ICLI unter 0,2 gibt es keinen Sektor, der gefährdet ist (Gesamtbewertung mittleres oder höheres Risiko). Von den zwölf Sektoren, die als gefährdet eingestuft werden, weisen sieben Sektoren, für die ein mittleres bis hohes Risiko besteht, einen ICLI von 0,2 bis 0,5 auf; die übrigen fünf, für die ein mittleres bis hohes Risiko besteht, weisen einen ICLI von über 0,5 auf. Diese Metrik enthält jedoch einige Schwächen, da im Bereich zwischen 0,2 und 0,5 die Gefahr besteht, dass eine Kompensation auf Grundlage der ICLI-Metrik diejenigen Sektoren überkompensiert, die als Sektoren mit niedrigem bzw. Niedrigem bis mittleren Risiko für *carbon leakage* eingestuft werden.

ii) **Beihilfeintensität und Degressivität**: Hier wird die Höhe des Ausgleichs für förderfähige Sektoren berücksichtigt, um ihr Risiko für *carbon leakage* auf ein überschaubares Maß zu reduzieren, sowie die Option einer degressiven Beihilfe während des Ausgleichszeitraums.
Im Hinblick auf die Beihilfeintensität zeigen unsere Ergebnisse, dass der Mindestausgleich um alle als gefährdet eingestuften Sektoren auf das niedrigste Risikoniveau zu bringen, eine Beihilfeintensität von 75 % umfassen müsste. Bei einer Beihilfeintensität von weniger als 75 % wird das Risiko bei vier der zwölf gefährdeten Sektoren nur teilweise verringert.
Selbst nach einem Ausgleich in Höhe von 75 % tragen einige Sektoren indirekte Kosten, die mehr als 0,5 % ihrer BWS ausmachen (mit höheren CO_2-Preisen sogar mehr als 1,0 % und 1,5 % ihrer BWS). Für diese Sektoren könnte ein Kompensationsmechanismus mit einer Beihilfeintensität von 75 % in Verbindung mit einem weiteren zusätzlich gewährten Ausgleich geschaffen werden, um den Anteil der indirekten CO_2-Kosten an der BWS auf 0,5 % zu senken und damit ihr Risiko weiter zu verringern, ohne dass Sektoren, die bereits nach einem Ausgleich von 75 % einem niedrigen Risiko ausgesetzt sind, überkompensiert werden. Eine BWS-Obergrenze von 1 oder 1,5% könnte berücksichtigt werden.
Im Hinblick auf die Degressivität ist unsere Analyse für die meisten der untersuchten Sektoren nicht aussagekräftig, da für eine beträchtliche Anzahl von Sektoren keine Informationen vorlagen, und die Informationen für Sektoren, welche einem hohen Risiko für *carbon leakage* ausgesetzt sind, nicht abschließend waren.

Daher gibt es nicht genügend Belege, ob die Situation der Sektoren in den überarbeiteten Leitlinien für eine stabile Beihilfeintensität von 75 % oder eine degressive Beihilfeintensität spricht.

iii) **Der bei der Berechnung der Beihilfe herangezogene Emissionsfaktor** sollte der Weitergabe der EU EHS-Kosten auf die Strompreise in einer gegebenen Zone entsprechen. Unsere Analyse bringt uns zu dem Schluss, dass die heutige Methodik, basierend auf den CO_2-Anteil im Strom hergestellt durch thermische Kraftwerke, geeignet ist, und dass die Aktualisierung regionaler CO_2-Faktoren auf der Grundlage modifizierter geografischer Gebiete der beste Ansatz ist, um die tatsächliche Weitergabe der EU EHS-Kosten in die Strompreise in einer gegebenen Zone zu berechnen. Unsere Analyse der Preiskonvergenz deutet darauf hin, dass einige der bestehenden Zonen weiterhin relevant bleiben würden (so die iberische Halbinsel, Tschechien + Slowakei), während zwei neue Zonen in Betracht gezogen werden könnten; eine im Baltikum, sowie eine weitere als Erweiterung der bestehenden Zone in Tschechien und der Slowakei einschließlich Ungarn und Rumänien. Die Preiskonvergenz in der Zone Mittel- und Westeuropa und in der Zone Nordeuropa hat sich verringert.

1. Introduction – Context and objectives

Carbon leakage refers to a situation that may occur when, for cost-related reasons induced by climate policies – e.g. EU Emissions Trading Scheme (ETS) – businesses choose to transfer production to other countries which have laxer constraints on greenhouse gas emissions. Carbon leakage could eventually lead to an increase in total emissions as a result of increased emissions outside Europe.

In Europe, following the introduction of the ETS, industrial sectors deemed at a risk of carbon leakage have been compensated for direct emission costs with free ETS allowances since 2013 (Carbon Leakage List). On top of the compensation for direct emission costs, the 2012 ETS Guidelines allowed Member States to compensate some energy-intensive industries for the higher electricity costs resulting from the EU ETS, also called indirect emission costs. Under those Guidelines, thirteen sectors and seven subsectors[3] are currently eligible for State Aid and 12 Member States[4] have currently introduced compensation schemes for indirect emission costs.

The revised ETS Directive, which entered into force in 2018 for the next trading period 2021-2030 (Phase IV), has modified the methodology to determine sectors exposed to direct carbon leakage risk using the product of their trade intensity[5] and emission intensity as criteria for eligibility. The previous list required both factors to reach a certain threshold independently from each other. The new Carbon Leakage List was adopted in February 2019 and identified 50 sectors and 13 subsectors for Phase IV that will receive free allowances to compensate direct emission costs.

This list witnessed a significant reduction of the number of sectors compared with Phase III that included 153 sectors and 22 subsectors. However, the issue of carbon leakage risk due to indirect carbon costs for this new period remains to be addressed. The Commission is currently considering inter alia a revision of the eligibility criteria for indirect costs compensation as well as the calculation of the maximum aid amount.

In this context, ADE and Compass Lexecon (the Consortium) have been commissioned by the European Commission (EC) to provide support in the combined retrospective evaluation and prospective impact assessment study of the ETS State Aid Guidelines.

More specifically, the EC mandated the Consortium to provide support on the following:

- Data and information to the EC for the update on the retrospective evaluation of the 2012 Guidelines during the Phase III of EU ETS. For this phase of work, we:
    - identified factors explaining why certain Member States have or have not implemented compensation mechanisms for indirect emissions costs, targeting industries deemed at risk of carbon leakage;

[3] https://eurlex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:52012XC0605%2801%29

[4] However, for the purpose of this study, only the compensation schemes in 11 Member States have been analysed, as Poland introduced its compensation scheme in August 2019 after the beginning of the work of the Consortium.

[5] Trade intensity = (Imports from extra-EU + export to extra-EU) / (import from extra-EU+ turnover) all in value

- analysed, based on a literature review, whether the current compensation mechanism prevented carbon leakage during the Phase III; and
- critically reviewed the public consultation responses to inform the EC's assessment on the intervention during Phase III with a specific focus on the evaluation criteria: effectiveness, efficiency, relevance, coherence and EU added value.[6]

- A sector analysis and an assessment of other parameters to support the EC's impact assessment of different categories for determining eligible sectors and for the calculation of the maximum aid amount for the next trading phase. The sector analysis was performed with Sector Fiches for 41 sectors presented in Annex 1: List of sectors. We present the methodology used for the preparation of the Sector Fiches in the Section 3 of our report.

An inception report presenting detailed methodology and the approach for the evaluation work and the Sector Fiche analysis was validated by the EC on the 22nd of May. An intermediate report presenting our mid-term results was validated by the EC on the 12th of July. This methodology is presented in Annex 2: Methodology. Two versions of the draft final report were submitted on the 26th of August and the 10th of September which included our preliminary final results.

This final report takes into account the comments from the EC and presents the final results and conclusions that can be drawn from those to respond to the EC's questions as per the Technical Specifications of this study.

The first part of this report aims at providing information to the EC for the evaluation of the 2012 Guidelines over the Phase III of the EU ETS.

The second part of the report aims at presenting our work regarding sectoral eligibility and proportionality. This section aims at answering the following questions of the Technical Specifications:

- What sectors face a significant risk of carbon leakage due to the indirect costs of ETS?
- For sectors facing such a risk, how and to what extent can this risk be mitigated by receiving financial compensation from the State?
- For sectors that could benefit from such compensation, how much compensation would be needed to mitigate the risk?
- What competition distortions in the internal market can result from such financial compensation?

The report is structured as follows:

- Section 2 presents our final results on the evaluation workstream; and
- Section 3 presents our final results on the impact assessment workstream.

This final report is complemented with separate Annexes that include:

- the 41 Sector Fiches for each sector identified by the EC to be potentially at risk of indirect carbon leakage;

[6] These criteria are presented in the Tool #47 Evaluation criteria and questions : https://ec.europa.eu/info/sites/info/files/file_import/better-regulation-toolbox-47_en_0.pdf

- the memo on the literature review on carbon leakage due to indirect carbon costs;
- the memo on the Member States indirect cost compensation mechanisms;
- the memo on the public consultation responses; and
- the report on the emission factor.

2. Evaluation workstream

In this section, we present the results of the evaluation workstream that covers the ex-post evaluation of the EC policy on the indirect cost compensation as per the 2012 Guidelines during Phase III. We first present the scope of work for this activity and then the main conclusions from each memo. The memos prepared for this workstream are found as separate Annexes to this report.

2.1 Scope of work

The initial scope of work for the evaluation workstream was to provide information enabling the Commission to update Section 3.5 "*Support for indirect CO_2 costs*" and the literature review included in Section 3.4 "*Free allocation and carbon leakage*" of the evaluation report "*Evaluation of the EU ETS Directive*" published in November 2015[7] and commissioned by the EC in the context of the revision of the ETS Directive. The aim of this work was to help the EC in the evaluation of the 2012 Guidelines during Phase III.

After the initial meeting, the EC sent us on the 1st of April 2019 the structure of the new evaluation report and asked the Consortium to provide information, data, and a literature review enabling the update of Sections 4 and 5 of this new report:

- Section 4 aims at providing a transparent account of what has been done during the evaluation process of the policy implemented in Phase III. This part of the report also describes the sources used for the evaluation and the limitations encountered during the analysis.
- Section 5 aims at answering the evaluation questions. The objectives of Section 5 are to identify potential factors that led to the implementation or otherwise of the indirect cost compensation mechanism by some Member States. The report also aims at assessing the intervention during Phase III with a specific focus on the evaluation criteria: effectiveness, efficiency, relevance, coherence and EU added value.

We note that the Consortium was not asked to conduct the evaluation of the intervention as this is done by the EC team.

In order to support the EC in the evaluation work of the Guidelines, we have prepared three memos that provide inputs for Sections 4 and 5 of the evaluation work (literature review, data, and information from Member States and public consultation respondents) as follows:

- Memo on the literature review of carbon leakage;
- Memo on Member States implementation or otherwise of compensation schemes; and
- Memo on public consultation responses with a focus on the evaluation; criteria set out in Section 4 of the evaluation report.

We present in the following sections our work for each memo.

[7] Umweltbundesamt for the EC (November 2015), *Evaluation of the EU ETS Directive*, available here : https://ec.europa.eu/clima/sites/clima/files/ets/revision/docs/review_of_eu_ets_en.pf

2.2 Main conclusions from the three memos

In this section, we present the main conclusions from the three memos that addressed the needs of the EC on the evaluation workstream:

- Memo on the literature review on indirect carbon leakage that is used to update the literature review included in the previous evaluation report;
- Memo on the factors explaining implementation or otherwise of compensation schemes in Member States; and
- Memo on the summary of the public consultation responses with a focus on the evaluation criteria that will be used by the EC in the evaluation report of the 2012 Guidelines.

The three full memos are attached as separate Annexes to this report.

2.2.1 Conclusions from the memo on the literature review on indirect carbon leakage

In this sub-section, we present our conclusions regarding the literature review performed and presented in the memo "*Literature review on theory and evidence of carbon leakage*".

To provide economic reasoning for compensation and/or evidence of carbon leakage, in Section 3.4 of the report '*Evaluation of the EU ETS Directive: Support for the review of the EU Emissions Trading System*' published by the EC in November 2015, the EC conducted a literature review on the evidence of carbon leakage for Phase I and Phase II of the EU ETS. As a result of the literature review, the EC concluded that there was an absence of evidence of carbon leakage and that carbon leakage had not occurred in the first two phases of the EU ETS.

Our literature review analysis, attached to this report, is structured as follows:

- the first part of the memo introduces the context and objectives, defines the scope of the literature review, and discusses relevant factors that influence carbon leakage within the framework of EU ETS through academic research and publicly available reports by practitioners;
- the second part of the memo introduces potential carbon leakage channels, identified by literature and then, following the structure of EC's literature review, discusses recent findings on the evidence of carbon leakage; and
- the final section of the memo presents conclusions of the literature review.

In line with the previous EC conclusion, the results of the updated literature review suggest that, to date, there is no hard evidence of carbon leakage caused by EU ETS. However, this literature review is based on a limited set of studies available to date and several factors need to be considered before drawing final conclusions on carbon leakage.

First, many recent empirical studies still focus on the first two phases of EU ETS. The number of empirical studies with extension to Phase III is very limited and so far, no published study has explored the very recent period characterised by relatively high carbon prices. However, when more recent data is tested, some research shows that the impact of carbon pricing is more significant in this period. It remains to be seen whether future studies that would include the recent period with persistent higher carbon prices could find more significant impacts of carbon prices on industry competitiveness.

From the short-term competitiveness perspective, the lack of evidence of carbon leakage may have multiple explanations, ranging from over-allocation of emission allowances, persistent low carbon prices until mid-2017, some ability of firms to pass on additional costs, the relatively low share of energy costs in the EU compared with other regions, the effect of the existing anti-carbon leakage measures, to innovations stimulated by carbon regulation. All these factors may have safeguarded to some extent against negative impacts on competitiveness and carbon leakage. Additionally, other fundamental cost drivers, such as other components of the energy costs, labour costs as well as taxation, may have an offsetting or countervailing effect on firms' production decisions.

From the long-term competitiveness perspective, the lack of evidence through investment channels may be related to the time that such effects take to materialise. Indeed, investment cycles are typically long, and capital stock is long-lived in most industrial sectors, meaning that carbon leakage would only materialise at the moment of investment or reinvestment. Given that 14 years of experience of EU ETS is relatively short compared with the typical industrial capital stock life, the long-term carbon leakage effects may need to be assessed over a longer period of time and it may be too early to provide any definitive conclusion. Additionally, the lack of evidence of carbon leakage could also imply that the effects of EU ETS on altering investment decisions and on stimulating innovations cancel out each other, or that some of the other fundamental cost drivers, such as other components of the energy costs, labour costs as well as taxation, may have an offsetting or countervailing effect on firms' investment decisions.

Finally, the fact that carbon leakage did not happen in the past when carbon prices were relatively low does not mean that it will not happen in the future. In this context the recent increase of the ETS carbon price suggests that careful monitoring and additional empirical studies leveraging more recent data could provide different results toward the end of Phase III.

2.2.2 Conclusions of memo on Member States compensation mechanism implementation

We present in this sub-section a summary of our findings detailed in the memo on indirect carbon cost compensation schemes among Member States attached to this report.

Since 2013, compensation schemes for indirect costs have been implemented by some but not all Member States. In 2015 the EC conducted an analysis of the drivers for the implementation of compensation schemes in the five Member States that had then implemented a compensation scheme. The EC analysis could not identify a specific economic or market specific driver and concluded that these decisions were rather motivated by policy considerations.

The EC mandated our Consortium to (i) update the analysis performed by the EC in 2015 of the drivers for the implementation of such compensation schemes and (ii) include further analysis on the six additional Member States that have recently introduced a compensation mechanism.

The attached memo is structured in two sections.

In the first section of the memo, we test the hypothesis that market differences between Member States in the industry structure or in a range of other market factors, driving the effect of carbon prices on industry competitiveness, could explain a difference in compensation approach. We define several market parameters which are specific to each country in order to test our hypothesis. These market parameters include: electricity prices, the taxes and levies on electricity prices, the type of industries across

Europe, the industrial electricity consumption in different Member States, and the commercial patterns of each country. The parameters electricity prices, type of industries and industrial energy consumption were already used in the 2015 evaluation report. In order to have a more complete view of the situation in each Member State, we have added a specific focus on the evolution of taxes and levies related to electricity prices as well as a section on the commercial patterns of each country. We refer to these parameters as 'market characteristics'.

The conclusion from the first section is that the picture is mixed, and we cannot identify a clear correlation between certain market characteristics and the implementation of a compensation mechanism. Whilst for some Member States a causality link could be established between a particular market characteristic and the implementation of a compensation mechanism, for others with the same market characteristics, no correlation exists.

In the second section of the memo, we present the 'policy considerations' of Member States and summarise Member States' answers to the EC consultation regarding the reasons for implementing or otherwise a compensation scheme. The conclusions from the second section are as follows:

- Member States with existing schemes generally share the same policy objective, namely reducing the risk of carbon leakage for electro-intensive industries.
- Member States that plan to implement a compensation scheme for Phase IV of the ETS (2021-2030) provide two main reasons: i) an increasing need for the industry related to the recent increase in carbon prices, and ii) neighbouring markets implementing such a mechanism, including neighbouring markets outside the European Union which are therefore not impacted by carbon prices.
- Member States without existing schemes provide the following reasons: i) financial restrictions and choices, ii) lack of empirical evidence on the efficiency of such measures on carbon leakage, and iii) the compensation mechanism is inconsistent with the decarbonisation objectives of the EU ETS.

Our overall conclusion is that, although the industry structure and market characteristics could partly explain the reasoning behind implementation of compensation mechanisms in some of the Member States, we cannot infer a clear correlation between market characteristics and the compensation schemes. Indeed, the analysis of our memo reinforces the conclusion of the EU 2015 Evaluation, namely that policy considerations are the main driver of the choices of the Member States over whether or not to implement a compensation mechanism.

2.2.3 Critical review of the public consultation responses

In this sub-section, we present the findings of our memo regarding the public consultation responses.

In order to collect feedback and suggestions for revision of the 2012 Guidelines, the EC launched a public consultation in the beginning of 2019. This public consultation was structured in two parts: the first section contains 15 questions designed to evaluate the impact of the current Guidelines for Phase III. The second section (also containing 15 questions) aims at collecting public views about potential evolutions of the Guidelines for the next phase. The EC received 127 participant responses (the large majority of replies comes from business associations and companies – 86%; 6% of the replies come from public authorities and only 3% from NGOs; the remaining 5% of the replies comes from academia, trade unions, consumer organisations and EU citizens) to this public consultation.

The Consortium was mandated to critically review the first part of these public consultation responses and synthetize them. In the memo attached to this final report, we present this review which aims at evaluating the impact of the existing Guidelines.

We present our review of the public consultation responses in three categories: the positive impacts of the Guidelines, the criticisms that respondents put forward, and suggestions from market participants concerning eligibility and the compensation mechanism.

Most of the respondents acknowledge the positive impacts of the implementation of the 2012 Guidelines. Respondents consider that the indirect emissions cost compensations as enabled by the Guidelines were useful and helped European electro-intensive industries maintain their competitiveness.

A total of 75% of the respondents also indicate the advantage of having EU Guidelines compared with having only national measures without any guidance from the EC.[8] In addition, most of the respondents agree that administrative costs related to the compensation schemes are low.[9] The public consultation responses indicate that the Guidelines have not hindered the incentive for the industries to improve their energy efficiency: 57% of respondents state that the amount of compensation for indirect emission costs has not undermined the incentive for decarbonisation of the economy, while only 6% of the respondents say that it has.[10]

Most of the respondents deemed the Guidelines efficient in the mitigation of the carbon leakage risk which results in socio-economic benefits by preventing some electro-intensive companies from relocating outside Europe and therefore maintaining jobs in the EU.

As a nuance to this positive feedback, the respondents also point out the limitations of the existing scheme. These limitations focus on the residual carbon leakage risk that was not mitigated by the compensation scheme, especially in relation to 'investment leakage', and market distortions created by the compensation scheme.

From the responses collected, few specific examples of carbon leakage are provided[11], whereas the majority of the responses do not provide evidence for their statements. On top of those examples, many industries state that there is a significant lack of long-term investments in Europe driven by indirect emissions costs. However, it is challenging to isolate indirect carbon costs as a determining factor for the investment decisions as these take into account a number of factors such as demand growth in Europe as well as other drivers of competitiveness. According to the respondents, this 'investment leakage' would be the result of weak compensation levels as well as compensation unpredictability. Indeed, 40% of respondents claim that compensations for indirect costs have not been enough to prevent carbon leakage, and only 7% say that they have

[8] Question 14 of the public consultation

[9] Question 10 of the public consultation: Only 2% of the respondents say those costs are 'high' or 'very high'. These responses were received from market participants receiving a low amount of compensation.

[10] Question 7 of the public consultation

[11] E.g. a few cement industrials mentioned the same example: "*In October 2018, Cemex Spain announced the closure of its Gádor cement plant, which had been in operation since 1977*".

been sufficient.[12] Regarding the issue of unpredictability, the consultation responses point out that the source of that unpredictability comes from the aid intensity factor which is subject to changes following revisions of the Guidelines.

In addition, some of the respondents claim that the Guidelines may create market distortions between sectors, as well as between companies within the same sector but in different European Member States: 30% of respondents say that compensation of indirect emissions costs created market distortion.[13]

Intra-sectoral distortion refers to the situation when market distortions appear within the same sector as a result of different compensation mechanisms in European countries which can vary in their compensation levels and frequencies of payment. Many participants ask for harmonisation across Europe to reduce those distortions.
Some respondents mention that the inter-sectoral distortion (i.e. difference of compensation between substitutable sectors) generates distortion when downstream customers such as the construction sector favour a product that receives compensation rather than its substitute which does not.

Some of the characteristics and the design elements of the Guidelines (namely no 100% compensation and eligibility for compensation for only affected sectors) are criticised by many respondents, who suggest that the compensation scheme should have been set differently, especially regarding the eligibility criteria and the compensation level.[14]

With regards to the eligibility criteria, many of the respondents are of the view that additional sectors should have been included in the eligibility list such as cement, non-ferrous metal, refined petroleum products and starch.
When it comes to the compensation level, some of the respondents state that the level is not accurately set to avoid carbon leakage because of the degressive aid intensity factor, the benchmark chosen, or the fact that it is based on historical production. Some industries say that the compensation cannot be fully effective unless it compensates 100% of the indirect costs. However, there is no evidence presented that would have quantitatively assessed the optimal level of compensation which makes it challenging to demonstrate the need for full compensation.

Suggestions regarding alternative calculations of compensation are made. Some industries suggest capping the share of indirect emission cost over the Gross Value Added and therefore compensating sectors to reduce this share to the cap (requested by the steel sector).[15]

Finally, a number of additional considerations were made regarding the Guidelines on the specific issue of power purchase agreements (PPAs). Many respondents consider that the exclusion of PPAs that do not include CO_2 costs from the scheme make renewable PPAs less attractive as some Member States have excluded these from their compensation scheme in their interpretation of the Guidelines. Some respondents insist that renewable PPAs pricing is linked to market prices and includes emission costs, and therefore should receive compensation. The responses also mention that a similar issue also affects electricity cogeneration.

[12] Question 5 of the public consultation
[13] Question 6 of the public consultation
[14] 48% of respondents consider the calculation formulas do not effectively compensate. In fact, many do not criticize the compensation formula but contest the eligibility rule.
[15] A system which equalizes the indirect cost as a percentage of GVA after compensation between undertakings.

3. Impact assessment workstream

In this section, we first present the scope of work for the impact assessment. Second, we detail our conclusions on the three tasks covered in this workstream: i) eligibility; ii) aid intensity and degressivity, and iii) the emission factor.

The 41 Sector Fiches and the memo on emission factor are provided as separate Annexes to this report.

3.1 Scope of work

With the work conducted and the results outlined in this report, we aim to present answers to the following questions, set by EC:

- What sectors face a significant risk of carbon leakage due to the indirect costs of ETS?
- For sectors facing such a risk, to what extent can this risk be mitigated by receiving financial compensation from the State?
- For sectors that could benefit from such compensation, how much compensation would be needed to mitigate the risk?
- What competition distortions in the internal market can result from such financial compensation?

In our analysis we assess four aspects of the 2012 Guidelines:

1. the eligibility criteria, which considers which sectors identified as potentially at risk of indirect carbon leakage should be eligible for compensation for indirect carbon costs;
2. the aid intensity level, which considers the level of compensation to give to eligible sectors in order to reduce their risk of carbon leakage to a manageable level;
3. the degressivity parameter to be applied to the aid intensity during Phase IV; and
4. the emission factor to be used in the calculation of the aid amount, representing the pass-through of carbon costs into electricity prices.

Several questions have been set by the EC, which mandated the Consortium to address them as part of the impact assessment workstream listed under Section 4.1 of the Technical Specifications.

We have conducted sectoral analyses presented in the format of a Sector Fiche for each of the 41 sectors identified as potentially at risk of indirect carbon leakage, presented in Annex 1: List of sectors. We have answered the questions listed by the EC for each of the sectors within the Sector Fiche by providing analyses under four categories: market characteristics, profit margins, abatement potential and fuel and electricity substitutability. To perform the assessment of the sectors, we have relied on independent sources and developed a database using Eurostat data (all data used in the data base are presented in Annex 12: CL Eurostat database).

With our memo on the emission factor, we assess the calculation of the relevant emission factor to be used in the calculation of the aid amount for the revision of the 2012 Guidelines.

In the sections below, we present our analysis on eligibility, aid amount and degressivity, as well as the emission factor.

3.2 Eligibility criteria

In this sub-section, we present our assessment regarding the eligibility criteria.

3.2.1 Methodology for evaluation the eligibility through Sector Fiches

In order to assess the eligibility criteria, the EC developed a list of questions to support the analysis. We have answered these questions for each sector through the Sector Fiches. They include our independent research as well as our data from the CL Eurostat database presented in Annex 12: CL Eurostat database. The EC questions are:

1. Are there particular market characteristics of the sector putting it at risk of carbon leakage due to indirect ETS costs?
2. To what extent are undertakings in the sector already passing or able to pass higher energy costs on to their customers?
3. What are the profit margins of EU undertakings in the sector, as a potential driver for long-run investment or relocation decisions?
4. To what extent is there a scope for energy efficiency investments in the sector? Would these incentives be distorted by granting compensation for indirect ETS costs and if so, how?
5. To what extent are the products of the sector substitutable with other products (inter-sector competition), the producers of which may be eligible for indirect cost compensation?
6. How significant is the risk of competition distortions in the sector if not all of the relevant Member States were to grant compensation for indirect costs or if they do so to a different degree?
7. To what extend do undertakings in the sector differ as regards their share of direct versus indirect emissions in their production processes? In particular: are undertakings in the sector using different production technologies which lead to a situation where some undertakings face a higher share of indirect ETS costs (electrification of production processes) compared with direct ETS costs?
8. Based on the information gathered, please indicate, especially from the questions above, which sectors are most exposed to carbon leakage?

Sector Fiche presentation

The approach proposed by the EC is to perform the impact assessment of the underlying parameters (eligibility, aid intensity, and degressivity) on a sector-by-sector basis.

For each sector, we produced a Sector Fiche that: i) assesses the risk of indirect carbon leakage using a Red Amber Green (RAG) assessment[16], and ii) determines the adequate maximum aid amount for this sector. We have also considered if there was enough evidence to plead for a degressivity principle in the Guidelines. The eligibility criteria and aid amount are expected to balance the EU objectives of minimising the risk of carbon leakage and of competition distortions within the EU, as well as maintaining the incentives for businesses to reduce their indirect emissions.

[16] In the RAG assessment, Red indicates a high risk of carbon leakage due to indirect carbon costs, Amber-Red a medium-high risk, Amber a medium risk, whilst Green indicates a low risk of carbon leakage and Green-Amber represents a low-medium risk.

For each Sector Fiche, we have analysed the data provided by sectors through the targeted consultation[17] which we have cross-checked with our Eurostat database. The list of responses received from sectors is provided in Annex 13: Responses received from sectors. We have also conducted independent research using publicly available sources as well as interviews with certain sectors to critically assess their statements regarding their eligibility and level of compensation required. For each interview with the sectors contacted, a representative of the Commission was present.

We have first assessed the data provided by the sectors, evaluating the robustness of the data by checking data sources (e.g. official sources like Eurostat are deemed to be of high quality), then the representativeness of the data in terms of sector coverage and geographical scope. Finally, we checked the periods covered by the data to ensure that it can be used for the impact assessment of the future ETS Guidelines for Phase IV.

For each of the 41 sectors identified by the EC, we have prepared a specific Sector Fiche that first assesses the risk of carbon leakage faced by the sector and therefore makes it eligible to receive a compensation for indirect costs and second, assesses the adequate level of aid that the sector should receive.

To assess the sector's risk of carbon leakage stemming from indirect ETS costs, and therefore the eligibility of the sector, we have analysed the risk of the sector by four categories, for which we assess a number of parameters:

- **Market characteristics**: in this category we assess the extent to which producers can pass on cost increases to customers, and in particular the ability to pass on higher electricity costs. We also refer to existing and future trading patterns, assessing parameters such as the bargaining position of the sector, the price taker position, and trading patterns.
- **Profit margins**: in this category we assess the current and future profitability of the sector in the EU ETS area. Under this category, we assess parameters such as current and future demand, output price, costs, investment, business demography of the sector and substitutability with other products. We also consider the feasibility of relocation for the sector.
- **Abatement potential**: in this category we assess the scope for energy efficiency investments in order to reduce electricity consumption in the sector. Under this category, we assess parameters such as current electricity consumption, international benchmarks and current and future adoption of Best Available Technologies (BAT).
- **Fuel and electricity substitutability**: in this category we assess the ability of the sector to shift from fossil fuel energies to electricity and evaluate if there is a risk that differences in treatment between direct and indirect cost compensation may hinder the energy-efficient electrification of the sector.

For each sector, we have analysed whether the evidence regarding the future adoption of BAT that allows the sector to reduce its electricity consumption in the future is sufficient to plead for a degressivity principle in the Guidelines.

[17] From 13 February 2019 to 9 April 2019, the Commission ran a targeted consultation to gather information enabling for the determination of the sectors exposed to carbon leakage risk due to indirect emission costs. The questionnaire is published on the DG Competition's consultation website: https://ec.europa.eu/competition/consultations/2019_ets_guidelines/index_en.html

We have conducted sensitivities around the carbon price with a Low scenario at 15€/tCO_2, a Baseline scenario at 25€/tCO_2, and a High scenario at 35€/tCO_2. We consider how the overall RAG rating, determining the risk of carbon leakage of a sector, changes under a High scenario of carbon prices. To determine how the risk changes we evaluate how the risk under the profit margins category changes since carbon prices do not have an impact on market characteristics and only a limited impact on the abatement potential of a sector.

Answers to questions from the EC regarding sectoral eligibility

As per the list of EC questions listed under 3.2.1, the answers have been provided as follows:
For Questions 1 and 2, responses have been provided in the Sector Fiche under the market characteristics category.

For Question 3, responses have been provided in the Sector Fiche under the profit margins category.

For Question 4, responses have been provided in the Sector Fiche under the abatement potential category. When data was available, comment was made on the fact that future compensation might create distortion.

For Question 5, responses have been provided in the Sector Fiche under the market characteristics and profit margins categories.

Question 6 was not covered in the Sector Fiche as it does not address the risk of carbon leakage of each sector but rather the risk of market distortions intra-EU as a result of different compensation mechanism implementations among the Member States. On this question, most sectors in the targeted consultation point out that the main risk of competition distortions arises between EU and non-EU players rather than between installations within the EU that would not receive the same compensation. In particular, non-ferrous metals (copper, aluminium, lead, zinc, etc.) emphasise this point given their products are traded on global markets (e.g. the LME). These responses indicate that the risk of competition distortions in the sector due to different levels of compensations is not perceived as significant.

Some sectors indicate that the risk of competition distortions within the EU could be mitigated when companies have multiple installations across the EU. Some sectors for which most of the trade is conducted at the EU level advocate a harmonisation of the compensation system across the EU in order to guarantee a level playing field between installations. The refined petroleum and fertiliser sectors insisted on the risk of market distortion in their sectors.

For Question 7, responses have been provided in the Sector Fiche under the fuel and electricity substitutability category.

For Question 8, within each Sector Fiche, we provide a RAG rating of their overall risk of carbon leakage: Green for low risk, Green-Amber for low-medium risk, Amber for medium risk, Amber-Red for medium-high risk, and Red for high risk.

The overall RAG rating of the sector derives from the four underlying RAG ratings of each category identified above (market characteristics, profit margins, abatement potential, fuel and electricity substitutability). A summary of the RAG ratings is provided in Table 1.

The category of fuel and electricity substitutability relates to the ability of certain sectors to shift from fossil fuel energies to electricity. In our analysis we have treated this category differently as the ability to shift to electricity does not put a sector at risk of carbon leakage per se. The sectors at risk are for example those that have no ability to reduce their electricity consumption or cannot pass through costs, or those that face increasing competition from cheaper import products.

In order to take into account this specificity, we develop the following methodology: if the RAG score is higher than Green for the fuel and electricity substitutability, then the overall RAG rating generated in the other three categories (market characteristics, profit margins, abatement potential) will be increased to a higher score reflecting a higher risk of carbon leakage.

3.2.2 Results regarding the eligibility criteria

In this part of the section, we provide the results of our impact assessment workstream in terms of the eligibility criteria.

First, we provide a background of the eligibility criteria in the context of the 2012 Guidelines, and then in relation to Carbon Leakage List 2021-2030. Second, we present our results summarised in Table 1. Finally, we compare our assessments with the responses received from the public consultation.

Based on the Sector Fiche work, we present in this section the results on the eligibility for compensation of the sectors considered for analysis and compare those results with the indirect carbon leakage indicator (ICLI).[18]

Background on eligibility criteria used for 2012 Guidelines

As specified in the 2012 Guidelines, to be eligible for compensation for indirect carbon costs, a sector must meet the following criteria:

- trade intensity[19] > 10%; and
- indirect emission intensity[20] >5%.

There is a possibility for sectors that do not meet those criteria to be eligible after a qualitative assessment if they meet one of the following conditions:

- borderline sectors with indirect emission intensity between 3% and 5% and trade intensity > 10%; or
- sectors with information missing; or
- sectors insufficiently represented.

As a result of those criteria, 13 sectors and 7 subsectors as listed in Annex II of the 2012 Guidelines were eligible for compensation for Phase III.

[18] This list of sectors was established using the criteria used by the DG CLIMA for the newly adopted Carbon Leakage List but applied only for indirect emissions –(. ICLI) corresponds to the product of trade intensity and indirect emission intensity.
[19] Trade intensity = (Imports + Exports) / (Turnover + Imports)
[20] Indirect emission intensity = Indirect emissions / GVA

Background eligibility criteria used for Carbon Leakage List 2021-2030

As part of the revision of the EU ETS Directive in 2018, a new methodology for the eligibility criteria used for the compensation of direct emissions was established for Phase IV (2021-2030).

To be eligible for compensation, a sector must meet the following criteria:

- trade intensity * emission intensity[21] > 0.2.[22]

A qualitative assessment can be considered if:

- the product of the trade intensity and emission intensity is above 0.15; or
- the emission intensity is above 1.5.

Results

In Table 1 below, we present the results of our Sector Fiche work in terms of risk rating: i) the overall RAG rating based on the four underlying criteria; ii) the overall RAG rating under a High carbon price scenario and iii) the overall RAG rating before taking into account the fuel and electricity substitutability criteria.

In our analysis, we consider that a sector is at risk of carbon leakage due to indirect carbon costs if its overall RAG rating is equal or above medium.

Those three RAG ratings are compared with the ICLI.
This table allows us to:

- consider the degree of risk of carbon leakage of each sector;
- estimate the impact of higher carbon prices on the risk of carbon leakage of the sector;
- consider if there is a risk of creating a barrier to energy-efficient electrification of the sector if no compensation for indirect carbon costs is granted to sector (by comparing the overall RAG rating before and after taking into account the fuel and electricity substitutability criteria); and
- compare the risk rating of the sector with the ICLI metric.

The ICLI metric focuses on two main criteria: the trade intensity and the indirect emission intensity. Each of these criteria aims at capturing a specificity of the sector that could indicate a risk of carbon leakage:

- the trade intensity criteria indicates the level of trade for the sector between the EU and countries outside the EU. This criteria aims at selecting sectors with strong exposure to international markets and thus identifying the ones that should be exposed to significant competition from countries outside EU not exposed to the EU ETS charges. Therefore, the sector could be at risk of carbon leakage because of this strong competition from abroad; whereas

[21] Emission intensity= Direct emission intensity+ Indirect emission intensity where direct emission intensity= direct emissions/ GVA.

[22] In Phase III, to be eligible for direct emissions compensation, a sector had to comply with the following both criteria:

- Trade intensity > 10%; and
- Emission intensity > 5%.

In Phase IV, the product of the two criteria above is considered rather each separate criterion.

- the indirect emission intensity indicates if the sector has significant exposure to indirect carbon costs and therefore could be at risk of carbon leakage due to these additional costs.

The multiplication of these two factors tends to identify the sectors with exposure to both international markets and indirect carbon costs or at least to one of these factors.

We therefore compare the results of our risk assessment with the ICLI to evaluate the merits of this indicator.

Table 1: Comparison of different scenarios with the eligibility results

NACE code	Sector name	ICLI	RAG rating	RAG rating under high carbon scenario	RAG rating before fuel and electricity substitutability
14.11	Manufacture of leather clothes	1.147	**Medium-high**	**Medium-high**	**Medium-high**
24.42	Aluminium production	1.062	**Medium-high**	**High**	**Medium-high**
20.11	Manufacture of industrial gases	0.917	Low-medium	**Medium**	Low-medium
20.13	Manufacture of other inorganic basic chemicals	0.732	**Medium-high**	**Medium-high**	**Medium-high**
24.43	Lead, zinc and tin production	0.62	**Medium-high**	**Medium-high**	**Medium-high**
17.11	Manufacture of pulp	0.521	**Medium-high**	**Medium-high**	**Medium-high**
07.29	Mining of other non-ferrous metal ores	0.474	Low-medium	Low-medium	Low-medium
08.99	Other mining and quarrying n.e.c	0.438	Low-medium	Low-medium	Low-medium
07.10	Mining of iron ores	0.423	Low-medium	Low-medium	Low-medium
17.12	Manufacture of paper and paperboard	0.412	**Medium**	**Medium-high**	**Medium**
24.10	Manufacture of basic iron and steel and of ferro-alloys	0.363	**Medium**	**Medium**	**Medium**
20.17	Manufacture of synthetic rubber in primary forms	0.337	Low-medium	Low-medium	Low-medium

24.51	Casting of iron	0.295	**Medium**	**Medium**	**Low-medium**
20.60	Manufacture of man-made fibres	0.282	Low-medium	Low-medium	Low-medium
19.20	Manufacture of refined petroleum products	0.267	**Medium**	**Medium**	**Medium**
24.44	Copper production	0.25	**Medium**	**Medium**	**Medium**
20.16	Manufacture of plastics in primary forms	0.246	**Medium**	**Medium**	**Medium**
05.10	Mining of hard coal	0.244	Low-medium	Low-medium	Low-medium
13.10	Preparation and spinning of textile fibres	0.244	Low	Low	Low
24.45	Other non-ferrous metal production	0.241	**Medium**	**Medium**	**Medium**
23.31	Manufacture of ceramic tiles and flags	0.225	Low	Low	Low
20.12	Manufacture of dyes and pigments	0.218	Low	Low	Low
13.95	Manufacture non-wovens and articles made from non-wovens, except apparel	0.213	Low	Low	Low
23.14	Manufacture of glass fibres	0.208	Low	Low	Low
27.20	Manufacture of batteries and accumulators	0.198	Low	Low	Low
20.14	Manufacture of other organic basic chemicals	0.191	Low	Low	Low

10.62	Manufacture of starches and starch products	0.176	Low	Low	Low
20.15	Manufacture of fertilisers and nitrogen compounds	0.175	Low	Low	Low
10.41	Manufacture of oils and fats	0.164	Low	Low	Low
23.43	Manufacture of ceramic insulators and insulating fittings	0.164	Low	Low	Low
27.31	Manufacture of fibre optic cables	0.164	Low	Low	Low
08.91	Mining of chemical and fertiliser minerals	0.163	Low	Low	Low
11.06	Manufacture of malt	0.162	Low	Low	Low
16.21	Manufacture of veneer sheets and wood-based panels	0.162	Low-medium	Low-medium	Low
23.11	Manufacture of flat glass	0.15	Low	Low-medium	Low
21.10	Manufacture of basic pharmaceuticals products (prodcom 21.10.20.10 & 21.10.20.20)[23]	0.143	Low	Low	Low
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	0.137	Low	Low	Low

[23] The ICLI is calculated at the NACE code level and not at the prodcom level.

23.51	Manufacture of cement	0.135	Low-medium	Low-medium	Low-medium
10.81	Manufacture of sugar	0.083	Low	Low	Low
08.93	Extraction of salt	0.071	Low	Low	Low
05.20	Mining of lignite	0.052	Low	Low	Low

The table above shows that the ICLI appears to be a relevant indicator to determine exposure to indirect carbon leakage risk based on the following observations:

- below 0.2, there are no sectors deemed at risk (RAG ratings equal or above medium) based on the overall RAG rating; and
- out of the twelve sectors deemed at risk, seven sectors deemed at medium risk have an ICLI between 0.2 and 0.5, and the remaining five deemed at medium-high risk have an ICLI above 0.5.

However, this metric presents some limitations considering that between 0.2 and 0.5, the picture is more mixed, with a possibility that compensation based on the ICLI metric will overcompensate sectors deemed at low risk of carbon leakage:

- Six sectors deemed at low risk of carbon leakage (low and low-medium RAG ratings) have an ICLI between 0.2 and 0.25.
- Five sectors with a low-medium RAG rating have an ICLI between 0.25 and 0.5 (no sector with a low RAG rating has an ICLI above 0.25).
- One sector with a low-medium RAG rating has an ICLI above 0.5.

These limitations of the ICLI metric could be explained by the fact that this factor tends to overestimate the risk of the sectors with high trade intensity (which could sometimes be related to exports and not imports) but with low exposure to indirect carbon costs.

For example, the following sectors would be overcompensated when using the ICLI factor as a metric for eligibility:

- 20.12 Manufacture of dyes and pigments, which is deemed at low risk in our analysis, has an ICLI at 0.218 driven by a high trade intensity at 48.5% (while indirect emission intensity is at 0.449 $kgCO_2$/EUR).
- 08.99 Other mining and quarrying n.e.c, which is deemed at low-medium risk in our analysis, has an ICLI of 0.438 driven by a high trade intensity at 173.3% (while indirect emission intensity is at 0.253 $kgCO_2$/EUR).
- 05.10 Mining of hard coal, which is deemed at low-medium risk in our analysis, has an ICLI of 0.244 driven by a high trade intensity at 62.1% (while indirect emission intensity is at 0.390 $kgCO_2$/EUR).

Based on the Sector Fiche analysis, we consider that the indirect carbon intensity has a more important impact in the determination of indirect carbon leakage risk than the trade intensity (this is especially the case when the trade intensity is high and therefore there is a risk of relocation). Some sectors with high trade intensity can be net exporters of their products from EU to extra-EU countries and therefore have a limited risk of carbon leakage related to international competitiveness. At the same time, the indirect emission intensity clearly identifies the additional costs that are borne by the sector due to the implementation of the ETS mechanism.

The limitations of the ICLI metric (risk of overcompensation of sectors at low risk of carbon leakage and under compensation of sectors with some degree of risk of carbon leakage) show that a more complete analysis that would include more parameters, as conducted in our analysis, would better estimate the risk of carbon leakage of sectors. However, parameters such as the cost pass-through rate as well as the potential for reduction of electricity consumption, are more complicated to gather in a uniform and quantitative way for a high number of sectors. Therefore, a methodology for eligibility criteria based on an extended number of parameters also presents limitations.

When considering the sensitivity scenarios for the carbon price, our results show that under a High carbon price scenario, only four sectors see their overall RAG rating increase, and for only one sector – manufacture of industrial gases – does the rating go from a low level (RAG rating equal and/or below low-medium) to a high level of risk

(RAG rating equal and/or above medium). For the manufacture of flat glass, the overall RAG rating goes from low to low-medium, for the manufacture of paper the overall risk goes from medium to medium-high, and finally for the aluminium production sector, the overall RAG rating increases from medium-high to a high rating.
It seems that, even under a High scenario, the ICLI metric is still a relevant metric for assessing the risk of carbon leakage due to indirect costs.

Our results also show the limited impact of the fuel and electricity substitutability criteria on the overall RAG rating. When comparing the overall RAG rating before and after inclusion of this criteria, we see that it only increases the risk of one sector (manufacture of veneer sheets and wood-based panels) from low to low-medium. The reason for the low impact derives from the fact that for the majority of sectors, the level of risk on the fuel and electricity substitutability criteria is deemed low due to low variability between undertakings in the sector based on their gas and electricity consumption in their production processes.

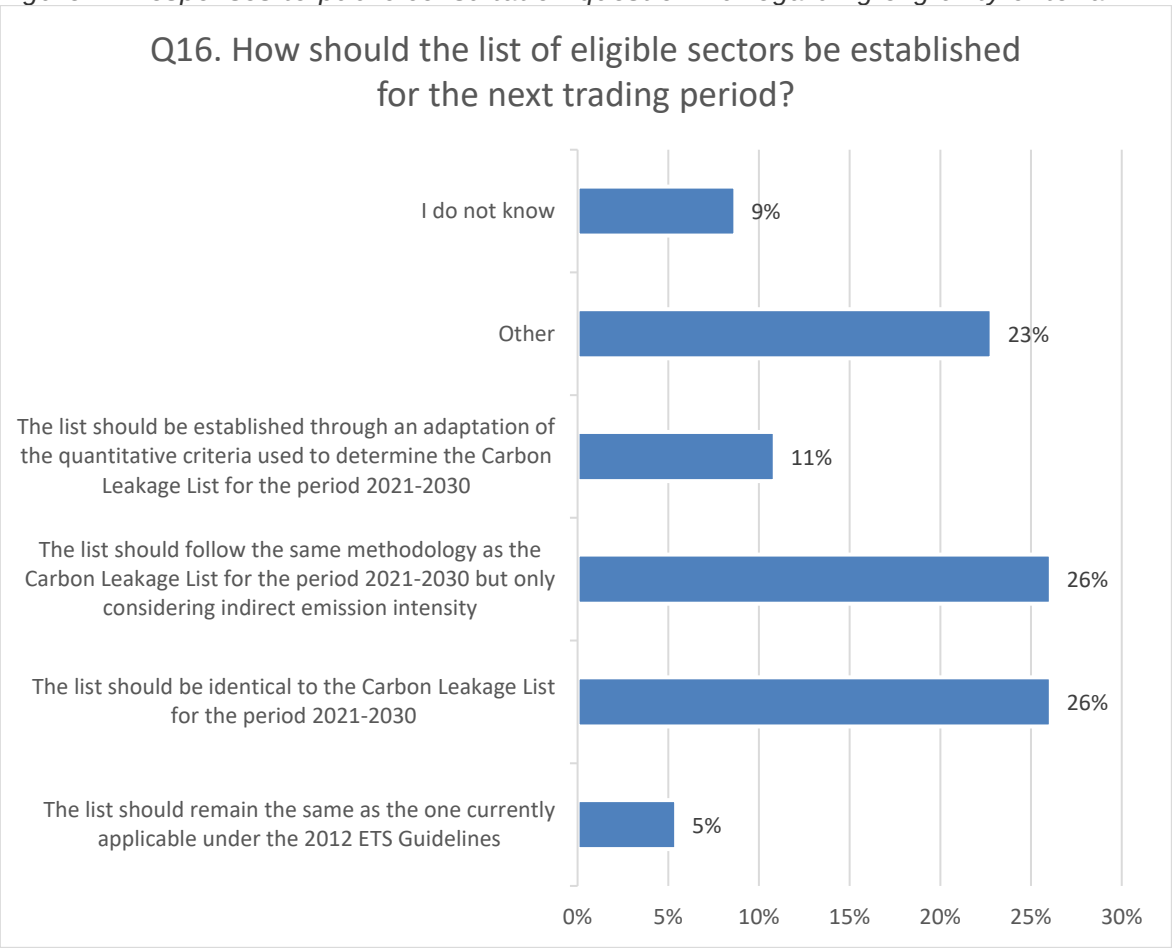
Our results demonstrate that in scenarios before the inclusion of fuel and electricity substitutability the ICLI metric is still a relevant metric for assessing the risk of carbon leakage.

Comparison with the public consultation responses

In the final step of our analysis we compare our assessments with the responses received from the public consultation and assess where there is a divergence with our results.

Question 16 of the public consultation considers the eligibility criteria and Figure 1 below shows the result of the responses to this question: "*How should the list of eligible sectors be established for the next trading period?"*

Figure 1: Responses to public consultation question 16 regarding eligibility criteria



Source: CL analysis based on public consultation responses.

As shown in Figure 1 above, respondents have selected as the highest preference the two options below:

- the list should be identical to the Carbon Leakage List for 2021-2030; and
- the list should follow the same methodology as the Carbon Leakage List for 2021-2030 but only considering indirect emission intensity.

The responses from the public consultation seem to be aligned with the conclusions of our analysis, showing that using the ICLI (the same methodology as the Carbon Leakage List for 2021-2030 but only considering indirect emission intensity) to assess the risk of indirect carbon leakage would be appropriate.

3.3 Aid intensity and degressivity parameters

In this section, we address the conclusions of our analysis regarding the aid intensity and degressivity parameters.

3.3.1 Methodology for the evaluation of the aid intensity and degressivity parameters in the Sector Fiches

In order to assess the aid intensity and degressivity parameters for Phase IV, the EC developed a list of questions to support the analysis to which we have answered for each sector through the Sector Fiche, and through a separate GVA analysis.

The EC questions are the following:

9. Depending on the sector's overall market characteristics, how much compensation of indirect ETS costs would be necessary to address the carbon leakage risk?
10. How would 100% indirect ETS costs compensation for the whole period affect the sector's incentives for energy efficiency investments? Would it be sufficient to base the compensation on efficiency benchmarks such as the ones used for the 2012 ETS Guidelines to maintain these incentives?
11. How would 100% indirect ETS costs compensation affect the risk of competition distortions between different undertakings, i.e. due to the fact that some Member States would be able to grant compensation whilst other may decide to grant no compensation or due to the gap between the treatment of sectors offering substitutable products?
12. Please consider how a degressive indirect ETS cost compensation starting at 75% as in Phase III would affect:
    a. The risk of carbon leakage in the sector?
    b. The sector's incentives for energy efficiency improvements?
    c. The risk of competition distortions between different undertakings, e.g. due to the fact that some Member States would decide to grant compensation whilst others may decide to grant no compensation or due to the gap between the treatment of sectors offering substitutable products?
13. Based on the situation of the sector concerned, what is the likelihood that efficiency gains will be possible on top of the efficiency benchmarks? Please indicate how the sector could increase efficiency.
14. Based on the overview of all sector studies, what are the merits of modulating the aid intensity based on the different sectors' trade intensity?
15. Based on the overview of all sectors analysed, what are the merits of limiting the total amount of indirect ETS costs to be sustained by the beneficiary based on a certain percentage of the beneficiaries' GVA in order to address a particularly high carbon risk in a limited number of sectors?

Sector Fiche analysis

As presented in the previous section on eligibility for compensation, we have developed a methodology for assessing the risk of carbon leakage using a RAG rating based on the RAG scores of four criteria – market characteristics, profit margins, abatement potential, and fuel and electricity substitutability – giving an overall RAG rating of the carbon leakage risk without financial compensation.

Our methodology determines what the minimum level of compensation required to bring the risk to the lowest level (i.e. to a RAG rating equal to green) is. In order to assess the level of aid, we evaluate how the RAG rating for each category changes under the

three different levels of compensation tested (baseline 75%, below 75%, and higher than 75%).

Given the new individual RAG ratings for each category estimated under those different levels of compensation, we are able to assess a new overall RAG rating for the sector using the same methodology used to determine the risk of carbon leakage before financial compensation.

As explained in the previous section, we have also conducted sensitivity analysis around the carbon price, with Low, Baseline and High scenarios, respectively at 15, 25, and 35€/tCO_2. Under those sensitivity scenarios:

- First, we estimate how the carbon leakage risk of the sector changes considering the change in the RAG rating of the profit margins category and eventually in the overall RAG rating.
- Second, given the new RAG rating of the profit margins category under a High carbon price sensitivity scenario, we estimate how the risk is reduced under all levels of compensation.
- Third, we evaluate the overall RAG rating of the sector for each of those levels. In this way we are able to determine the minimum level of compensation required to reduce the risk to the lowest level under a High sensitivity scenario for carbon prices.

In our analysis we consider for each sector the possibility of future BAT related to the electricity consumption that would allow the sectors to reduce their consumption during Phase IV. Based on the outcome of the abatement potential category, we determine if a degressivity principle should be envisaged in the future Guidelines.[24]

We thus only consider the category abatement potential and the risk of each sector in this category to determine if there is enough evidence to plead for a degressivity principle in the Guidelines.

Answers to the questions from the EC regarding aid intensity and degressivity

As per the list of EC questions listed under 3.3.1 the answers have been provided as follows:

For Question 9 responses have been provided in each Sector Fiche under the maximum aid amount compensation section and the main conclusions of this sector analysis are provided in the section 3.2.2 below.

For Question 10 in the Sector Fiche we only assess the possibility for further energy efficiency investments over the next years and not the impact of the compensation on the incentives to invest in energy efficiency. To answer this question, we therefore evaluate the responses provided by the sectors in the targeted consultation (question 9). Full answers are provided in Annex 4: Responses to targeted consultation question 9.

All the sectors which submitted a response argue that energy efficiency incentives should be separated from the level of compensation. The respondents noted a number of arguments to support this point:

- It is in the sectors' own interest to invest in energy efficiency as it is necessary to maintain their competitiveness.

[24] If the RAG rating for the abatement potential category is equal or above medium, then the situation of the sector does not plead for a degressivity principle in the revision of the Guidelines.

- There is a risk that sectors will not invest in energy efficiency measures as they will not have the financial resources to do so.
- Higher carbon costs related to EU ETS is actually a barrier for decarbonisation measures including electrification.
- Certain sectors point out as evidence that energy efficiency investments were still performed during the last period even when sectors received compensation.

Similar to the level of compensation, most sectors seem to view the efficiency benchmarks as separate from the incentives to invest in energy efficiency investments and argue that restrictive benchmarks reduce their compensation and thus limit their potential for investments.

With regard to Question 11, we analyse sectors' replies to question 10 of the targeted consultation. Full responses are provided in Annex 5: Responses to targeted consultation question 10.

Responses received were very similar to the responses to question 6 of the consultation and presented in the eligibility section above.

The majority of sectors do not see 100% compensation as increasing the risk of competition distortions between different undertakings as they mostly see the risk of competition distortions between the EU and extra-EU countries.

For the sectors, reducing the level of compensation would only increase the risk of carbon leakage. Some sectors also point out that a reduced level of compensation would rather increase the risk of inter-sectoral market distortion rather than intra-sectoral for sectors with substitutable products.

For Question 12, we analyse the responses received to questions 11, 12, and 13 of the targeted consultation. Full answers for those questions are presented respectively in:

- Annex 6: Responses to targeted consultation question 11;
- Annex 7: Responses to targeted consultation question 12; and
- Annex 8: Responses to targeted consultation question 13.

All sectors view the degressivity principle as a factor that could increase the risk of carbon leakage given that the reduction in compensation would reduce the competitiveness of the sectors. Some sectors argue that they cannot pass on higher electricity costs to their customers.

Similar to the responses received to question 9, the majority of sectors do not see the degressivity principle as an incentive for energy efficiency investments. On the contrary they argue that any reduction in the level of compensation would worsen the competitiveness of the sectors and therefore lead to increased risk of carbon leakage. For certain sectors, energy efficiency measures require capital funding that would be reduced with degressive aid. For others, those investments would already take place whether or not degressive aid was received.

We note that only two sectors (manufacture of sugar and manufacture of malt) indicated that a degressive parameter would intensify the adoption of electrification and energy efficiency measures.

As expressed in responses to questions 6 and 9 of the targeted consultation, the majority of sectors advocate for full compensation and therefore view degressive aid as increasing the risk of market distortions with extra-EU countries. This is the risk of competition distortions that matters the most to sectors rather than the intra-EU market distortions. In particular, for the metals sectors such as copper, lead, zinc, etc, products

are exchanged on global markets and therefore competition is at a global level rather than at an EU level.

Most respondents therefore do not directly address the risk of intra-EU market distortions in relation with the degressivity parameter.

Question 13 is answered in each Sector Fiche in the abatement potential category. We also consider the responses received to question 14 of the targeted consultation. Full answers are provided in Annex 9: Responses to targeted consultation question 14 of this report. The possibility for further efficiency gains on top of the efficiency benchmarks is specific to each sector. A number of sectors point out that the likelihood of further efficiency gains is linked to the economic and technical feasibility of additional investments in energy efficiency.

Some sectors argue that some decarbonisation strategies lead to higher electricity consumption.

A number of sectors indicate that technologies are already mature and therefore, apart from a breakthrough technology, they do not see the possibility of further energy efficiency measures.

Question 14 is addressed in question 15 of the targeted consultation. Full answers are provided in Annex 10: Responses to targeted consultation question 15, of this report. Most sectors do not see the trade intensity parameter as a relevant parameter for assessing the risk of carbon leakage and therefore for modulating the aid intensity with the sectors' trade intensity.

For most sectors, the most relevant factors are the market characteristics (in particular the ability to pass through costs, the profit margins and the abatement potential).

Some sectors point out that there is no legal basis to modulate the aid intensity with the trade intensity.

We note that two sectors (manufacture of dyes and pigments, and manufacture of basic pharmaceutical products) see the trade intensity as the most relevant criteria for the indirect carbon cost compensation.

In order to answer question 15, we first analyse the responses given from the sectors to question 18 of the targeted consultation (full answers are provided in Annex 11: Responses to targeted consultation question 18). We have also performed a GVA analysis – for the aid intensity modulated on the beneficiary's GVA – and we have only conducted an analysis on the GVA based on the sectors' responses which indicated that modulating aid intensity with GVA was a pertinent approach, rather than the trade intensity.

This choice is confirmed by the responses to the targeted consultation (question 15) presented above. Indeed, the trade intensity considers both imports and exports and does not allow us to determine if these exchanges are 'hurting' the sector or not, leading to carbon leakage. Only a deep analysis as performed in the Sector Fiches allows the assessment of such a risk. Most responses received to question 18 of the targeted consultation indicate that there is little merit in modulating the compensation with the beneficiaries' GVA apart from the non-ferrous metals sector, which considers this approach the most relevant one for compensating. The Environmental and Energy State

Aid Guidelines (EEAG) [25] example is also given to demonstrate the effectiveness of such a measure.
Arguments put forward against this approach are:

- a high GVA for a sector does not correlate with a high risk of carbon leakage, as the GVA indicator is not an indicator for carbon leakage risk;
- there is difficulty in collecting data and accurately estimating GVA; and
- GVA fluctuates with economic cycles.

GVA analysis

In this part of the section we present our methodology for our GVA analysis that considers the merits of compensating sectors with an aid intensity linked to the GVA of the beneficiaries.

In our exercise, we decide not to apply such a modulation to all sectors. We are of the view that the method will only be efficient if we focus on the sectors at the highest risk of carbon leakage due to indirect carbon costs, namely the sectors with a high share of carbon leakage over GVA after compensation.
In order to apply this principle, we decide to analyse the impact of the following compensation in this section:

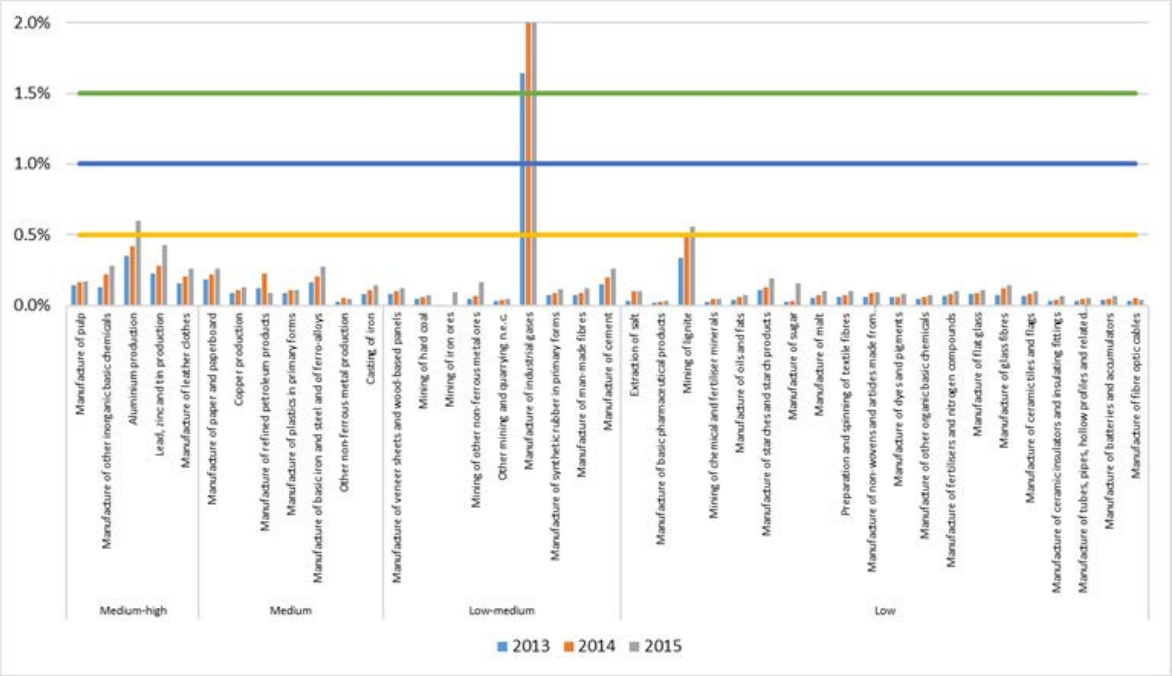
- all sectors at risk will be compensated at 75%; and
- if the indirect carbon costs after the compensation are higher than 0.5% of the sector's GVA, additional compensation will be provided to the sector to reduce the share of indirect carbon costs to 0.5% of the GVA.

The 0.5% cap was provided by Eurometaux in its response to the consultations, sourced from the EEAG. In our analysis below, we also consider a GVA cap set at 1% and 1.5%.

The first part of our analysis aims at identifying the number of sectors that would be impacted by such a measure. In Figure 2 below, we show the indirect carbon costs borne by each sector as a percentage of the GVA after receiving compensation at 75% for the historical period 2013-15.

[25] OJ C 200 of 28.6.2014, p.1

Figure 2: Indirect emission costs borne as a share of GVA after 75% compensation – 2013/15



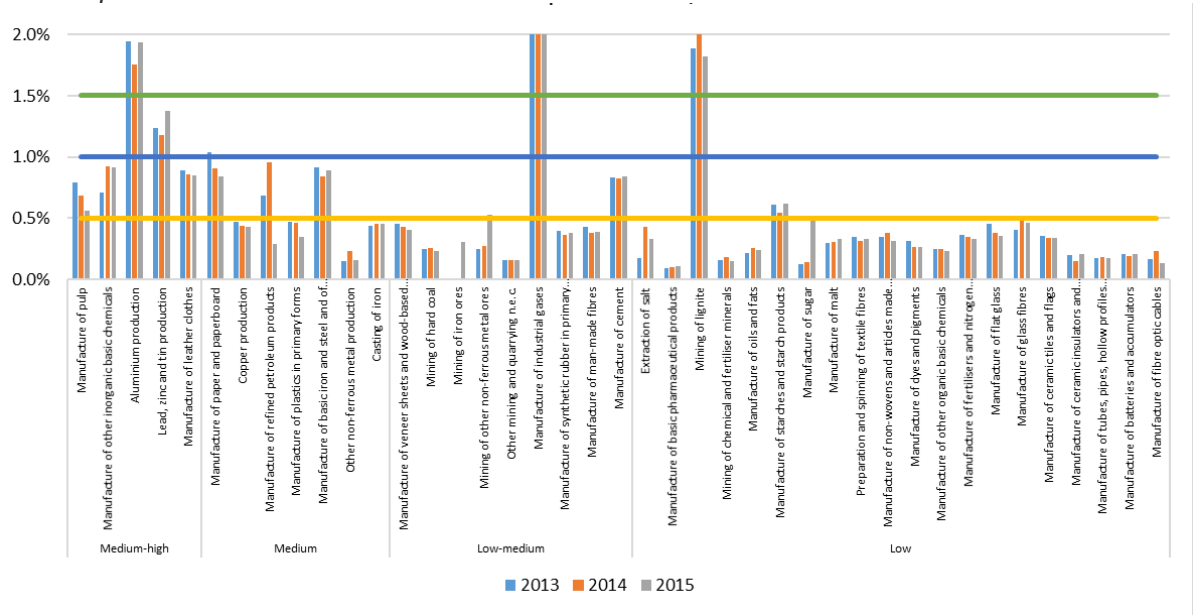
Notes: The following calculation was performed: ((1-75%) x Indirect emissions in tonnes of CO_2 x historical carbon price) / GVA.
Source: CL analysis based on DG CLIMA data.

We compare the indirect carbon costs as a share of the GVA borne by the sector after a 75% compensation with the 0.5%, 1% and 1.5% caps mentioned above. We see in Figure 2 that only a small number of sectors bore indirect costs representing a higher amount than 0.5% of their GVA after compensation over the period 2013-15. These sectors were aluminium production, mining of lignite and manufacture of industrial gases. And only one sector, the manufacture of industrial gases, has a share of indirect carbon costs higher than 1% of GVA after compensation (and also 1.5%).

However, this graph also indicates that the total indirect carbon costs borne as a share of GVA are very different from one sector to the other, as mentioned by Eurometaux in its answer.

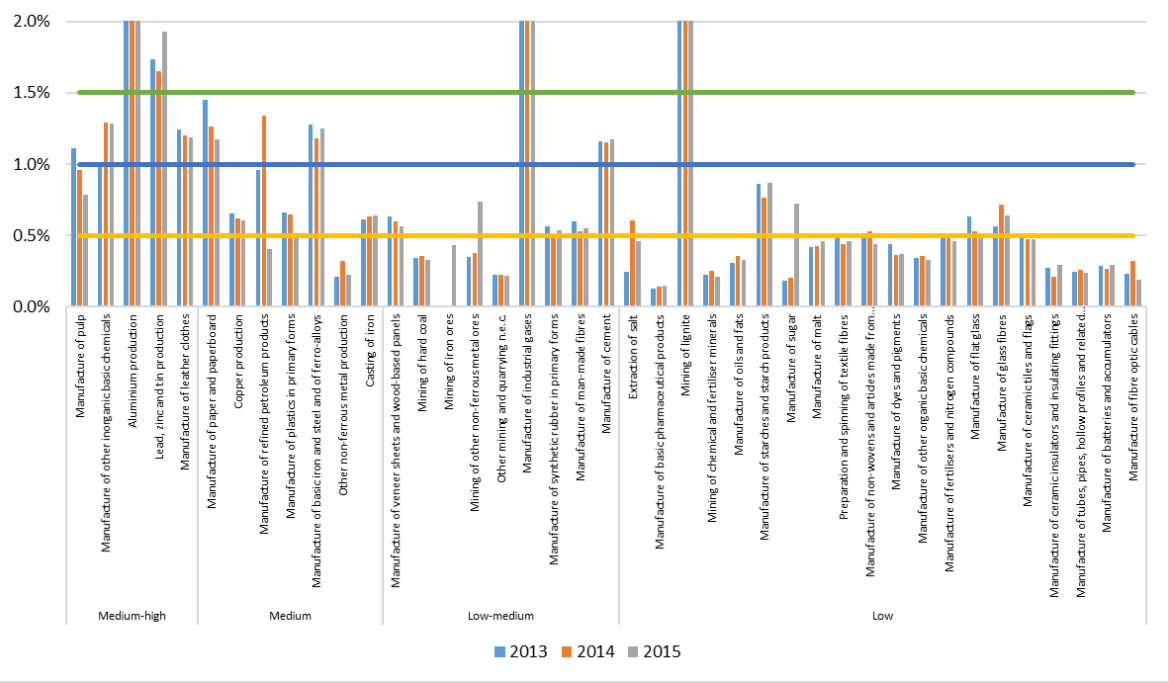
The situation will be different with a higher carbon price. We perform the same analysis but with a carbon price respectively at 25€/tCO_2 (representing the current market level) in Figure 3 and at 35€/tCO_2 in Figure 4 below.

Figure 3: Indirect carbon costs as a share of GVA borne after a 75% compensation with carbon price at 25€/tCO₂



Notes: The following calculation was performed: ((1-75%) x Indirect emissions in tonnes of CO_2 x 25€/tCO_2) / GVA.
Source: CL analysis based on DG CLIMA data.

Figure 4: Indirect carbon costs as a share of GVA borne after a 75% compensation with carbon price at 35€/tCO₂



Notes: The following calculation was performed: ((1-75%) x Indirect emissions in tonnes of CO_2 x 35€/tCO_2) / GVA.
Source: CL analysis based on DG CLIMA data.

With a carbon price at 25€/tCO_2, our analysis indicates that 15 sectors bear a share of indirect carbon costs higher than 0.5% of their GVA after compensation, including 9

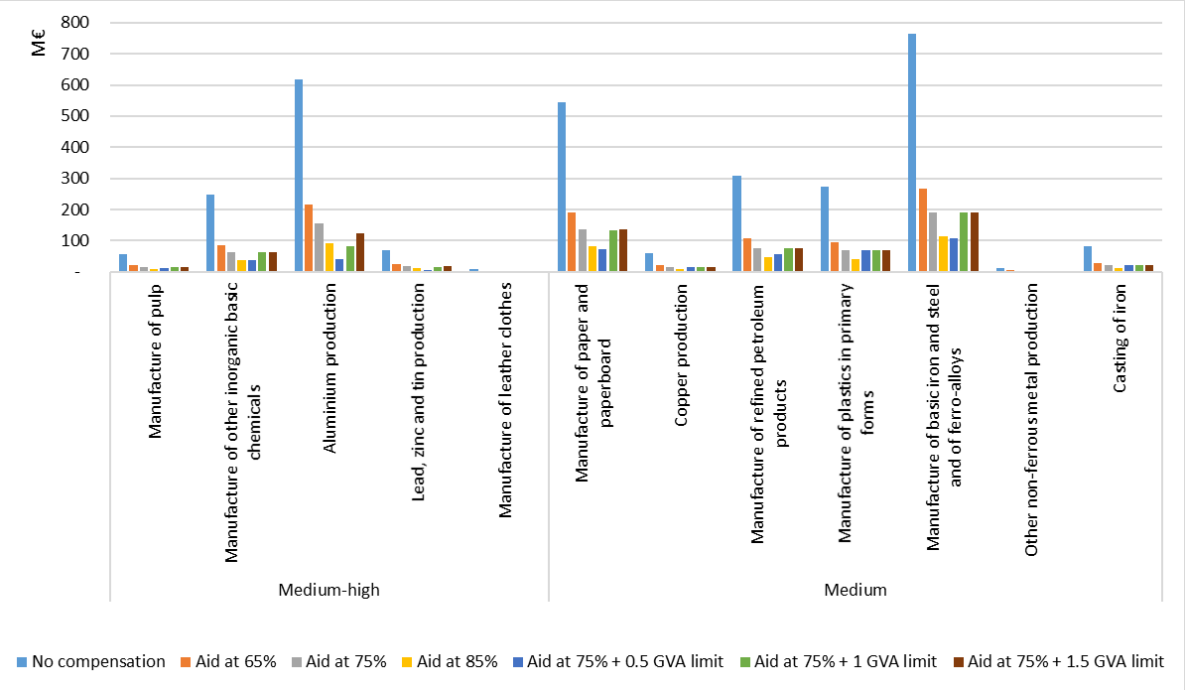
sectors at risk (RAG rating equal and above medium) according to our analysis presented in the previous section. Five sectors have a share of indirect carbon costs higher than 1.0% of GVA, including three sectors at risk. Finally, three sectors have a share of indirect carbon costs higher than 1.5% of GVA, including only one sector at risk, which is the aluminium production sector.

With a carbon price at 35€/tCO_2, our analysis indicates that 27 sectors bear a share of indirect carbon costs higher than 0.5% of their GVA after compensation, including 11 sectors at risk (RAG rating equal and above medium) according to our analysis presented in the previous section. Eleven sectors bear a share of indirect carbon costs higher than 1% of their GVA, including eight sectors at risk. Finally, four sectors bear a share of indirect carbon costs higher than 1.5% of their GVA, including two sectors at risk.

Figure 3 and Figure 4 indicate that a mechanism that would compensate the indirect carbon costs above 0.5% of GVA (after a 75% compensation) could be relevant especially given the current carbon market prices. A higher GVA cap, for example at 1.0% could also be relevant in the context of higher carbon prices as it would limit the impact of high carbon prices while limiting the financial compensation amount (compared with a lower GVA cap). This additional financial compensation would reduce the disparities between sectors as presented in the graphs above.

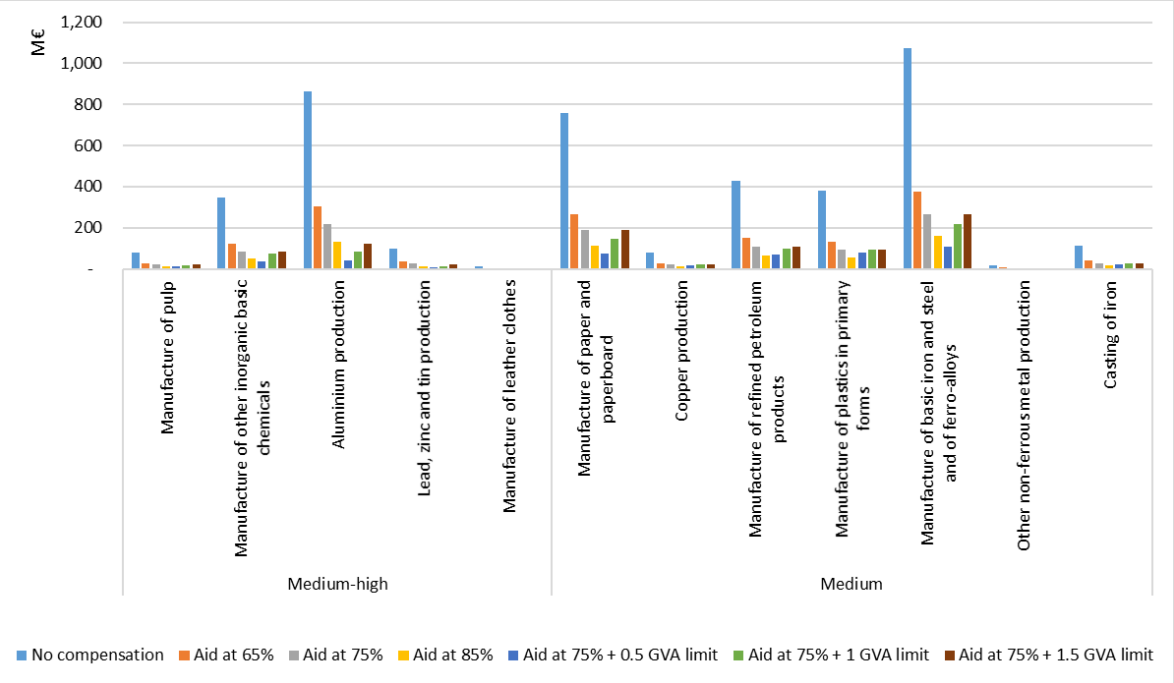
In Figure 5 and Figure 6 below, we present the impact of different compensation mechanisms on the annual indirect carbon costs borne by sectors that could benefit from the compensation mechanism i.e. sectors at risk in our analysis and with indirect carbon costs after 75% compensation higher than 0.5%, 1.0% and 1.5% of their GVA.

Figure 5: Annual indirect costs borne by the sector under different compensation mechanisms considering a carbon price at 25€/t



*Notes: The calculation is based on the average indirect carbon costs over the period 2013-2015. The following calculation was performed: Indirect emissions in tonnes of CO_2 x 25€/tCO_2 x (1-XX% aid compensation allowed). For the case of the aid at 75% + Y% GVA limit, we subtract from the indirect emissions costs borne by the sector under an aid at 75%, a cost surplus calculated as: (Indirect cost with 75% aid/GVA – Y%*GVA) x GVA.*
Source: CL analysis based on DG CLIMA data.

Figure 6: Annual indirect costs borne by the sector under different compensation mechanisms considering a carbon price at 35€/t



*Notes: The calculation is based on the average indirect carbon costs over the period 2013-2015. The following calculation was performed: Indirect emissions in tonnes of CO_2 x 35€/tCO_2 x (1-XX% aid compensation allowed). For the case of the aid at 75% + Y% GVA limit, we subtract from the indirect emissions costs borne by the sector under an aid at 75%, a cost surplus calculated as: (Indirect cost with 75% aid/GVA – Y%*GVA) x GVA.*
Source: CL analysis based on DG CLIMA data.

As shown in Figure 5, the cap at 0.5% of the GVA would reduce the amount of indirect costs borne by the sectors compared with a scenario with compensation at 75%, but has less impact than compensation at 85% for most of the sectors under a scenario with a carbon price at 25€/tCO_2. For almost all sectors, if the GVA cap is increased to either 1.0% or 1.5%, then the effect of the compensation is similar to an aid intensity at 75%.

However as shown in Figure 6, under a higher level of carbon prices at 35€/tCO_2, for seven sectors considered, an aid at 75% + 0.5% GVA would provide better compensation than an aid intensity at 85%. Particularly under high carbon prices, we notice that the spread between the indirect carbon costs borne after compensation at 85% and 75%+0.5% GVA deepens compared with the spread under current carbon prices.

This is because the compensation that caps the amount of indirect carbon costs borne to 0.5% GVA is not correlated with carbon prices and provides a more reliable shield against higher levels of carbon prices. For example, for the aluminium production sector, under a carbon price at €25/tCO_2, the sector receives €52 million more with an aid intensity at 75%+0.5% GVA, compared with an aid intensity at 85%, while under a carbon price at €35/tCO_2, the sector receives €89 million more under the aid intensity at 75%+0.5% GVA compared with the aid intensity at 85%.

A GVA cap equal to or higher than 1.0% shows similar result to an aid intensity at 75% under a carbon price at €35/tCO_2.

We conclude that a compensation mechanism that provides extra compensation to limit the indirect carbon costs share to 0.5% of GVA (after compensation at 75%) would be particularly relevant for sectors at high risk under high carbon prices and would therefore further reduce the risk of carbon leakage of those sectors exposed to high indirect carbon costs as a share of GVA. This would be without overcompensating sectors that are already at low risk under compensation at 75% (which would be the case under compensation at 85%). A higher GVA cap would be less effective as it would compensate a smaller number of sectors, but it would be more cost efficient.

3.3.2 Results of the evaluation of the aid intensity and degressivity parameters

In this part of the section, we evaluate the aid intensity and degressivity parameters.

Conclusions on aid intensity

In the 2012 Guidelines, an aid intensity parameter was set at the beginning of Phase III at 85% (and gradually decreased to reach 75% at the end of the period). We assess the following aid intensity scenarios that could be applied for Phase IV:

- aid intensity of 75%;
- aid intensity lower than 75%;
- aid intensity higher than 75%; and
- aid intensity modulated on beneficiary's GVA.

Under the different aid intensity scenarios, we looked at how the risk of carbon leakage of sectors deemed at risk was reduced and therefore assess which level of aid intensity was most effective in reducing the risk.

Based on our analysis under a compensation below 75%, out of the twelve sectors considered at risk (RAG rating equal and above medium), all the sectors see their risk reduced in various degrees, four sectors see their risk partially reduced to low-medium, one sector see its risk reduced to medium, and seven sectors see their risk reduced to the lowest level.

Under a compensation aid at 75%, all the sectors deemed at medium-high risk will see their risk reduced to the lowest level.

Our results therefore show that the minimum level of aid to bring the sectors deemed at risk of carbon leakage to the lowest level is compensation with an aid intensity set at 75%.

A compensation aid above 75% would also be effective in reducing the risk of carbon leakage but there is a risk of overcompensation and therefore this level of aid intensity would not be cost-efficient.

We note that for some sectors, even after a compensation level at 75%, the share of indirect carbon costs over GVA would still be higher than 0.5%. This means that even if all sectors present a low level of risk under a 75% compensation, the situation of sectors can vary and our analysis with categories of risk under a RAG assessment is not granular enough to capture the different degrees of risk.

There is therefore merit in considering a compensation level at 75% with an extra compensation that would bring the share of indirect carbon costs to 0.5% of GVA for those sectors. This type of compensation would only target specific sectors, which avoids the risk of overcompensation and could increase the effectiveness of the compensation

mechanism by further reducing the carbon leakage risk for those sectors that face a high share of indirect carbon costs over their GVA.

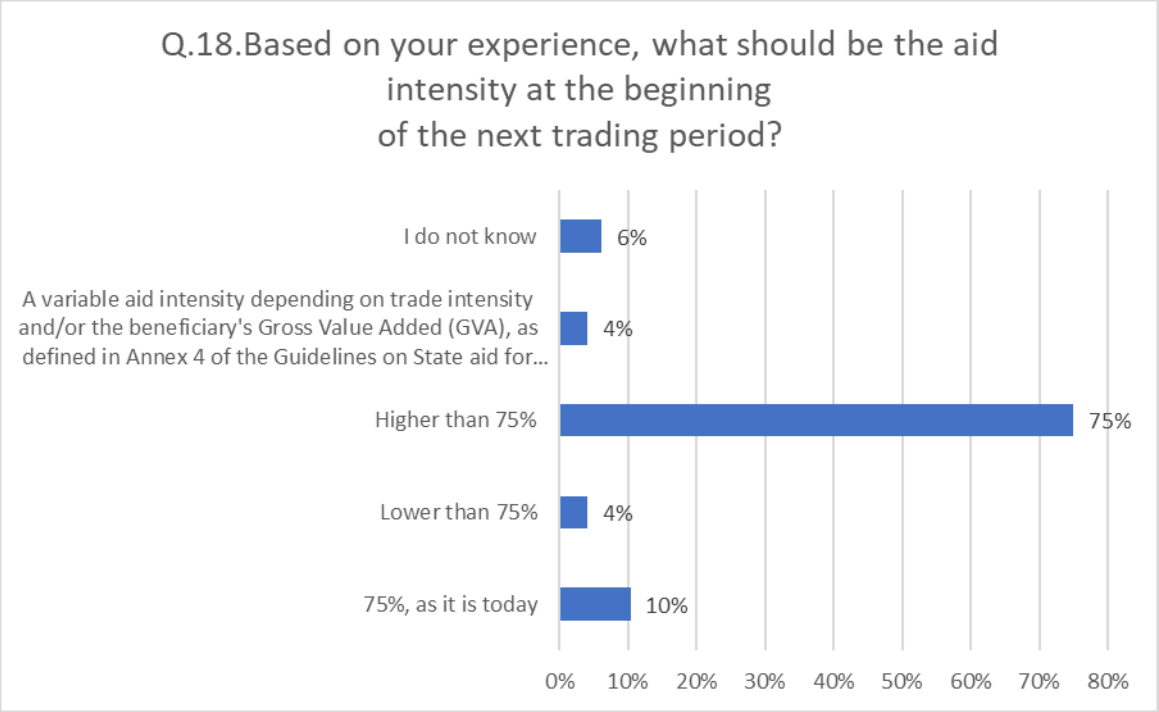
Under a High carbon price scenario at 35€/tCO_2, only one sector (manufacture of industrial gases) goes from low-medium to medium risk. Under this scenario, the level of compensation required to reduce the risk to the lowest level will increase to 75%. For the other three sectors for which the level of risk increased under a High carbon price scenario, the level of compensation required to bring the risk to the lowest level remains the same as under the current situation.

Comparison with the public consultation responses

We also consider the responses received from public respondents to the consultation question 18: "*Based on your experience, what should be the aid intensity at the beginning of the next trading period?*" to inform our conclusions on the aid intensity parameter.

Figure 7 below shows the responses received for question 18.

Figure 7: Responses to public consultation question 18



Source: CL analysis based on public consultation responses.

Based on Figure 7, we infer that the majority of respondents advocated a higher than 75% aid intensity, which is consistent with the responses to the targeted consultation received from the sectors. Only 4% of respondents advocated a lower than 75% compensation or a compensation modulated to trade intensity and/or GVA.

Conclusions on degressivity

In the 2012 Guidelines, a degressivity principle was included and brought the aid intensity from 85% to 75% at the end of Phase III. The EC has asked the Consortium to consider the following degressivity options to be applied for Phase IV:

- stable aid intensity; and

- degressive aid intensity.

The degressivity principle can be envisaged given the efficiency benchmarks calculated at the beginning of the next trading period are not time-sensitive and could avoid overcompensating certain sectors that will manage to reduce their electricity consumption beyond the benchmarks during the next period. Therefore, in our analysis, we considered that the situation of a sector pleads for a degressivity principle if the sector has potential to reduce its electricity consumption, i.e. if the risk on the abatement potential was low (RAG rating at low or low-medium). When the RAG rating of the abatement potential category is equal or above medium then it means that there is limited possibility for the sector to reduce its electricity consumption in the next ten years. Therefore, the situation does not plead for a degressivity principle in the revision of the 2012 Guidelines.

Our analysis shows that out of the 41 sectors, only two sectors show clear evidence that could plead for a degressivity principle in the Guidelines. We could not conclude for 32 sectors due to insufficient evidence, and for 7 sectors the evidence pointed to not applying a degressivity principle for Phase IV.

When assessing the five sectors at medium-high risk, only one sector shows clear evidence that could plead for a degressivity principle in the Guidelines. We could not conclude for two sectors due to insufficient evidence, and for the remaining two sectors the evidence pointed to not applying a degressivity principle for Phase IV.

Out of seven sectors considered at medium risk, we could not conclude on the degressivity principle for five sectors, and for the remaining two sectors, our results indicated that the situations of the sectors did not plead for a degressivity principle in the revision of the 2012 Guidelines.

Comparison with the public consultation responses

We also consider the responses received from public respondents to the consultation question 19: "*Based on your experience, should the aid intensity be degressive over the next trading period?*" and compare them with our results.

Figure 8 below shows the responses received to question 19.

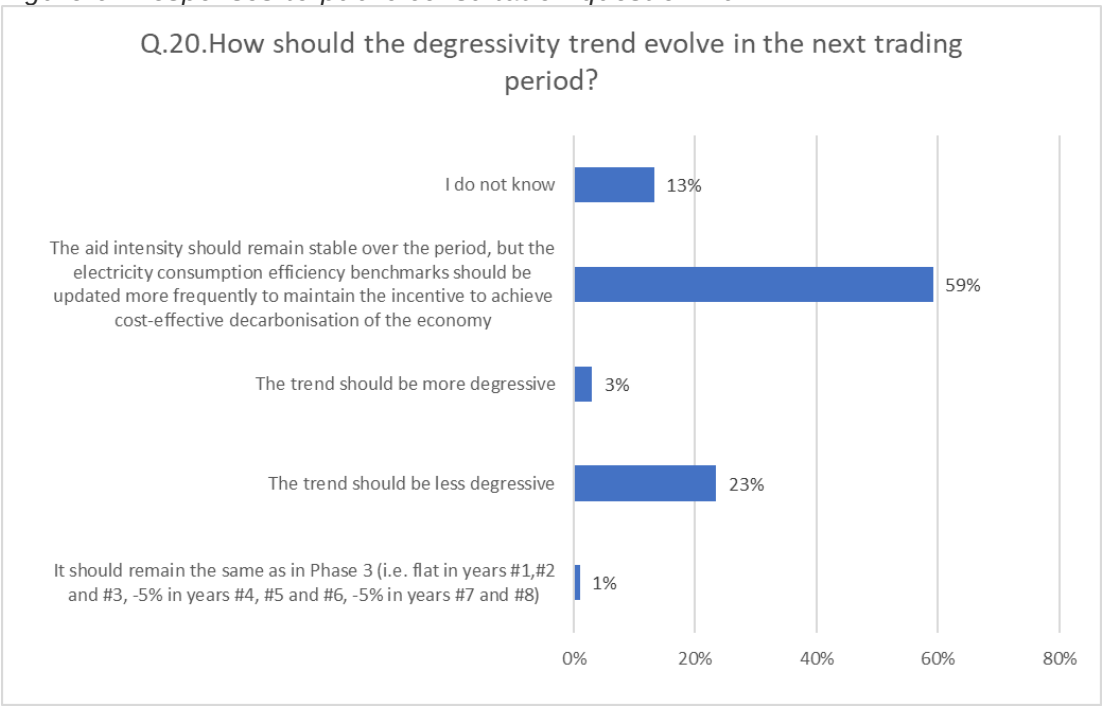
Figure 8: Responses to public consultation question 19

Source: CL analysis based on public consultation responses.

As shown in Figure 8 above, a clear majority of respondents advocated for no degressivity for the next trading period. This response is also consistent with the sectors' response to the targeted consultation.

Figure 9 below shows the responses received to question 20: "*How should the degressivity trend evolve in the next trading period?*"

Figure 9: Responses to public consultation question 20



Source: CL analysis based on public consultation responses.

As shown in Figure 9 above, a majority of respondents advocated a stable intensity but also indicated that efficiency benchmarks should be updated more frequently to maintain incentives to achieve decarbonisation objectives. This position differs from the responses received from the sectors which support a stable aid intensity but noted that efficiency benchmarks were not a parameter that played a role in the sectors' incentives to be more energy efficient.

The responses to both the targeted and public consultations are aligned with our conclusions which show that for a majority of sectors at risk, we either cannot conclude, or the situation of the sectors did not plead for a degressivity principle.

3.4 Emission factor

In this section, we present the conclusions of our analysis on the emission factor to be considered for the calculation of the aid amount for the revision of the 2012 Guidelines.

We present in this sub-section the conclusions from our analysis on the emission factor. The full report is provided as a separate Annex to this final report.
The EC developed a list of questions to support the analysis. The questions are the following:

16. Under the 2012 ETS Guidelines the CO_2 factors are calculated for specific regions which are established based on the criterion of market coupling. Have these regions changed based on the current stage of development of the EU electricity market and if so, how? Please also consider forecasts of future market coupling.
17. To what extent has market coupling led to price convergence throughout the coupled area? Is there evidence to claim that all installations in the coupled area incur the same carbon costs?
18. Based on the calculation method used for the 2012 ETS Guidelines, what would be the relevant CO_2 factors for each of the regions identified under question 16 above, taking into account the increased amount of carbon-free generation in the regions, in particular RES?
19. What would be the relevant CO_2 factors if the calculation was carried out at national level?
20. Would a calculation of CO_2 factors at national level adequately reflect the market circumstances in the EU electricity market as regards the carbon price content of electricity sold in different EU Member States?
21. What would be the relevant CO_2 factor if the calculation was carried out at EU level?
22. How would a calculation of CO_2 factors at EU level reflect the market circumstances in the EU electricity market as regards the carbon content of electricity sold in different EU Member States?
23. Would it be feasible to improve the simplified marginal approach and determine the CO_2 factors not by referring to the general electricity mix of a given area but by analysing who has been the actual marginal generation plant in the relevant market as observed over the entire year-1? If so, please provide such CO_2 factors for a sample of representative Member States (i.e. Member States with both a high and a low share of renewables in their energy mix).

3.4.1 Conclusions of memo on emission factor

The 2012 Guidelines define the maximum amount of compensation based on a formula aiming at replicating the indirect costs incurred by industrial companies. This formula includes an emission factor representing the share of an increase in carbon prices that is passed on through power prices.

The memo on emission factor is structured in three sections:

- Section 1 is the introduction to the report;
- Section 2 reviews available evidence and public consultation responses regarding the determination of the relevant market for the emission factor calculation; and
- Section 3 considers the methodology to derive the emission factor – in particular the question of whether a move to a methodology based on the actual marginal generation plant in a given market would be appropriate and feasible. It also provides an update of the emission factor calculation based on the 2012 Guidelines geographic areas and determines what the

emission factor would be for national or EU-wide areas, using the most recent data.

In the second section of the report, our analysis based on power price convergence points to the relevance of maintaining some of the 2012 ETS Guidelines geographical areas – perhaps with the introduction of a new region in the Baltics, or the extension of the Czech Republic and Slovakia region to a wider region including Hungary and Romania (the 4M Coupled region).

The evolution of power price convergence for the next ETS trading phase depends on several factors, including: cross-border capacity additions, availability of capacity for day-ahead market coupling, electricity mixes and internal bottlenecks.

We note that Member States and public consultation responses have validated the approach of selecting ETS geographical zones based on price convergence and therefore the methodology used in the report.

Based on our price convergence analysis, our results show that only some of the 2012 Guidelines geographical zones would still be relevant for the next trading phase, which are the Iberia and the Czech Republic + Slovakia zones considering the 2012 Guidelines threshold for price convergence.

The price convergence of the Central and Western Europe (CWE) and Nordic zones has decreased.

Our results show that two changes could be considered for the revised geographical zones: i) a potential new zone for the Baltics which shows price convergence above 73% of the time in 2018, ii) and an extension of the Czech + Slovakia zone to the 4M Coupled region that would include two new countries, Hungary and Romania, which shows price convergence above 55% of the time in 2018.

In the third section of the report, we consider the methodology used to compute the emission factor and first assess the question of the marginal approach. The public consultation responses point out the theoretical advantages of such a method:

- The marginal analysis would take into account the cross-border impacts on power prices and therefore on emission factors, without relying on predefined geographical zones.
- This method would automatically update the emission factor calculation based on the evolution of relevant markets.
- The marginal approach could also take into account the penetration of renewables and their impacts on the marginal units. This point is not covered by the current method.

However, a number of practical limitations exist regarding the potential implementation of a marginal approach for Phase IV. There are a number of dispatch models that could be used to simulate emission factors but no reference that would establish a European consensus. We also identified a number of practical limitations associated with the potential use of these models to apply the marginal approach. Alternatively, the EC could rely on historical data on marginal technologies to apply the marginal approach, but this would also raise practical issues as such information is only provided by a limited number of energy regulators.

With the current approach for computing the emission factor, we notice a general downward trend in the emission factor over the last few years, driven by the recent

evolution of the energy mixes in Europe. We therefore suggest updating the emission factors for the next ETS trading phase to reflect this trend.

Finally, we analyse the impact of moving to national or EU-wide emission factors for the main Member States. We show that the impact would depend on the energy mix of each Member State.
We also provide emission factors for each zone analysed in the first section of the report for the revised Guidelines.

3.4.2 Answers to EC questions

As per the list of EC questions listed under 3.4 the answers have been provided as follows.

For Question 16, under the 2012 ETS Guidelines, the emission factors are calculated for specific regions which are defined with the following formula: "a*) which consisted of submarkets coupled through power exchanges, or (b) within which no declared congestion existed. In both cases, hourly day-ahead power exchange prices within the zones showed price divergence in Euros of maximum 1% in a significant number of all hours in a year*". In our memo, we present the deployment of market coupling over the last years across Europe. The market coupling is currently well implemented in the EU and only a limited amount of changes could be expected over the Phase IV. In our report and in the next question, we also explain why considering market coupling is not enough to justify the convergence of prices between countries. Therefore, we assess the price convergence within existing zones to assess if the 2012 Guidelines zones are still relevant for the next EU ETS trading phase.

We based our analysis on the historical data regarding price convergence. Our results show that only some of the 2012 Guidelines geographical zones still present high levels of price convergence. These are the Iberia and Czech Republic + Slovakia zones.

The price convergence of CWE and Nordic zones has decreased.

For Question 17, we explain in our report that the fact that electricity is traded between coupled markets does not automatically imply full price convergence. Several factors may limit price convergence despite market coupling. These include:

- physical interconnection capacity;
- available cross-border capacity on the day-ahead market; and
- national specificities, e.g. energy mix and internal bottlenecks.

These three factors are detailed in our report and the example of the border between France and Germany is used to illustrate the impact of these different factors.
We conclude that all installations in an area with market coupling do not necessarily incur the same carbon costs and that the convergence of prices within a zone is the only indicator confirming that all installations in the area incur the same indirect carbon costs.

For Question 18, we present in our report the evolution of emission factors for each region identified under Question 16 over the period 2011-2018 (both existing zones as per 2012 Guidelines and the potential new zones). As shown on Figure 9 of our report, the emission factors have generally been on a slightly downward slope over the last years. This overall decrease can be explained by several factors: closure of the most polluting units and emission reductions driven by Large Combustion Plant Directive and Industrial Emissions Directive (IED), increase in gas capacity and diminution of

coal/lignite capacity, reduction in peaking oil unit productions and increase in renewable generation.

Depending on the year or the period chosen for the calculation of Phase IV, emission factors differ but are generally lower than the ones used for the 2012 ETS Guidelines, as presented in our report.

Regarding Question 19, Figure 10 of our report on the emission factor provides our calculations of emission factors when estimated at a national level. The emission factor would be modified for all Member States in the process of national configuration, but to various degrees depending on the fuel mixes of each country. Member States with higher results at a national level compared with zonal results tend to have a higher share of coal generation in their thermal mixes than the rest of the geographical zone. When the opposite trend is visible, Member States tend to have more gas in their thermal mixes.

Regarding Question 20, we first note that the calculation of the emission factors at the national level as explained in the previous question does not take into account market coupling and price convergence, which are presented in the first section of the report.

The cross-border capacity between countries that impacts flows and convergence of prices are not taken into account in national emission factors. As mentioned in the previous questions, the choice of relevant market needs to take into account price convergence as this is the only factor that reflects whether two neighbouring markets shared similar indirect carbon costs. We show in our report that using regions is more relevant for the calculation of the emission factor than a calculation at the national level.

Therefore, the national emission factor could reflect the carbon price content of electricity produced in different EU Member States but not directly the carbon content of the electricity paid by the end customers. The latter is more relevant for our exercise because it can be priced by neighbouring markets as demonstrated by the price convergence exercise.

Regarding Question 21, Figure 11 of our emission factor report indicates the emission factor if the calculation was carried out at EU level. The average would be 0.61 tCO_2/MWh for the EU-wide scale considering the year 2017. Our analysis indicates that there are two groups of Member States:

- The Member States with a national coefficient lower than the EU average such as Ireland, Spain, Italy and Austria. These Member States have an important share of gas generation in their mixes that results in a low national coefficient compared with the EU average.
- The Member States with a national coefficient higher than the EU average, such as Germany, Poland, Slovenia, and the Czech Republic. These Member States have an important share of coal or oil generation in their mixes that drives such a result.

Moving current zones to a European emission factor would therefore have an impact for most Member States. The direction of this impact would depend on the energy mix of the Member State compared with the European zone.

With regard to Question 22, as mentioned in the previous questions, the calculation of emission factors at the EU level does not reflect the market circumstances in the EU electricity market with regard to the carbon content of electricity sold in different Member States. Indeed, only the calculation of an emission factor in the relevant market

determined by the convergence of prices reflects the carbon content of electricity paid in the different Member States.

As mentioned in the previous question, such a measure would result in an overcompensation of countries with currently low emission factors/carbon content (countries with important electricity shares produced from gas generation) and an under compensation of countries with currently high emission factors/carbon content (countries with an important part of their electricity produced from coal).

For Question 23, in our report, we present the benefits and the limitations regarding the marginal approach. We also present the alternative approach that uses historical information on the marginal power units observed over the entire year t-1. Based on this information and considering that the same or similar units would be marginal during the year t, we could assess the impact of the EU ETS prices on the power prices based on the emission factor (the emission in tonnes related to the production of 1 MWh of electricity) of these marginal units.

The main limitation of this approach is the availability of such data for all European markets. For most Member States, the information regarding marginal units is not directly available from results provided by the power exchanges after the day-ahead market. Some energy regulators have produced analysis regarding the historical marginal units. However, this practice is not well established and not all European regulators provide this analysis on a regular basis.

We conclude that while some energy regulators estimate the marginal units based on historical data, this may not be a regular practice of all regulators in the EU, which could make it costly and challenging to implement by the EC. Therefore, this simplified option does not seem to be feasible at this stage.

Conclusions

Based on the analysis presented in our report, we believe that amending regional CO_2 factors based on modified geographical areas is the most relevant approach to be used for Phase IV. Our analysis indicates that some of the 2012 Guidelines geographical zones still present high levels of price convergence while other zones have witnessed a decrease. Potential new zones could be considered based on the price convergence.

3.5 Conclusion on the impact assessment workstream

The impact assessment workstream covered the assessment of the following parameters of the aid amount – aid intensity, degressivity and emission factor – for the revision of the 2012 Guidelines, as well as the eligibility criteria to determine which sectors should be eligible for compensation.

Our analysis of the eligibility criteria indicates that the ICLI appears to be a relevant indicator to determine exposure to carbon leakage risk. Below 0.2, there is no sector deemed at risk (overall RAG ratings equal to and above medium). Out of the twelve sectors deemed at risk, seven sectors deemed at medium risk have an ICLI between 0.2 and 0.5, and the remaining five deemed at medium-high risk have an ICLI above 0.5. However, this metric presents some limitations considering that between 0.2 and 0.5, the picture is more mixed, with a possibility that a compensation based on the ICLI metric will overcompensate sectors deemed at low risk of carbon leakage.

Based on our Sector Fiche work and GVA analysis, the responses to the targeted and public consultation as well as our emission factor report, we conclude the following:

- **Aid intensity**: our results show that the minimum level of compensation to bring all the sectors deemed at risk to the lowest level would be an aid intensity set at 75%. With an aid intensity below 75%, the risk is partially reduced for four out of the twelve sectors at risk.
  Even with compensation at 75%, some sectors bear indirect costs representing more than 0.5% of their GVA (and with higher carbon prices even more than 1.0% and 1.5%). A compensation mechanism with an aid intensity at 75% plus extra compensation to bring the share of indirect carbon costs over GVA to 0.5% could be considered for those sectors in order to further reduce their risk, without overcompensating sectors that are already at low risk after 75% compensation. A higher GVA cap at 1.0% or 1.5% could also be considered.

  The majority of sectors and respondents to the public consultation advocate the highest aid intensity possible, as they argue that a lower than 100% compensation would hinder their competitiveness and raise the risk of carbon leakage. A modulation with GVA was suggested by the non-ferrous metal sectors but was not advocated by the other sectors as the wording of the option might lead to the assumption that the aid intensity would be lower for sectors with lower GVAs. In our analysis, the aid intensity considered guarantees a floor of 75% for the aid intensity which is different from a complete modulation of the aid intensity with the GVA of the beneficiary.

- **Degressivity**: our analysis is inconclusive on the degressivity principle for a majority of sectors analysed in this study. Also, for sectors deemed at risk (medium and medium-high), the analysis is inconclusive due to lack of evidence.

  The majority of sectors and respondents to the public consultation advocate no degressivity in the revisions of the Guidelines as they do not see the correlation between degressivity and incentives to be more efficient. For some sectors, technologies will not be available, or the financial resources would be limited, therefore there is no further potential for efficiency gains. Other sectors point out that to maintain their competitiveness, sectors would still maintain their incentives to be energy efficient regardless of the degressivity parameter.

- **Emission factor:** our analysis shows that retaining the current methodology, i.e. looking at the carbon content of electricity produced by fossil-fuel generation plants, and amending regional CO_2 factors based on modified geographic areas seems to be the most appropriate approach to approximate the actual pass-through of ETS carbon costs into the electricity generated in a given area. Our analysis of price convergence indicates that some of the existing zones would still remain relevant (Iberia and the Czech Republic + Slovakia) while two new ones could be considered, one for the Baltics and the other as an extension of the existing Czech Republic and Slovakia zone including Hungary and Romania. Price convergence in the CWE and Nordic zones has decreased.

Conclusion

As part of the EC's evaluation and impact assessment for the revision of the 2012 Guidelines, the Consortium provided deliverables to support the EC's work containing analysis based on independent research, public sources, literature review, responses to the targeted and public consultation responses.

On the evaluation workstream, the Consortium provided three memos to support the EC's work on the evaluation of the previous Guidelines: i) on the literature review on the risk of carbon leakage, ii) on the factors explaining why Member States implement a compensation mechanism or otherwise, and iii) on the review of the public consultation responses.

The key message from our literature review work is that there is no hard evidence of carbon leakage during Phase III, but this conclusion might differ under higher carbon prices.

Respondents to the public consultation acknowledge the effectiveness of the intervention as well as the EU-added value but mostly consider the intervention limited in terms of the eligibility of the sectors as well as the level of aid received. Most respondents point out the residual risk of carbon leakage in the form of investment leakage, that in their view requires a higher aid amount by removing degressivity, changing the efficiency benchmarks to less constraining parameters as well as increasing the aid intensity parameter.

Finally, our task on the Member States implementation showed that there is no clear correlation between market characteristics such as trade patterns or electricity consumption and prices, and the implementation of compensation by Member States. Our analysis confirms the conclusions from the 2015 evaluation report which found that policy considerations were the main drivers for the implementation of compensation mechanisms by Member States.

On the impact assessment workstream, we provided 41 Sector Fiches on the sectors identified by the EC as potentially at risk of carbon leakage, analysis on the GVA and emission factor calculation, as well as responses to the EC impact assessment questions using the responses to the targeted and public consultation responses.

Our analysis of the eligibility criteria indicates that the ICLI appears to be a relevant indicator to determine exposure to carbon leakage risk. Below 0.2, there is no sector deemed at risk (RAG ratings equal and above medium). Out of the twelve sectors deemed at risk, seven sectors deemed at medium risk have an ICLI between 0.2 and 0.5, and the remaining five deemed at medium-high risk have an ICLI above 0.5. However, this metric presents some limitations considering that between 0.2 and 0.5, the picture is more mixed, with a possibility that compensation based on the ICLI metric will overcompensate sectors deemed at low risk of carbon leakage.

Based on our Sector Fiche work and GVA analysis, the responses to the targeted and public consultation as well as our emission factor report, we conclude the following:

- Aid intensity: our results show that the minimum level of compensation to bring all the sectors deemed at risk to the lowest level would be an aid intensity set at 75%. With an aid intensity below 75%, the risk is partially reduced for four out of the twelve sectors at risk.
  Even with compensation at 75%, some sectors bear indirect costs representing more than 0.5% of their GVA (and with higher carbon prices even more than 1.0% and 1.5%). A compensation mechanism with an aid

intensity at 75% plus extra compensation to bring the share of indirect carbon costs over GVA to 0.5% could be considered for those sectors in order to further reduce their risk, without overcompensating sectors that are already at low risk after 75% compensation. A higher GVA cap at 1.0% or 1.5% could also be considered.

- Degressivity: our analysis is inconclusive on the degressivity parameter as limited evidence was found for a number of sectors and therefore the analysis was incomplete. For sectors deemed at risk of carbon leakage (medium and medium-high risk), the analysis is inconclusive for a majority of sectors and for the remaining others the analysis shows that the situation of those sectors does not plead for a degressivity principle in the revision of the 2012 Guidelines.

- Emission factor: based on our analysis, we conclude that retaining the current methodology, i.e. looking at the carbon content of electricity produced by fossil-fuel generation plants, and amending regional CO_2 factors based on modified geographical areas seems to be the most appropriate approach to replicate approximate the actual pass-through of ETS carbon costs into the electricity generated pricesin a given area. Our analysis of price convergence indicates that some of the existing zones would still remain relevant (Iberia and the Czech Republic + Slovakia) while two new ones could be considered, one for the Baltics and the other as an extension of the existing Czech Republic and Slovakia zone, including Hungary and Romania. Price convergence in the Central and Western Europe (CWE) and Nordic zones has decreased.

Abstract

ADE and Compass Lexecon (the Consortium) have been commissioned by the European Commission (EC) to provide support in the combined retrospective evaluation and prospective impact assessment study of the European Union (EU) Emission Trading System (ETS) State Aid Guidelines.
The report first presents our work on the evaluation workstream in the form of three memos covering i) a literature review on carbon leakage risk; ii) an analysis of the factors explaining why Member States did implement or not compensation schemes; and iii) a review of the public consultation responses. Our literature review is consistent with the findings of the EC in 2015 and suggest that to date, no hard evidence of carbon leakage caused by EU ETS is observed. This situation could change with the higher carbon prices. Our analysis also shows that respondents acknowledge the effectiveness of the EU intervention but some of the characteristics of the Guidelines are criticised. Finally, our report shows that policy considerations mainly drive Member States' decision to implement a compensation mechanism or not.

Secondly, the report presents our results on the impact assessment workstream which covers the eligibility criteria, the aid intensity, degressivity and CO_2 emission factor parameters. We show that the indirect carbon leakage indicator is a relevant indicator to assess eligibility although some sectors at low risk could be compensated. An aid intensity at 75% could be envisaged along with a GVA cap after compensation. For the degressivity parameter, our analysis is inconclusive and for the CO_2 emission factor parameter, we conclude that amending regional CO_2 factors based on modified geographical areas seems to be the most appropriate approach.

Key words: indirect emission costs, EU ETS, compensation

Résumé

ADE et Compass Lexecon (le Consortium) ont été mandatés par la Commission Européenne (CE) pour soutenir la mission conjointe d'évaluation rétrospective et d'évaluation prospective d'impact des lignes directrices concernant certaines aides d'Etat dans le contexte du système d'échange de quotas d'émission de gaz à effet de serre (SEQE).

Ce rapport présente tout d'abord nos résultats sur l'évaluation rétrospective sous la forme de trois mémorandums couvrants : i) une revue de littérature sur le risque de fuite de carbone ; ii) une analyse des facteurs contribuant à la mise en place ou non d'un système de compensation par les Etats membres ; et iii) la revue des réponses des différents acteurs à la consultation publique lancée par la CE. Notre revue de littérature est cohérente avec les conclusions de la CE en 2015 et suggère qu'il n'y a pas, à ce jour, de preuves confirmant le lien entre le risque de fuite de carbone et le SEQE. Cette situation pourrait changer avec des prix du carbone plus élevés. Notre analyse montre également que les participants reconnaissent l'efficacité de l'intervention de l'UE mais certaines caractéristiques du système sont critiquées. Enfin, notre rapport montre que les considérations politiques sont le facteur principal qui explique la décision des Etats membres de mettre en place un système de compensation ou non.

Deuxièmement, le rapport présente nos résultats concernant l'évaluation prospective d'impact qui couvre le critère d'éligibilité, et les critères d'intensité de l'aide, de dégressivité et de facteur d'émission de CO_2. Nous montrons que l'indicateur de fuite de carbone due au coût indirect des émissions est un paramètre approprié pour déterminer l'éligibilité d'un secteur bien que certains secteurs à bas risque puissent être compensés. Une intensité de l'aide à 75% pourrait être envisagée accompagnée d'un plafond de valeur ajouté après compensation. Concernant le paramètre de dégressivité, notre analyse est peu concluante et pour le facteur d'émission de CO_2, nous concluons que mettre à jour les facteurs d'émission régionaux à partir de zones géographiques modifiées apparaît comme l'approche la plus appropriée.

Mots clés : coûts indirects des émissions, SEQE, compensation

Kurzzusammenfassung

ADE und Compass Lexecon (im Folgenden das „Konsortium“) wurden von der Europäischen Kommission beauftragt, die Kommission bei der Evaluierung und Folgenabschätzung der Leitlinien für Beihilfemaßnahmen im Zusammenhang mit dem Europäischen Emissionshandelssystem (EU EHS) zu unterstützen.

Erstens präsentiert dieser Bericht unsere Ergebnisse in Bezug auf die Evaluierungsarbeit in Form von drei Vermerken : I) eine Auswertung der Fachliteratur zum Risiko einer Verlagerung von CO_2-Emissionen (sog. ‚carbon leakage‘); II) eine Analyse der Faktoren, aus denen hervorgeht, warum die Mitgliedstaaten Kompensationsmaßnahmen eingeführt haben oder nicht; sowie III) eine Zusammenfassung der Ergebnisse der von der Europäischen Kommission veröffentlichten Konsultation.
Unsere Auswertung der Fachliteratur steht im Einklang mit den Ergebnissen der von der Kommission im Jahr 2015 durchgeführten Literaturauswertung und lässt denken, dass es bis heute keinen eindeutigen Nachweis für *carbon leakage* durch das EU-EHS gibt. Diese Lage könnte sich bei höheren CO_2-Preisen verändern. Unsere Analyse zeigt auch, dass die Teilnehmer die Wirksamkeit der EU-Intervention anerkennen, auch wenn einige Eigentümlichkeiten der Regelung kritisiert werden. Schliesslich zeigt unser Bericht, dass politische Betrachtungen am besten erklären, weshalb die Mitgliedstaaten Kompensationsmaßnahmen eingeführt haben oder nicht.

Zweitens präsentiert der Bericht unsere Ergebnisse in Bezug auf die Folgenabschätzung, welche drei Themen umfasst : I) die Förderfähigkeit; II) die Beihilfeintensität und Degressivität; und III) der bei der Berechnung der Beihilfe herangezogene Emissionsfaktor. Wir zeigen, dass der indirekte Carbon-Leakage-Indikator ein relevanter Parameter ist, um die Förderfähigkeit eines Sektors zu bestimmen, auch wenn einige Sektoren mit niedrigem Risiko kompensiert werden können. Eine Beihilfeintensität von 75 % in Verbindung mit einer höheren BWS-Obergrenze nach Kompensation könnte berücksichtigt werden. Im Hinblick auf die Degressivität ist unsere Analyse nicht aussagekräftig. Im Hinblick auf den bei der Berechnung der Beihilfe herangezogenen Emissionsfaktor kommen wir zu dem Schluss, dass die Änderung regionaler CO_2-Faktoren auf der Grundlage modifizierter geografischer Gebiete der am besten geeignete Ansatz ist.

Schlüsselwörter: indirekte CO_2-Emissionskosten, EHS, Kompensation

Annex 1: List of sectors

Table 2: List of sectors per NACE code identified by the EC in their Targeted Consultation

Sector NACE-4	Sector name
14.11	Manufacture of leather clothes
24.42	Aluminium production
20.11	Manufacture of industrial gases
24.43	Lead, zinc and tin production
17.11	Manufacture of pulp
07.29	Mining of other non-ferrous metal ores
08.99	Other mining and quarrying n.e.c
17.12	Manufacture of paper and paperboard
24.10	Manufacture of basic iron and steel and of ferro-alloys
20.17	Manufacture of synthetic rubber in primary forms
24.51	Casting of iron
20.60	Manufacture of man-made fibres
19.20	Manufacture of refined petroleum products
24.44	Copper production
11.06	Manufacture of malt
13.95	Manufacture non-wovens and articles made from non-wovens, except apparel
16.21	Manufacture of veneer sheets and wood-based panels
20.12	Manufacture of dyes and pigments
23.31	Manufacture of ceramic tiles and flags
20.15	Manufacture of fertilisers and nitrogen compounds
20.16	Manufacture of plastics in primary forms
23.11	Manufacture of flat glass
23.14	Manufacture of glass fibres
20.14	Manufacture of other organic basic chemicals
10.62	Manufacture of starches and starch products
24.45	Other non-ferrous metal production
10.41	Manufacture of oils and fats
23.43	Manufacture of ceramic insulators and insulating fittings
27.31	Manufacture of fibre optic cables
05.10	Mining of hard coal
05.20	Mining of lignite
07.10	Mining of iron ores
08.91	Mining of chemical and fertiliser minerals
08.93	Extraction of salt
10.81	Manufacture of sugar
13.10	Preparation and spinning of textile fibres

20.13	Manufacture of other inorganic basic chemicals
Prodcom 21.10.20.10 & 21.10.20.20	Manufacture of basic pharmaceuticals products (prodcom 21.10.20.10 & 21.10.20.20)
23.51	Manufacture of cement
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
27.20	Manufacture of batteries and accumulators

Annex 2: Methodology

Approach for the impact assessment: sector fiches

In this section, we present our approach for the sector fiches informing the impact assessment.

Sector fiches

In this subsection, we introduce the objectives and content of the sector fiches.

We perform the impact assessment of the underlying parameters – eligibility, aid intensity, and degressivity – on a sector-by-sector basis.

For each sector, we establish a sector fiche which i) assesses the risk of indirect carbon leakage using a Red Amber Green (RAG) assessment, and ii) determines the adequate maximum aid amount for this sector. The eligibility criteria and aid amount have to balance the EU objectives of minimising the risk of carbon leakage and of competition distortions within the EU, as well as maintaining the incentives for businesses to reduce their indirect emissions.

For this task, we analyse the data provided by sectors through the targeted consultation. We also conduct independent research and, where useful, interviews for those sectors. Before each interview, we seek the approval of the Commission on the exact individuals we would like to meet and on the list of questions to be raised with them. Commission representatives have the opportunity to participate to these interviews with sectors. In case no Commission representatives is present during the interview, we send a transcript of the exchanges to the Commission.

When using the data provided by sectors, we first assess the robustness of the data by checking the sources of the data (e.g. official sources like Eurostat are be deemed of high quality), then we check the representativeness of the data in terms of sector coverage and geographical scope. Finally, we check the periods covered by the data to ensure the data can be used for the impact assessment of the future ETS Guidelines for Phase IV.

For each of the sectors presented in Annex 1: List of sectors, we prepare a sector fiche that first assesses the risk of carbon leakage faced by the sector and therefore makes it eligible to receive a compensation for indirect costs and second, assesses the adequate level of aid that the sector should receive.

The first issue to address in the sector fiche is the sector's risk of carbon leakage stemming from indirect ETS costs.

To determine a sector's eligibility for compensation based on its potential risk of carbon leakage, the sector fiche addresses the following issues:[26]

- Market characteristics:
    - Are there particular market characteristics of the sector putting it at risk of carbon leakage due to indirect ETS costs?
    - To what extent are businesses in the sector already passing or able to pass higher energy costs on to their customers?

[26] Regarding these indicators, reference is made to the Carbon Leakage Qualitative Assessment Framework annexed to the Technical Specifications.

  - To what extent are the products of the sector substitutable with other products (inter-sector competition), the producers of which may be eligible for indirect cost compensation?

- Profit margins as proxy for long-term incentives to invest in EU ETS area:
  - What are the profit margins of EU undertakings in the sector, as a potential driver for long-run investment or relocation decisions?

- Abatement potential:
  - To what extent is there a scope for energy efficiency investments in the sector? Would these incentives be distorted by granting compensation for indirect ETS costs and, if so, how?

- Fuel and electricity substitutability:
  - To what extent do undertakings in the sector differ as regards their share of direct versus indirect emissions in their production processes? In particular: are undertakings in the sector using different production technologies which lead to a situation where some businesses face a higher share of indirect ETS costs (electrification of production processes) compared with direct ETS costs?

After determining if the sector is at risk of carbon leakage due to indirect ETS costs and therefore eligible for compensation, the level and form of aid are considered (aid intensity level and degressivity). In particular, we assess whether the baseline aid intensity of 75% is adequate or not.

In the following subsections, we present the approach for determining the eligibility of sectors and for assessing the level of compensation for those sectors at risk.

Eligibility of sectors

In this subsection, we present how the eligibility of sectors is assessed with a RAG rating.

This list of sectors was established using the criteria provided by the DG CLIMA for the newly adopted Carbon Leakage List but applied only for indirect emissions – the indirect carbon leakage indicator (ICLI) corresponds to the product of trade intensity and indirect emission intensity. This gives a first list of 23 sectors for which the ICLI is above 0.20. Eleven sectors for which the ICLI is between 0.15 and 0.20 complement this list. Finally, the "*Mining of lignite*" sector with an indirect emission intensity above 1.5 is included, as well as the "*Mining iron ores*" sector that was included in the previous ETS Guidelines, but which would no longer be eligible under this potential ICLI criteria. Based on the responses to the targeted consultation, the EC also added an additional five sectors to be analysed in this study.

Our proposed approach to determine if a sector is at risk of indirect carbon leakage and therefore eligible to receive compensation for its indirect costs is to conduct a 'RAG assessment' on a number of parameters grouped under three main categories: i) market characteristics, ii) profit margins, and iii) abatement potential. A fourth category of parameters related to the fuel and electricity substitutability is also considered but is treated differently as we consider this category as not influencing the sector's risk of indirect carbon leakage.

In the RAG assessment, Red and Amber-Red indicate a high risk of indirect carbon leakage whilst Green indicates a low risk of indirect carbon leakage and Green-Amber represents a low-medium risk.

We then use a combined approach based on the three RAG ratings of each main category to determine the final RAG rating of a sector that determines if it is at risk of indirect carbon leakage.

The parameters and the way they are assessed in the RAG exercise are in line with the Annex II of Technical Specifications as well as with the European Commission's existing qualitative framework assessment used for the Carbon Leakage List.

If the data is missing for a number of parameters, we either contact the sector for further information or gather publicly available information using platforms such as Eurostat. If we receive more than one submission for a sector, we mainly rely on the data that presents the largest geographical and installation coverage. We however check the consistency of these multiple submissions in order to have an exhaustive view of the sector. For each category, the underlying parameters give the overall RAG rating of the main category.

Market characteristics

This category assesses the extent to which producers can pass on cost increases to customers, and in particular the ability to pass on higher electricity costs to customers.

The table below presents the list of parameters that are individually assessed to give a RAG rating on the current and future market characteristics of the sector. These parameters are divided into three categories: existing and future trade patterns, link between cost and output prices, and market structure and bargaining position. We provide a RAG rating for each of these categories. The overall RAG rating for the market characteristics is based on a simple average of these three ratings[27].

Table 3: Market characteristics parameters

Category	Criteria	Parameter	Green	Amber	Red
Link between cost and output prices / Price taker	Link between cost and output prices	Comparison between output price evolution and inputs/production costs evolution	Clear correlation	Weak correlation	No correlation at all
	Price taker	Compare trends in sector output prices in the EU with trends in sector output	No correlation between trends	Weak correlation	Clear correlation

[27] If not enough evidence is provided in order to conclude on one of these categories, the overall RAG rating is based on available RAG ratings for the other categories.

		prices outside EU countries			
		Common reference price set globally	EU-specific prices/regional prices	In between	Unique global price
Market structure and bargaining position	Bargaining position-industry structure	Share of each firm-size band in sector/ concentration of sector	More concentrated than downstream sectors, or large sectors that account for large share	In between	Less concentrated than downstream sectors, or small firms accounting for larger share of value added
	Bargaining position-interdependence between downstream customers and sector	Downstream sector's purchases of input Sales to downstream customers	High % of downstream's inputs come from sector and/or sales to the largest downstream customer are a small % of total sales	In between	Low % of downstream's inputs from sector and/or sales to the largest downstream customer are a large % of total sales
	Bargaining position-pricing power	Pricing power over downstream customers	Sector output has high value-added content	In between	Sector output has a low-value added content
Existing and future trade patterns	Trade patterns-domestic demand	Trends in expected growth of demand	Strong/ growing demand	Stable	Weak/ shrinking demand
	Trade patterns-import penetration	The role imports play in meeting demand and trend in import penetration	Low/falling penetration	Stable	High/ growing penetration
	Trade patterns-import prices	Levels of import prices and trends	Higher import prices/ rising	Stable	Lower/ falling import prices

Note: the parameters presented above for each criteria are suggested parameters that we would expect to receive as supporting evidence of criteria.

Profit margins

This category focuses on the incentives a sector has for long-term investment in the EU ETS area based on its current and future profit margins in the zone covered by ETS.

If profit margins are positive and sustained in the domestic market, then the incentive to relocate is considered low. Whereas if profit margins are low or margins are higher in third countries outside the EU ETS zone, and the indirect costs related to the ETS are a significant share of the profit margins, then the incentive to relocate is high.

The relocation decision outside the EU ETS area has both economic and environmental impacts. At the economic level, if EU undertakings relocate outside Europe then it impacts employment and creates adverse distributional effects as well as impairing economic growth within Member States. At the environmental level, if EU undertakings relocate in areas with less constrained climate policies then this would potentially lead to higher global greenhouse gas emissions and will undermine the ETS objective of contributing to a global reduction of CO_2 emissions.

Two categories of parameters are assessed to understand the current investments and profit margins in a particular sector as well as the projections of future margins and demand growth in the EU ETS zone. Comparing the projections for demand growth and profit margins in the EU ETS area with third countries outside the area gives a view of the incentives to invest in EU ETS area.

A third category of parameters is assessed to give a view on the feasibility of relocation for a sector independent of the incentives to invest in EU ETS area assessed above. Those parameters look at the physical aspects that contribute to a relocation decision based on the current trade routes. In this category we also look at the net trade balance that gives an indication of the feasibility of relocating to serve the EU market through imports.

For each category, a RAG rating is calculated based on available parameters. The overall RAG rating for the profit margin category is estimated as the simple average of the RAG ratings of the three categories.

Table 4 below presents the list of parameters that are assessed to provide a RAG rating on a sector's incentives to invest in the EU ETS area in the current and long term, as well as the sector's ability to relocate.

Table 4: Parameters on current and long-term incentives to invest in EU ETS area

Category	Parameter	Green	Amber	Red
Current investment in the sector in EU ETS area	Current financial situation of the sector	High profitability/ Higher than in EU ETS countries	Similar profitability than in outside EU ETS countries	Low profitability/ Lower than in outside EU ETS countries
	Investment in sector in EU ETS area compared with outside countries	High/ growing/ faster than in other countries outside EU ETS area	Comparable investment in sector in EU ETS area and outside	Low/ falling/ slowing than in outside countries

	Products substitutable with other products with indirect costs compensation (competition within EU ETS area)	No substitution	In between	Substitutable
Long-term investment in EU ETS area	Projections of demand in EU ETS area (ideally compared with outside area)	High demand- in line or faster than in countries outside EU ETS area	Weak demand	Very weak or reduced demand - not as fast as in other countries outside EU ETS area
	Projections of costs/ prices/ margins	Margins to hold or widen and/or margins in line with or wider than in outside EU ETS countries	In between	Margins to narrow and/or margins smaller than in other countries outside EU ETS area
	Business demography (birth rate/ death rate/ churn/ survival rate)	High birth rate, low death rate, high survival rate	In between	Low birth rate, high death rate, low survival rate
Feasibility of relocation[28]	Current trade patterns	No or little trade - indicates that routes and infrastructure are not set up	In between	Goods already heavily traded - routes and infrastructure in place
	Net trade balance	High/ widening	Stable	Low or negative/ narrowing

Abatement potential

This category focuses on the scope for energy efficiency investments in the sector.

[28] For this criteria, a possible parameter that could be analysed is the value to weight ratio.

The abatement potential of a sector relates to a sector's ability to mitigate the risk of carbon leakage when incorporating new technologies. For sectors where there is little scope for further reduction in indirect carbon costs, the risk of carbon leakage will be higher than for sectors that can still adopt the best existing technologies in their sector to reduce their electricity consumption.

A first category of parameters assesses the current electricity consumption and scope of reduction. If the parameters indicate some leeway for sectors to reduce their indirect emissions through the adoption of best technologies, then the risk of carbon leakage is deemed low. A second category of parameters assesses the ability of the sector to implement best available technologies (BAT) regarding electricity consumption over Phase IV.

The overall RAG rating for abatement section is based on the simple average of the RAG ratings of the two categories presented above.

Table 5 below presents the parameters that are individually assessed to give a RAG rating on the scope for reduction of indirect emissions.

Table 5: Parameters of the scope for reduction of indirect emissions

Category	**Parameter**	**Green**	**Amber**	**Red**
Current electricity consumption	Current level of electricity intensity	High/above sector average in outside EU ETS countries (or above average for manufacturing sector); not falling; high compared with best available technologies	In between	Low/below sector average in outside EU ETS countries (or below average for manufacturing sector); falling for some time; low compared with best available technologies
	Indirect emission intensity	High/above sector average in outside EU ETS countries (or above average for manufacturing sector); not falling; high compared with best available technologies	In between	Low/below sector average in outside EU ETS countries (or below average for manufacturing sector); falling for some time; low compared with best available technologies
Adoption of best available technologies	Penetration of best available technologies	Low	In between	Already high

Overall RAG rating to assess risk of indirect carbon leakage

Based on the three RAG ratings given for the following categories: i) market characteristics, ii) profit margins and iii) abatement potential, we give an overall RAG rating that assesses the risk of indirect carbon leakage for a sector.

We provide below in Table 6 a sample of the methodology used to determine overall RAG ratings.

For the overall RAG assessment performed below, the key assumption made is the higher weight given to the market characteristics criteria which includes the ability of the sector to pass on higher costs to customers.[29] The risk of carbon leakage is deemed manageable by a sector if it can pass through higher electricity costs to its customers.

Table 6: Methodology for overall RAG rating on risk of carbon leakage

Market Characteris-tics	Profits margins	Abatement potential	Overall RAG rating	Note
Green	Green/ Green-Amber	Green/ Green-Amber	Green	The risk of carbon leakage is limited based on the three criteria of the RAG assessment.
Green	Green	Red	Green-Amber	The inability of the sector to reduce its electricity consumption puts it at a low risk but the risk of carbon leakage is manageable based on the market characteristics and profit margins criteria.
Green	Red	Red	Amber	If a sector has an ability to pass through costs to its customers then it can reduce the risk of carbon leakage arising from the inability to reduce its consumption and the low incentives to invest in EU ETS area. The sector has a medium-high risk of carbon leakage based on the three criteria of the RAG assessment.
Amber -Red	Green	Green	Green-Amber	The market characteristics including the ability to pass through costs will have a bigger weight on the overall risk of carbon leakage.
Red	Green	Green	Amber	
Red	Red	Green/ Green-Amber/ Amber-Red/ Red	Red	If a sector has no ability to pass through costs and the prospects of investment in the EU ETS area are worsening, then the sector will be deemed at high risk of carbon leakage as the investment to reduce its electricity consumption will not be financially viable if the domestic demand is not growing.

[29] Rule applied for the overall RAG score for eligibility
-Green=1; Green-Amber=1.5; Amber= 2; Amber-Red=2.5; and Red=3.
- Weight of market characteristics=2, profit margins=1 and abatement potential=1.
- Overall RAG score: Green=4-5; Green-Amber=6-7; Amber= 7.5-8; Amber-Red=8.5-9.5; and Red>=10.
- For categories without conclusion, we consider a RAG rating of 1.

Red	Green	Red	Red	The risk of carbon leakage is deemed high.
Green - Amber	Green	Amber	Green-Amber	The risk of carbon leakage is still manageable based on the three criteria used in the RAG assessment.
Green	Green-Amber/ Amber-Red	Green	Green	If a sector can pass-through costs to customers and has an ability to reduce its electricity consumption then regardless of the investment outlook in EU ETS area, the sector should be able to sustain those increased energy costs.
Green	Red	Green-Amber	Green-Amber	
Green	Green-Amber	Red	Green-Amber	The ability to pass-through costs has a bigger weight than the other criteria and will therefore reduce the risk of carbon leakage.
Amber-Red	Green	Red	Amber-Red	The risk of carbon leakage driven by the inability to pass-through costs and to reduce electricity consumption is deemed medium-high.
Amber-Red	Red	Red	Red	The risk of carbon leakage is deemed high.
Amber-Red	Red	Green/ Green-Amber	Amber-Red	The risk of carbon leakage is driven by the inability to pass-through costs and the weak incentives for investment in the future in EU ETS area.

Note: All the possible combinations are not presented in the table above for convenience.

Fuel and electricity substitutability

As referred to in the Benchmarking Decision, some production processes can, to a certain extent, shift from fuel to electricity consumption. However, the increase in electricity costs related to the EU ETS means that certain sectors might not shift as they prefer maintaining their compensation for direct emissions costs linked to their fuel consumption. There may therefore be a case for compensating these sectors for their indirect costs as set out in the ETS Directive in order to avoid a preferential treatment of fuel that could undermine energy efficiency measures.

We treat those parameters differently as the ability to shift to electricity does not make a sector at risk of carbon leakage per se. The sectors at risk are for example those that have no ability to reduce their electricity consumption or cannot pass-through costs, or those that face increasing competition from cheaper import products.

Table 7 below shows the parameter assessed to determine a RAG rating for the fuel and electricity substitutability criteria.

Table 7: Parameters on fuel and electricity substitutability

Criteria	**Parameter**	**Green**	**Amber**	**Red**
Fuel and electricity substitutability	Variability between undertakings in sector based on	No variability- either most undertakings use fuel, or if undertakings mostly use electricity then	In between	High variability in sector

	fuel/electricity consumption	indirect compensation has been assessed in previous ETS 2012 Guidelines		
	Unequal treatment of direct and indirect costs compensation within sector	Receive compensation for indirect costs	In between	Unequal compensation between direct and indirect costs

To determine the overall RAG rating, we consider first if there is variability between undertakings on fuel used for production. If there is no variability, then there is no risk on this criterion. If variability exists, the risk on the fuel and electricity substitutability criteria only exists if the sector is included on the Carbon Leakage List for Phase IV, i.e. the sector receives compensation for its direct emissions.

If the RAG score is Red for the fuel and electricity substitutability, then the overall RAG rating performed on the previous three criteria will be increased to a higher score reflecting a higher risk of carbon leakage.

Summary of eligibility criteria

For each sector, the sector fiche establishes if the sector is at risk of carbon leakage and is therefore eligible to receive compensation for its indirect carbon costs based on the overall RAG rating received.

In the RAG assessment, Red and Amber-Red indicate a high risk of indirect carbon leakage whilst Green indicates a low risk of indirect carbon leakage and Green-Amber represents a low-medium risk.

The overall RAG rating is a combined assessment of the carbon leakage risk based on three criteria – market characteristics, profit margins, and abatement potential – that each receive an individual RAG rating after assessment of their underlying parameters. This RAG rating on the risk of carbon leakage is supplemented by the RAG rating on the potential for shifting to electrification that determines if the sector should be granted a compensation to incentivise the shift.

Approach for the assessment of aid amount

In this subsection, we present our approach for the analysis of the maximum aid amount for each sector.

We determine whether the baseline scenario (aid intensity set at 75%) can adequately address the risk of carbon leakage while limiting the aid amount such as to preserve the incentive for cost-effective decarbonisation and minimising competition distortions. This is based on the targeted consultation responses, independently verified, and publicly available information.

In order to determine this level of aid, we have decided to split our work in two parts:

- Assessment of the aid intensity level
- Assessment of the degressivity option

Aid intensity level

Presentation of methodology

Our analysis is mainly based on a qualitative assessment of the extent to which the baseline scenario remains adequate or whether adaptations are necessary, that is informed by the data provided by the sector in the targeted consultation responses, which have been independently verified, and publicly available information.

As presented in the previous section on eligibility for compensation, we have developed a methodology to assess the risk of carbon leakage using a RAG rating based on the RAG scores of three criteria- market characteristics, profit margins and abatement potential- giving an overall RAG rating of the carbon leakage risk without financial compensation.

Our methodology to determine the maximum aid amount is first to analyse how those three RAG ratings change under a baseline scenario with 75% aid intensity. We assume that the individual RAG scores of each criterion – market characteristics, profit margins and abatement potential - will be reduced[30] when receiving a 75% compensation which in some cases change their RAG ratings. These new RAG ratings give a new overall RAG rating under a baseline scenario which indicates if for certain sectors this level of aid is sufficient to reduce the risk of carbon leakage to a manageable level (we consider that Green-Amber and Green ratings indicate a manageable level of risk).

We then undertake the same exercise for the other two levels of intensity- >75% and <75%.

As in the previous section, we also take into account the fuel and electricity substitutability to assess the final risk of carbon leakage.

Impact of compensation on the three categories

Our approach is therefore to analyse the impact of the financial compensation on each category and then determine the overall RAG rating based on the new RAG ratings of those three categories.

Table 8 shows the impact of different levels of compensation on the RAG rating for the market characteristics.

Table 8: RAG ratings of market characteristics after compensation

RAG rating of market characteristics category	**Pass-through level of sector**	**New RAG rating after compensation**		
		Baseline-75%	**>75%**	**<75%**
Red	The sector is a price taker so the pass-through level to end-customers is close to zero.	Green-Amber	Green	Amber-Red
Amber-Red	The sector has a rather limited ability to pass through.	Green-Amber	Green	Green-Amber

[30] We present in the following section how the individual RAG scores are reduced.

Amber	The sector has a moderate ability to pass through.	Green	Green	Green-Amber
Green-Amber	The sector has some ability of pass through.	Green	Green	Green
Green	The sector has the ability to pass through.	Green	Green	Green

The different levels of compensation reduce more or less the indirect cost borne by the sector after pass-through and therefore reduce the risk of carbon leakage based on this sector.

In the example of a sector with high risk without compensation, under a baseline scenario, the risk is reduced to a manageable level but with compensation below 75% the risk is still high. Therefore, for a sector with no ability to pass through costs, compensation below 75% will not be sufficient to reduce the risk at this stage of the process. But we also need to look at the impact of the compensation on the other two categories - profit margins and abatement potential - to get an overall view of the carbon leakage risk remaining after compensation.

Table 9 shows the impact of the different levels of compensation on the profit margins category.

Table 9: RAG ratings of profit margins after compensation

RAG rating of profit margins category	**Profit margins of sector**	**New RAG rating after compensation**		
		Baseline-75%	**>75%**	**<75%**
Red	Current situation of sector and future outlook in EU ETS are not favourable for sector and put it at high risk of relocating.	Green-Amber	Green	Amber-Red
Amber-Red	Medium-high risk of relocating.	Green-Amber	Green	Green-Amber
Amber	Medium risk of relocating.	Green	Green	Green-Amber
Green-Amber	Profit margins in the EU ETS are relatively stable.	Green	Green	Green
Green	Profit margins of the sector are high and will stay at a high level in the future.	Green	Green	Green

The different levels of compensation reduce by more or less the financial impact of the indirect carbon costs on the profit margins of the sector.

Table 10 shows the impact of the different levels of compensation on the abatement potential category. For this category, the same rule is applied as in the other categories except if the RAG rating for the category is Red. We assume that the financial compensation does not reduce the high risk of carbon leakage in this category which is due to a lack of available technology to reduce electricity consumption.

Table 10: RAG ratings of abatement potential after compensation

RAG rating of abatement potential category	**Scope to reduce consumption of sector**	**New RAG rating after compensation**		
		Baseline-75%	**>75%**	**<75%**
Red	No scope to reduce electricity consumption due to a lack of available technology in sector.	Red	Red	Red
Amber-Red	Little scope to reduce electricity consumption as sector is already at the technological frontier after adoption of best available technologies.	Green-Amber	Green	Green-Amber
Amber	Sector has a certain degree of scope to reduce electricity consumption in the future if technologies become viable or if financial resources are allocated to afford the investment.	Green	Green	Green-Amber
Green-Amber	Sector has scope to reduce electricity consumption as technologies exist for which investments are commercially viable.	Green	Green	Green
Green	Sector either has financial resources to adopt BAT[31] or is mostly using fuel and is therefore not consuming a high level of electricity.	Green	Green	Green

[31] BAT refers to Best Available Technology

The different levels of compensation help the sector to invest in new BAT that will allow it to reduce its electricity consumption. However, the level of compensation will not reduce the risk if the sector cannot reduce its electricity consumption because the technologies to become more efficient do not exist in the sector. The sector will therefore still face a risk of higher electricity costs that can lead to relocation despite a high level of compensation.

Impact of different levels of compensation on overall RAG rating

Using the same methodology as applied above, for each sector, we determine whether the baseline scenario adequately addresses the risk of carbon leakage and also preserves the incentive to a cost-effective decarbonisation while avoiding overcompensation. Table 11 below gives an example of how the risk of carbon leakage changes under the baseline scenario (compensation at 75%) for a number of combinations possible (not all combinations are presented in this report for convenience).

Table 11: New RAG rating under baseline scenario

Initial market Characteris-tics rating	Initial profits margins rating	Initial abatement potential rating	Overall initial RAG rating	New RAG rating after 75% compensation
Green	Green/ Green-Amber	Green/ Green-Amber	Green	Green
Green	Green	Red	Green-Amber	Green-Amber
Green	Red	Red	Amber	Green-Amber
Amber-Red	Green	Green	Green-Amber	Green
Red	Green	Green	Amber	Green
Red	Red	Green/ Green-Amber	Red	Green
Red	Red	Amber- Red/ Red	Red	Green-Amber
Red	Green	Red	Red	Green-Amber
Amber	Green	Amber	Green-Amber	Green
Amber	Red	Green	Amber	Green
Green	Amber	Amber	Green-Amber	Green
Green-Amber	Green	Amber-Red	Green-Amber	Green
Green	Green-Amber/ Amber-Red	Green	Green	Green
Green	Red	Green-Amber	Green-Amber	Green

Green	Green-Amber	Red	Green-Amber	Green-Amber
Amber-Red	Green	Red	Amber-Red	Green-Amber
Amber-Red	Red	Red	Red	Green-Amber
Amber-Red	Red	Green/ Green-Amber	Amber-Red	Green

Note: We only show in the table the new overall RAG rating and do not repeat the new RAG rating for each category as shown in previous tables.

For each sector, to identify the minimum level of intensity required to reduce the risk of carbon leakage to a manageable level, we determine how the overall RAG rating changes under a compensation with aid intensity higher and lower than 75% and compare it with the baseline scenario. Table 12 below shows the new overall RAG ratings under the different levels of compensation.

Table 12: Level of compensation and effect on the overall score mapping

Initial market Characteristics rating	**Initial profits margins rating**	**Initial abatement potential rating**	**Overall initial RAG rating**	**New RAG rating after compensation**		
				Baseline -75%	**>75%**	**<75%**
Green	Green/ Green-Amber	Green/ Green-Amber	Green	Green	Green	Green
Green	Green	Red	Green-Amber	Green-Amber	Green-Amber	Green-Amber
Green	Amber	Amber	Green-Amber	Green	Green	Green
Green	Red	Amber	Green-Amber	Green	Green	Green-Amber
Green	Red	Red	Amber-Red	Green-Amber	Green-Amber	Green-Amber
Amber-Red	Green	Green	Green-Amber	Green	Green	Green
Red	Green	Green	Amber	Green	Green	Green-Amber
Red	Red	Green/ Green-Amber	Red	Green	Green	Amber-Red
Red	Red	Amber-Red	Red	Green-Amber	Green	Amber-Red
Red	Red	Red	Red	Amber	Green-Amber	Red
Red	Green	Red	Red	Green-Amber	Green-Amber	Amber-Red

Green-Amber	Green	Amber-Red	Green-Amber	Green	Green	Green
Green	Green-Amber/ Amber-Green	Green	Green	Green	Green	Green
Green	Red	Green-Amber	Green-Amber	Green	Green	Green
Green	Red	Amber-Red	Amber	Green	Green	Green-Amber
Green	Green-Amber	Red	Green-Amber	Green-Amber	Green-Amber	Green-Amber
Amber-Red	Green	Red	Amber-Red	Green-Amber	Green-Amber	Green-Amber
Amber-Red	Red	Red	Red	Amber	Green-Amber	Amber-Red
Amber-Red	Red	Green/ Green-Amber	Amber-Red	Green	Green	Green-Amber

Note: We only show in the table a selection of the possible combinations.

After determining the new overall RAG rating, we take into account the RAG rating of the fuel and electricity substitutability criteria to determine the final overall RAG rating of a sector. We use the same methodology as explained in the table above to determine the level of aid intensity necessary to bring the overall RAG rating to the lowest level.

The second part of the aid amount analysis considers degressivity.

Degressivity

Regarding degressivity, the baseline scenario considers a stable aid intensity over the next trading period. In this section, we assess whether degressivity is necessary to avoid overcompensating sectors.

The degressivity parameter of the aid amount aims at reflecting technological advances that can occur during the future trading period as efficiency benchmarks are only updated at the start of this period. The rationale for degressivity would therefore be to avoid overcompensating sectors that will manage to become more efficient during the next trading period and will therefore have less indirect carbon costs.

Therefore, the degressivity of the aid intensity should be linked to the potential for further abatement of the sector beyond today's available technology.

We map the RAG score given to the Abatement category in the eligibility section with the option for degressivity as presented in the table below.

Table 13: Degressivity option

RAG rating of abatement potential category	**Degressivity option**	**Explanation**
Red/Amber-Red/Amber	No degressivity	The sector cannot perform any further electricity consumption reduction over the next trading period. We would therefore recommend no degressivity.
Green-Amber/ Green	Degressivity	The sector will be able to perform further reduction of its electricity consumption over the next trading period. In order to reflect this decrease, we would recommend a reduction of the aid amount over the period.

Based on this approach, we provide for each sector a sector fiche summarising our considerations on the eligibility, the aid amount, and the degressivity parameter.

Annex 3: Responses to targeted consultation question 6

Table 14: Responses to question 6
"To what extent are companies in the sector competing with undertakings based in other EU Member States? How significant is the risk of competition distortions in the sector if not all of the relevant Member States were to grant compensation for indirect costs or if they do so to a different degree?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	Intra-EU trade has a significant share of the total traded values in NACE 07.10. Most interviewees reported that their main competitors were outside of the EU, and mostly in Brazil. To the extent that not granting compensation for indirect costs or granting different levels of compensation will significantly impact the costs that companies face in different Member States, there is a risk that competition is distorted by such unequal treatment.
07.29 - Mining of other non-ferrous metal ores	Intra-EU trade has a significant share of the total traded values. Because data is at the NACE and not the PRODCOM level, it is not possible to analyse potential trade distortions for particular non-ferrous metal ores. Most interviewees reported that their main competitors were outside of the EU, and mostly in South America. But different levels of compensation will likely only further increase this price differential and potentially distort competition.
08.91 - Mining of chemical and fertiliser minerals	The EU fertilizer market has a high degree of intra-EU competition with more than 20 producers. A level playing field (in the EU) is essential. Therefore the basis for the compensation of indirect costs should be the same within the EU.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	If not all relevant Member States grant compensation, the risk of competition distortions within the sector is considerable. As the energy costs are considerable in relation to operating costs and the sector is unable to pass these costs to their customers, any company within the sector which receives State Aid would outcompete the companies that would not receive such aid.
10.81 - Manufacture of sugar	In general, due to consolidation of the sector, there is full competition over the EU 28. The sector is also exposed to competition on the world market. As potential for indirect ETS cost compensation depends on the energy mix of the Member State used for grid electricity production, a national, specific implementation in our understanding would be a suitable approach to minimise distortion of competition.
11.06 - Manufacture of malt	No competition distortion is expected at EU level.
13.10 - Preparation and spinning of textile fibres	N/A

13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	Assessing the situation within the EU, unfortunately some EU member states introduced this compensation, others not which causes a distortion.
17.11 - Manufacture of pulp	Intra-EU trade is as relevant as extra-EU trade. Therefore the risk of distortion of competition within the EU is always relevant. Although schemes are different from one country to the other, similar levels of compensation reduced significantly the risk of market distortion.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	The EU refineries are already competing at an EU level. The pricing mechanism reflects this evidence. FuelsEurope has always been advocating moving towards a more harmonized approach tohow indirect costs are being addressed in all EU countries.
20.11 - Manufacture of industrial gases	There is always a risk that policy decisions impact competition. There is a risk that competition is distorted by such unequal treatment. To eliminate all possible distortions, Member States should provide the same level of aid intensity - and basis for implementation - to enable a level playing field across all sectors.
20.12 - Manufacture of dyes and pigments	As the mechanism of indirect cost compensation is heterogenous among the countries, the distortion risk is non negligible.
20.13 - Manufacture of other inorganic basic chemicals	With electricity being the dominant factor in the production costs, it is clear that discrepancies between Member States in compensation for indirect costs may lead to competition distortion.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	The EU fertilizer market has a high degree of intra-EU competition with more than 20 producers. A level playing field (in the EU) is essential. Therefore the basis for the compensation of indirect costs should be the same within the EU.
20.16 - Manufacture of plastics in primary forms	N/A
20.17 - Manufacture of synthetic rubber in primary forms	N/A

20.60 - Manufacture of man-made fibres	Reducing indirect compensation would level the internal EU playing field vis-à-vis non-compensating countries but as a consequence gravely distort the competitive position of EU companies in global markets. CIRFS supports maintaining national compensation provisions where they exist and increasing them to reach the protection level of 100% of the benchmark and urges expanding those to all EU countries.
21.10 - Manufacture of basic pharmaceutical products	As there is only one producer, there is no risk of market distortion within EU.
23.11 - Manufacture of flat glass	The European flat glass sector is made up of multinational firms with manufacturing facilities located in several Member States, while the products from these installations are marketed and sold throughout the European Union. Glass for Europe considers that the risk of distortion of competition in the sector, if any, is mitigated by the fact that each corporation has installations in several Member States.
23.14 - Manufacture of glass fibres	If Member States were to grant differentiated compensation, the risk of internal competition distortion would remain low. However, if a given country were not granted compensation, extra-EU players would de facto be favoured over EU players. The significant price gap between extra EU and intra-EU import prices is sufficiently important to create a risk of carbon leakage and shows that European players are in an unfavourable competitive position.
23.31 - Manufacture of ceramic tiles and flags	The risk of competitive distortion within the EU therefore is limited as the large production and demand are located in Southern European countries. Additionally, Northern European countries already have large import penetration so there is a higher risk of competition distortion from non-EU countries than from EU countries.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	Intra-EU competition distortions are not created by granting indirect compensation but by not doing so. The cement industry structure is characterized by large cement manufacturers having production sites in multiple countries throughout the EU. Unless compensation for indirect costs is granted, competition will first emerge from extra-EU operators, especially close to EU borders or given high accessibility by bulk shipping, rather than from intra-EU players.
24.10 - Manufacture of basic iron and steel and of ferro-alloys	The steel sector faces high competition both within the EU and vis a vis third country producers. The extra-EU competition puts the whole EU market under great pressure and risk of carbon leakage.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	The sector faces high competition within the EU and vis a vis third country producers. This situation results from those member states that do not implement the Guidelines and do not grant compensation.
24.42 - Aluminium production	Aluminium is a commodity which is traded globally with a price set by the LME. As the primary objective of indirect compensation is to reduce carbon leakage, it should be on a level playing field for the European aluminium industry to compete in a global market. Considering the high dependency on imports in Europe, it is very likely that a reduction in aluminium production in one European country, even if due to lack of or lower compensation, would not be replaced by increased production in another Member State. It will be instead most likely replaced by

	increased imports from countries outside the EU, which have most often a much higher carbon footprint and no embedded carbon cost.
24.43 - Lead, zinc and tin production	They are not competing against each other because the price is not set by the EU producers but by the LME market. Different levels of compensation would not necessarily lead to competition distortion. A reduction in or a closure of production in one (Non-compensating) Member State will not be replaced by increased production in another EU smelter, but by increased imports from outside the EU.
24.44 - Copper production	For copper, given the global environment in which we compete, the greatest competition distortion is between EU and non-EU producers - rather than between producers within the EU. Indeed, the industry reality is that a reduction in production in one (Non-compensating) Member State will not be replaced by production in another, but increased imports from outside the EU.
24.45 - Other non-ferrous metal production	European nickel producers are competing on a global scale. In case an EU member state does not grant State Aid, production will not be allocated to other producers within Europe but will get lost to growing markets outside Europe. The key competition distortion is between EU and non-EU producers who are not subject to comparable carbon schemes.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 4: Responses to targeted consultation question 9

Table 15: Responses to question 9
"What level of aid intensity would best maintain the sector's incentives for energy efficiency investments? What parameters besides the efficiency benchmarks should be used to promote sector's incentives for energy efficiency investments?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	A maximum level of compensation should be ensured without any degressive factor applied during the upcoming period. Also, the compensation system should be implemented by all member states to avoid any additional intra EU distortions in competition. It is in the sector's own interest to implement energy efficiency investments.
07.29 - Mining of other non-ferrous metal ores	It is in the sector's own interest to implement energy efficiency investments. The lack of aid compensation is likely to diminish the competitiveness of the sector. The main element determining competitiveness is production cost, which is driven by energy, equipment and labour costs. The non-ferrous metals mining sector is a price taker.
08.91 - Mining of chemical and fertiliser minerals	The EU ammonia industry is already the most energy-efficient globally. The extra-cost of the EU ETS passed on the electricity prices is not providing an incentive for further energy efficiency investments. On the contrary, it lowers the amount of capital available for investments in new technologies or machines. A carbon inclusion (of imported fertilizers) mechanism would be the best way to ensure a level playing field and at the same time to incentivise both EU producers and importers to improve their energy efficiency.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	Navigant does not suggest a level of aid intensity to avoid conflicts of interest. However, it is in the sector's own interest to implement energy efficiency investments. The lack of aid compensation is likely to diminish the competitiveness of the sector.
10.81 - Manufacture of sugar	Typically, an increase in energy efficiency would be based on economic drivers. Electrification is associated with higher decarbonisation costs. Therefore, there is no interference. The high costs of electricity from the grid with full exposure to the carbon cost is today one of the main reasons not to invest in technology leading to rising electrification.
11.06 - Manufacture of malt	We envisage that a full level (100%) of aid intensity will maintain our sector incentives for energy investments. We consider that all parameters that are technically feasible, financially viable and that can help our sector to reduce production costs related to electricity use, could be considered.
13.10 - Preparation and spinning of textile fibres	N/A

13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	An aid intensity limited to 75% would not be sustainable for the European industry as the CO_2 price will increase. Indirect cost compensation has no impact on investments in energy efficiency.
17.11 - Manufacture of pulp	Efficiency improvements continued also when industry received compensation for indirect carbon costs. Even in case of 100% compensation, incentives for energy efficiency would still be there, due to high electricity prices. This being said, with rising carbon prices and no compensation, increasing electricity prices would make operations unprofitable, leading to disinvestments in Europe.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	If a sector is not compensated for indirect costs, there is a loss of competitiveness that puts investment to decarbonise the production facility at risk (e.g. by electrification and other technologies to make efficiency improvements on the total energy balance). Electrification would not necessarily lead to more energy efficiency (i.e. a lower total energy use) since some electrified processes might be more energy-intensive than the initial/traditional ones.
20.11 - Manufacture of industrial gases	It is in the IG sector's own interest to implement energy efficiency investments. While lack of compensation is likely to diminish the competitiveness of the sector and its end users, the provision of aid is unlikely to reduce incentives for energy investment given that the main element determining competitiveness is production cost mainly driven by electricity costs.
20.12 - Manufacture of dyes and pigments	Energy efficiency is a non-priority subject. The compensation aid is not significative enough compared with other competitivity issues. Compensation aid has no impact on incentivising energy efficiency improvements.
20.13 - Manufacture of other inorganic basic chemicals	For competitiveness reasons the chemical industry has traditionally invested significantly in energy efficiency improvements so that efficiency is close to theoretical limits (e.g. ammonia production). Extra EU policy costs may act counter-productively and rather than stimulate investment and innovation in EU manufacturing. The current fall-back-benchmark factor ('electricity use efficiency BM') for indirect cost compensation is 0.8. This value should be 0.97 as this is the fall-back-benchmark for the direct cost (free certificates).
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	The extra cost of the EU ETS passed on through electricity prices is not providing an incentive for further energy efficiency investments. On the contrary, it lowers the amount of capital available for investments in new technologies or machines. A carbon inclusion (of imported fertilizers) mechanism would be the best way to ensure a level playing field and at the same time to incentivise both EU producers and importers to improve their energy efficiency.

20.16 - Manufacture of plastics in primary forms	Indirect cost compensation serves to compensate the financial burden of indirect costs in order to protect against carbon leakage - it is a discharge of a charge. This means, that energy efficiency measures are not allowed to become a requirement for indirect cost compensation. Energy efficiency measures are realized by companies in their own financial interest. No trigger via indirect compensation is needed.
20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	Full compensation would be the first best because it leaves financial space for energy efficiency measures. Most sectors already invested in energy efficiency measures.
21.10 - Manufacture of basic pharmaceutical products	The level of compensation must be indexed with CO_2 costs. Producers in Europe have already implemented the investments for energy efficiency. Energy efficiency improvements are driven by the cost of energy.
23.11 - Manufacture of flat glass	Energy efficiency improvements are driven by the cost of energy, and the climate and energy efficiency EU policies (under the EU ETS and Energy Efficiency directives). A high level of compensation for indirect emissions costs will not disincentivise improvements since its impact on the total energy cost will be limited. Glass for Europe therefore believes that a level of compensation of 85%, sustained throughout the EU ETS Phase IV, is the appropriate level to protect against the risk of carbon leakage and to maintain an incentive for energy efficiency improvements, in the framework of existing EU State Aid rules.
23.14 - Manufacture of glass fibres	The sector industry has been making significant efforts to reduce both direct and indirect emissions. Today, the potential for improvement is incremental since breakthrough technologies are not expected to be implemented before the end of ETS IV.
23.31 - Manufacture of ceramic tiles and flags	Most plants are already equipped with BAT for energy efficiency measures, except for breakthrough technologies that are not likely to deliver results over the ETS IV period. Therefore, efficiency benchmarks are not fully efficient and should not further reduce emissions in the short run. Cerame-Unie believes it is key to develop positive incentives to further reduce emissions in a long-term perspective (defined carbon and electricity price targets, visibility on regulatory parameters).
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	Electricity efficiency benchmarks are unlikely to push further investment in the NACE 23.51 sector. Under current and expected market conditions over the ETS IV period, incentives for energy efficiency investments are very limited. Indeed, further deterioration in margins will lead to a flight of capital away from the cement industry.
24.10 - Manufacture of basic iron and steel and of ferro-alloys	Compensation of indirect costs does not distort incentives for energy efficiency investments because it is still based on very strict benchmarks reflecting the best performance in the sector. On the contrary, reducing the compensation below this technically achievable level undermines the financial ability of the companies to invest in further energy efficiency measures since it exposes them to unavoidable costs. Therefore, aid intensity at 100% is justifiable in this regard since (limited or digressive) aid intensity is not the appropriate tool to promote investments.
24.20 - Manufacture of tubes, pipes, hollow profiles and	Higher than 75%. As the sector is electro - intensive and electricity costs are high, it already has incentives to reduce its electricity consumption.

related fittings, of steel	
24.42 - Aluminium production	The cost is so high that there is no need (or 'room') for extra incentives, any reduction of aid will reduce profit margins and hinder investments. In addition, as there is always uncertainty about actually receiving future compensation, regardless of its level, electro-intensive companies need to invest in energy efficiency in any case, in order to stay competitive in the market. Benchmark is the best methodology to incentivize energy efficiency and emissions reduction. Additional binding energy efficiency requirements are not in line with the objectives to minimize the risk of carbon leakage. We find it inappropriate to condition the compensation by energy efficiency improvements, as long as the indirect costs are not the result of the European aluminium industry's actions, but the responsibility of the European electricity sector.
24.43 - Lead, zinc and tin production	There will always be an incentive to invest in energy efficiency improvements. However, only the highest level of compensation will provide sufficient financial margin to execute such investments. The lower the level of compensation, the higher the risk that lack of capital will lead to cancellation of investments.
24.44 - Copper production	Sector is energy intensive and is engaged to continue to improve its energy efficiency by adopting energy management system, which continuously monitors and encourages to act upon energy savings opportunities with top management support. For eligible sectors, the percentage of indirect cost compensated should be at least 85% and remain stable throughout the period. It should be noted that degressive aid, from a policy perspective, does not serve any function. Indeed, the decarbonisation of EU electricity markets will ensure that aid beneficiaries do not become dependent. Instead, the instrument to reduce aid given in line with the electricity market decarbonisation should be regular updates of the emission pass-through factor - not a degressive aid scheme.
24.45 - Other non-ferrous metal production	Reduced compensation will reduce the capital available to invest in energy efficiency improvements. Carbon compensation thus becomes a tool, not a barrier, for promoting industrial sectors' energy efficiency measures. As energy is a major element in our overall production costs, we have to permanently improve our energy efficiency to remain competitive with nickel producers outside Europe. In order to allow our industry to continue investing into energy efficiency and to further decarbonize our production processes, there is a need to get full compensation throughout the entire period.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 5: Responses to targeted consultation question 10

Table 16: Responses to targeted consultation question 10
"What level of aid intensity would best safeguard (minimise) the risk of competition distortions between different undertakings, i.e. due to the fact that some Member States would be able to grant full compensation whilst other may decide to grant no compensation or due to the gap between the treatment of sectors offering substitutable products?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	The electricity intensive processes of iron ore mining are carried out in only one Member State (Sweden), so the risk of market distortion in intra-EU trade should not be a concern for the time being. There are no substitutes available for the main downstream market, namely the steel sector.
07.29 - Mining of other non-ferrous metal ores	If not all Member States grant compensation to NACE 07.29 installations, there is a risk of competition distortions within the sector. To avoid intra-EU distortions, all Member States should provide the same level of aid intensity.
08.91 - Mining of chemical and fertiliser minerals	Indirect emission costs compensation should fully balance indirect emission costs added to electricity prices for industries exposed to carbon leakage, and this in all member states in the same way. The fact that the exchangeability of fuel and electricity was used in setting the benchmark means that full compensation is needed to avoid distortion between EU producers.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	Navigant does not suggest a level of aid intensity to avoid conflicts of interest. However, if not all Member States grant compensation, there is a risk of competition distortions within the sector and with other sectors, such as the sugar beet sector. Since the energy costs are considerable in relation to operating costs and the sector is unable to pass these costs to their customers, any company within the sector that receives State Aid would outcompete the companies that would not receive such aid.
10.81 - Manufacture of sugar	Full compensation of ETS costs associated with use of grid electricity are seen as adequate. The biggest distortion for the market is the different industrial electricity prices in the Member states.
11.06 - Manufacture of malt	If the level of aid intensity will not be 100%, there will be risks of competition distortions between sectors (starch in competition with malt).
13.10 - Preparation and spinning of textile fibres	N/A

13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	An aid intensity limited to 75% would not be sustainable for the European industry as the CO_2 price will increase. Assessing the situation within the EU, unfortunately some EU member states introduced this compensation, others not which causes a distortion.
17.11 - Manufacture of pulp	First and foremost, each Member State can compensate to the maximum level allowed. In this respect, it should be noted that, over the past years, the number of Member States providing compensation has increased. The European Commission also has a role to play in minimizing the risk of competition distortions and encouraging Member States to provide compensation for indirect costs and support investment in industrial activities.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	In the respect to provide a level playing field within the EU, the EC should urge Member States to enact the Directive accordingly and to introduce an indirect costs compensation scheme based on a harmonized approach defined by the revised Guidelines. The current situation where not all MS have adopted measures in favour of carbon leakage exposed (sub)sectors due to significant indirect costs, cannot be used as an excuse to have a lower overall amount of aid.
20.11 - Manufacture of industrial gases	EIGA does not suggest a level of aid intensity. If not all Member States provide compensation to NACE 20.11, there may be some minimal risk of competition distortion at internal borders. However, the industrial gas company could follow the customer and therefore limit the potential risk of competition distortion between different undertakings.
20.12 - Manufacture of dyes and pigments	A high level of compensation aid might lead to a market distortion intra-EU.
20.13 - Manufacture of other inorganic basic chemicals	Given the chemical industry market characteristics the carbon leakage risk is best addressed by full indirect CO_2 cost compensation. There should be no degressive or partial compensation that will only increase chemical companies' carbon leakage risk exposure in comparison with extra EU competition.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	Indirect emission costs compensation should fully balance indirect emission costs added to electricity prices for industries exposed to carbon leakage, and this in all member states in the same way. The fact that the exchangeability of fuel and electricity was used in setting the benchmark means that full compensation is needed to avoid distortion between EU producers.
20.16 - Manufacture of plastics in primary forms	The level of compensation has to be comprehensive and cover indirect cost fully.

20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	The carbon leakage risk is best addressed by full indirect CO_2 cost compensation. There should be no degressive or partial compensation that will only increase chemical companies' carbon leakage risk exposure in comparison with extra EU competition. The current 'public demand' to use more bio-based materials is already a problem due to the unavailability of certified bio-materials. The prospects of investing into bio-based materials are thus uncertain; what seems sustainable and financially viable today can be environmentally and financially unsustainable in a few years' time.
21.10 - Manufacture of basic pharmaceutical products	As there is only one producer, there is no risk to market distortion within EU.
23.11 - Manufacture of flat glass	The European flat glass sector is made up of multinational firms with manufacturing facilities located in several Member States, while the products from these installations are marketed and sold throughout the European Union. Glass for Europe considers that the risk of distortion of competition in the sector, if any, is mitigated by the fact that each corporation has installations in several Member States. Flat glass products can be substituted by other materials covered for indirect cost compensation in ETS Phase III and are included as part of this current consultation exercise. To avoid that this risk materialises in Phase IV of the EU ETS, all sectors, once deemed eligible by EU authorities, should be compensated according to the same calculation methodology for determining the level of State Aid in each of the Member States that puts in place compensation schemes.
23.14 - Manufacture of glass fibres	If Member states were to grant differentiated compensation, the risk of internal competition distortion would remain low. However, if a given country were not granted compensation, extra-EU players would de facto be favoured over EU players. Indeed, extra-EU players do not operate by economic and environmental European rules and are already gaining market shares, leading EU players to relocate in countries where labour is cheaper and ETS rules do not apply.
23.31 - Manufacture of ceramic tiles and flags	The risk of competitive distortions mainly comes from non-EU countries, rather than between different EU countries. The absence of aid in an EU country would be in favour of non-EU manufacturers and would not exacerbate competition from other EU countries. Therefore, indirect emission costs should be fully compensated.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	Specific approaches to compensation among Member States would not necessarily create distortions internally but could rather favour extra-EU players over EU players depending on Member States' respective proximity to extra-EU exporting countries and depending on bulk shipping accessibility. The aid would not fully compensate this competitiveness gap, but its absence would further exacerbate the phenomenon. Also, because concrete competes on the downstream construction market with steel, which is already eligible for indirect compensation, substitution between the two building materials could increase.

24.10 - Manufacture of basic iron and steel and of ferro-alloys	The steel sector is in high competition both within the EU and vis a vis third countries' producers. The extra-EU competition puts the whole EU market under great pressure and risk of carbon leakage. The different treatment of sectors is inherent and fully justifiable within the EU ETS mechanism because the carbon leakage exposure of those sectors is different (i.e. lower). In this context, it could be argued that reducing compensation to the most exposed sectors would actually undermine their competitive position against the lower exposed sectors since they would remain exposed to much higher indirect costs caused by the EU-wide cap and trade mechanism.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	Higher than 75%. The sector faces high competition within the EU and vis a vis third country producers. This situation results from those member states that do not implement the Guidelines and do not grant compensation.
24.42 - Aluminium production	With the significant import dependency of aluminium, a reduction in production in one (non-compensating) Member State will likely not be replaced by increased production in another, but rather by increased imports from outside the EU. The aid intensity should be at least 85%, with the possibility for a proportionate adaptation to the actual impact of the indirect costs on the competitiveness of the undertakings operating in an eligible sector.
24.43 - Lead, zinc and tin production	Reduced aid to avoid the risk of distortions of competition in the internal market, will for the most electro intensive industries, only lead to increased risk of carbon leakage. If a Member State does not grant compensation, then this must not be to the detriment of all other market players and Member States, especially not in the light of the fact that we are a price-taker industry and the main competitors of the electricity-intensive industry are outside the EU.
24.44 - Copper production	Given that we are a price-taker sector, facing the highest level of global competition, only a maximum aid intensity would minimise the risk of competition distortion. Indirect carbon costs related to outsourced oxygen production, which are integral part of the copper production process should also be eligible to receive compensation. Not making outsourced oxygen eligible will lead to a distortion between companies who choose to outsource production and those who do not.
24.45 - Other non-ferrous metal production	Nickel producers experience competition with producers outside EU. As we are a price taker industry, we cannot pass on costs to our customers. It therefore is of critical importance that companies are fully compensated for indirect costs throughout the entire trading period.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 6: Responses to targeted consultation question 11

Table 17: Responses to targeted consultation question 11
"How would a degressive indirect emissions cost compensation, e.g. starting at 75% of the aid intensity, affect the risk of carbon leakage in the sector?"

Sector	Summary of the response
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	Any compensation less than full compensation reduces the competitiveness of the mining of iron ore sector compared with companies producing outside of Europe, since production cost is the main driver of competitiveness. Given the market characteristics of the sector, such as no pricing power, general low prices and strong international competition, a degressive compensation would likely increase the risk of carbon leakage.
07.29 - Mining of other non-ferrous metal ores	Any compensation less than full compensation reduces the competitiveness of the other non-ferrous metals mining sector compared with companies producing outside of Europe, since cost is the main driver of competitiveness. A degressive compensation would likely increase the risk of carbon leakage.
08.91 - Mining of chemical and fertiliser minerals	As stated above, any partial compensation of the indirect costs of the EU ETS triggers an incentive to relocate production where no such cost exists. Given the trade intensity of the EU fertilizer industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	Any compensation less than full compensation reduces the competitiveness of the Starch sector compared with companies producing outside of Europe, since production cost is the main driver of competitiveness. Given the market characteristics of the starch sector a degressive compensation would likely increase the risk of carbon leakage.
10.81 - Manufacture of sugar	It would reduce the carbon leakage risk also between EU Member States.
11.06 - Manufacture of malt	If the level of aid intensity will not be 100%, this might affect the competitivity of the malting sector, hence there would be a concrete risk of delocalization of production activities outside the EU.
13.10 - Preparation and spinning of textile fibres	N/A

13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	An aid intensity limited to 75% would not be sustainable for the European industry as CO_2 price will increase. A degressive approach is not applicable as with rising electricity costs the proportion of granted compensation will be automatically lower over time.
17.11 - Manufacture of pulp	Increasing exposure to carbon prices is not an effective measure to avoid the risk of carbon leakage. The more degressive the cost compensation, the higher the risk of carbon leakage.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	The more indirect costs compensation is degressive, the greater the risk of carbon leakage.
20.11 - Manufacture of industrial gases	Any compensation less than full compensation reduces the competitiveness of, and hence exacerbates investment carbon leakage from, the relevant industrial gas value chain compared with similar industrial gas value chains outside the EEA since production cost is the main driver of competitiveness.
20.12 - Manufacture of dyes and pigments	The degressivity principle is not adapted because international competitivity is increasing.
20.13 - Manufacture of other inorganic basic chemicals	Undersupply of compensation e.g. from starting at 75% increases the EU companies‘ exposure to the risk of carbon leakage. Accordingly, indirect emissions cost compensation should start at least at 85% as a minimum.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	As stated above, any partial compensation of the indirect costs of the EU ETS triggers an incentive to relocate production where no such cost exists. Given the trade intensity of the EU fertilizer industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.
20.16 - Manufacture of plastics in primary forms	A general deduction leads to an inadequate compensation. The level of compensation is already shortened by several factors: E.g. in case of a fall-back benchmark the deduction is 40% (degressivity factor 75% x fall-back factor 0.8) for the years 2019/2020. The aid intensity must be 100% with no degressivity factor.
20.17 - Manufacture of synthetic rubber in primary forms	N/A

20.60 - Manufacture of man-made fibres	Undersupply of compensation e.g. from starting at 75% increases the EU companies' exposure to the risk of carbon leakage. Given the trade intensity of the industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.
21.10 - Manufacture of basic pharmaceutical products	The sector is an international competitive market, it is important to benefit from a compensation aid without degressivity corresponding to the indirect emissions cost in order to be competitive around the world.
23.11 - Manufacture of flat glass	The indirect emissions cost compensation is meant to address the risk of carbon leakage resulting from increases in electricity costs due to the EU ETS. A degressive indirect cost compensation should only be contemplated in the event that outside EU countries with laxer CO_2 emission constraints start implementing equivalent measures to the EU ETS. So long that this is not the case, the carbon leakage risk in the flat glass sector will only increase as the level of compensation decreases.
23.14 - Manufacture of glass fibres	A degressive cost compensation scheme would not address the risk of carbon leakage since it would create negative margins as early as 2025, preventing the sector from investing - notably in energy efficiency measures.
23.31 - Manufacture of ceramic tiles and flags	The combination of a degressive indirect emissions cost compensation scheme and ambitions of reduced emissions for the electricity sector in the coming years, leading to increased electricity prices, would have significant impacts on the industry and further increase the carbon leakage risk. A stable or full compensation would better address the risk of carbon leakage, especially considering the electrification of processes is the best option for the industry to reduce overall emissions in the long term.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	A degressive indirect emissions cost compensation would increase the risk of carbon leakage. Indeed, in the era of decarbonisation, the carbon leakage risk should shift from direct to indirect emissions. Lowering the aid intensity will directly affect the competitiveness of the cement sector and increase the risk of carbon leakage. If no aid is provided to the sectors, profit margins will become negative.
24.10 - Manufacture of basic iron and steel and of ferro-alloys	The steel sector is highly exposed to carbon leakage risk linked to indirect costs and is unable to pass through unilateral regulatory costs without genuine risk of losing market shares. Therefore, existing and further reductions of the aid intensity below 75% undermine the effectiveness of the carbon leakage provisions because actually the risk faced by the sector is not digressive. This risk is even more relevant in the context of much higher carbon prices compared with the ones experienced until 2017.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	The seamless steel pipes sector is highly exposed to carbon leakage risks linked to indirect costs and to its trade intensity and is unable to pass through unilateral regulatory costs without risk of losing market shares. Therefore existing and further reductions of the aid intensity below 75% undermine the effectiveness of the carbon leakage provisions because the risk faced by the sector is not degressive.
24.42 - Aluminium production	For the most electro intensive industries as aluminium, decreasing the aid intensity would result in a huge cost increase compared with competitors outside Europe. The shrinking margins would create a strong barrier to new investments, thus causing investment leakage, which would then lead to a further loss of capacity, resulting in carbon leakage.

24.43 - Lead, zinc and tin production	Due to the lack of proportionality of aid, the most electro-intensive sectors face a substantially higher risk of carbon leakage. A degressive State Aid, starting at 75% and linked to historic capacity with CO_2 price at €20-30 or even higher, would drive the industry in a situation of permanent loss.
24.44 - Copper production	Any amount less than the current amount will increase the risk of carbon leakage. It should be noted that digressive aid, from a policy perspective, does not serve any function. Indeed, the decarbonisation of EU electricity markets will ensure that aid beneficiaries do not become dependent. Instead, the instrument to reduce aid given in line with the electricity market decarbonisation should be regular updates of the emission pass-through factor – not a digressive aid scheme.
24.45 - Other non-ferrous metal production	As a price-taker industry, we cannot pass on any costs to our customers. Limiting the State Aid to a certain level and combining this with a digression over time will lead to a loss of competitiveness. Companies will be required to postpone or even cancel investments into innovation or plant renewal and this will lead to a loss of their competitiveness.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 7: Responses to targeted consultation question 12

Table 18: Responses to targeted consultation question 12
"How would a degressive cost compensation, e.g. starting at 75% of the aid intensity, affect the sector's incentives for energy efficiency improvements?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	Companies in this sector are seeking to reduce carbon emissions by electrification of operations. Given that installations are competing on costs, many are already attempting to use best available technologies to increase their energy efficiency and reduce energy costs. Compensation at levels below the full additional cost incurred will reduce available funding for additional investments.
07.29 - Mining of other non-ferrous metal ores	Companies in this sector are seeking to reduce carbon emissions by further electrification of operations. Given that installations are competing on costs, many are already attempting to use best available technologies to increase their energy efficiency and reduce energy costs. Compensation at levels below the full additional cost incurred will reduce available funding for additional investments. In addition, degressive cost compensation might lead to further pressure on profit margins.
08.91 - Mining of chemical and fertiliser minerals	Due to the climate ambition and the future availability of renewable electricity there is a drive towards electrification of pumps, compressors and boilers. Reduction of the compensation of indirect costs will hamper this transition.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	There seems to be limited scope to further reduce indirect emissions without significantly increasing costs, given that installations are already using best available technologies as much as possible to increase their energy efficiency and reduce energy costs. Compensation at levels below the full additional cost incurred will reduce available funding for additional investments. In addition, degressive cost compensation might lead to further pressure on profit margins.
10.81 - Manufacture of sugar	It would intensify the installation of electricity driven efficient technologies like industrial heat.
11.06 - Manufacture of malt	The level of aid intensity envisaged for our sector is 100%. The level of compensation will not affect the interest of our sector in reducing the cost related to energy consumption. Only a higher cost of energy will drive an increase in adoption of investments in energy efficiency.
13.10 - Preparation and spinning of textile fibres	N/A

13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	A degressive approach is not applicable as with rising electricity costs the proportion of granted compensation will be automatically lower over time.
17.11 - Manufacture of pulp	It would act as a disincentive for investments. It would erode profit margins, making more attractive to invest outside Europe
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	The more indirect costs compensation is degressive, the greater the risk of carbon leakage. Electrification is one of the major options to decarbonize the sector's processes. So, if the sector is not compensated for indirect costs, it would create a financial obstacle to electrification investment and increase operating costs affecting directly carbon leakage risk (electrification not being directly linked to energy efficiency gains). For these reasons and in light of the revision/tightening of the benchmarks, we stand in favour of starting with total indirect costs compensation (i.e. 100%) with no decline.
20.11 - Manufacture of industrial gases	There seems to be limited scope to further reduce indirect emissions, given that installations already attempt to use best available technologies as much as possible to increase their energy efficiency and to reduce energy costs. Regardless of aid intensity, the sector will consistently aim at maximizing energy efficiency.
20.12 - Manufacture of dyes and pigments	The process are already mature and no major technological improvements is expected. The compensation aid is not an incentive to energy efficiency improvements.
20.13 - Manufacture of other inorganic basic chemicals	Given the chemical industry market characteristics the carbon leakage risk is best addressed by full indirect CO_2 cost compensation at 100% of a realistic benchmark. Combining indirect cost compensation with additional energy efficiency requirements will not add value but will increase administration needs. Undersupply of compensation will increase the risk of carbon leakage and the risk of relocating investment.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	Due to the climate ambition and the future availability of renewable electricity there is a drive towards electrification of pumps, compressors and boilers. Reduction of the compensation of indirect costs will hamper this transition.
20.16 - Manufacture of plastics in primary forms	Indirect cost compensation serves to compensate the financial burden of indirect costs in order to protect against carbon leakage - it is a discharge of a charge. This means that energy efficiency measures are not allowed to become a requirement for indirect cost compensation.

	Energy efficiency measures are realized by companies in their own financial interest. No trigger via indirect compensation is needed.
20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	Full compensation would be the best because it leaves financial space for energy efficiency measures. Most sectors already invested in energy efficiency measures.
21.10 - Manufacture of basic pharmaceutical products	There is no major technological disruptions expected soon. The compensation aid will not incentivise to energy efficiency improvements as they are already implemented due to energy costs.
23.11 - Manufacture of flat glass	In the flat glass sector, energy efficiency improvements are driven by the cost of energy, and the climate and energy efficiency objectives and obligations, which are covered under the EU ETS and Energy Efficiency directives. These incentives will remain throughout the next phase of the EU ETS, independently of the level of compensation granted to the flat glass sector. A degressive compensation system will therefore offer no additional incentive to energy efficiency improvements and investments.
23.14 - Manufacture of glass fibres	A degressive cost compensation scheme would negatively affect the sector's investment capacity since it would significantly create negative margins as early as 2025. Investments in energy efficiency improvements would therefore be very difficult.
23.31 - Manufacture of ceramic tiles and flags	A degressive indirect emission cost compensation would be a wrong signal to the reduction of the industry emissions as the shift from direct (gas) to indirect emissions (electricity) is key to further reducing the industry emissions in the future. Therefore, a degressive indirect emission cost compensation would prevent/slow down efforts from players in the industry to make long-term investments in electricity kilns and dryers.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	The cement sector has already invested heavily in energy efficiency improvements. One of the technologies that may help in further maximizing energy efficiency is investment in waste heat recovery installations. Indirect cost compensation could help in doing so but a 75% aid intensity which, in addition, would be degressive, will not restore the competitiveness of the sector.
24.10 - Manufacture of basic iron and steel and of ferro-alloys	Reducing the compensation below the technically achievable level of performance benchmarks undermines the financial ability of the companies to invest in further measures since it exposes them to unavoidable costs.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	As the sector is electro-intensive and electricity costs are high, it already has incentives to reduce its electricity consumption. Reducing the compensation below this technically achievable level undermines the financial ability of the companies to invest in further energy efficiency measures, since it exposes them to unavoidable costs.

24.42 - Aluminium production	With rising ETS prices, a further degressive compensation would lead to huge cost increases, reduced profit margins and no financial resources for energy efficiency investments. For the most electro intensive industries, a further degressive compensation would most likely lead to closure of capacity. Compensation of the extra costs from EU ETS does not reduce the incentives to become more energy efficient. A reduction of compensation leads to cost increase and shrinking margins lead to reduced financial resources for investments in energy efficiency improvements.
24.43 - Lead, zinc and tin production	In summary, reduced compensation will reduce the capital available to invest in energy efficiency improvements.
24.44 - Copper production	Any amount less than the current amount will increase the risk of carbon leakage and this will be an impediment for energy efficiency improvements.
24.45 - Other non-ferrous metal production	In case the indirect emission cost compensation is reduced, there is a risk that companies will reduce capital investments in innovation and energy efficiency improvements. The increasing carbon price throughout the last two years as well as the forecast for the time period 2021-2030 indicate that companies would no longer be capable to deal with both indirect costs as well as energy efficiency investments.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 8: Responses to targeted consultation question 13

Table 19: Responses to targeted consultation question 13
"How would a degressive cost compensation, e.g. starting at 75%, affect the risk of competition distortions between different undertakings, e.g. due to the fact that some Member States would be able to grant full compensation whilst others may decide to grant no compensation or due to the gap between the treatment of sectors offering substitutable products?"

Sector	Summary of the response
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	The electricity intensive processes of iron ore mining are carried out in only one Member State (Sweden), so the risk of market distortion in intra-EU trade should not be a concern for the time being. However, given the fact that he updated State Aid Guidelines will refer to the 2021 – 2030 period, future iron ore exploration and extraction should also be taken into consideration. There are no substitutes available for the main downstream market, namely the steel sector.
07.29 - Mining of other non-ferrous metal ores	To limit possible distortions, all Member States should provide the same level of aid intensity to enable a level playing field within the sector. A degressive cost compensation would likely affect the risk of competition distortions within the other non-ferrous metal mining sector. Many non-ferrous metal ores have no substitutes. However, where substitutes do exist and other sectors receive State Aid, distortions are likely to occur. Furthermore, lack of or limited compensation would likely affect the other non-ferrous metal mining sector's competitiveness in the international market.
08.91 - Mining of chemical and fertiliser minerals	Undersupply of compensation will increase the risk of carbon leakage and the risk of relocating investment. Given the trade intensity of the EU fertilizer industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	To limit possible distortions, all Member States should provide the same level of aid intensity to enable a level playing field within the sector. A degressive cost compensation would likely affect the risk of competition distortions within the starch sector and between the starch sector and other sectors (e.g. sugar beet) in Europe. Furthermore, lack of or limited compensation would likely affect the starch sector's competitiveness in the international market.
10.81 - Manufacture of sugar	There is still a high risk of competition distortion depending on the industrial electricity prices and the given cost compensation. Companies in Member States with high industrial electricity prices and without cost compensation will have a higher barrier to investing in low carbon technologies via electrification.

11.06 - Manufacture of malt	No competition distortion is expected at EU level regarding our sector. If the level of aid intensity is not 100%, there will be risks of competition distortions between sectors (starch in competition with malt).
13.10 - Preparation and spinning of textile fibres	N/A
13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	A degressive approach is not applicable as with rising electricity costs the proportion of granted compensation will be automatically lower over time.
17.11 - Manufacture of pulp	Product substitution should be determined by market conditions. Interfering in the market with degressive cost compensations will not be helpful, as undertakings will focus on mitigating the impact of increasing carbon costs on their own business, rather than investing in product substitution.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	Any discrepancy between EU countries may introduce a competition distortion between EU refineries. However, what is primarily at stake for EU refiners is their competitiveness against refiners operating in other regions of the world enjoying lower operating costs. Therefore, indirect emissions costs compensation for refiners will tackle the most critical issue of competitiveness. Competition distortion intra-EU countries is a second order of magnitude effect.
20.11 - Manufacture of industrial gases	To limit possible distortions all Member States should provide the same level of aid intensity to enable a level playing field across all sectors. To maintain the competitiveness compared with businesses outside of Europe, the full amount of additional carbon pass-through costs should be compensated.
20.12 - Manufacture of dyes and pigments	The risk of market distortion intra-EU is non-negligible, independently of the degressivity of the compensation aid.
20.13 - Manufacture of other inorganic basic chemicals	Undersupply of compensation will increase the risk of carbon leakage and the risk of relocating investment. Given the trade intensity of the EU chemical industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	Undersupply of compensation will increase the risk of carbon leakage and the risk of relocating investment. Given the trade intensity of the EU fertilizer industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.

20.16 - Manufacture of plastics in primary forms	The level of compensation has to be comprehensive and cover indirect costs fully. The refusal of Member States to meet this obligation shall not be used as argument for insufficient compensation.
20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	Undersupply of compensation e.g. from starting at 75% increases the EU companies' exposure to the risk of carbon leakage. Given the trade intensity of the industry, a loss of global competitiveness due to indirect carbon costs could be more harmful than internal market distortions from diverse national compensation schemes.
21.10 - Manufacture of basic pharmaceutical products	As there is only one producer, there is no risk of market distortion within the EU.
23.11 - Manufacture of flat glass	In Glass for Europe's view, the risk of competition distortion between different undertakings in the flat glass sector can be contained due to the sector's widespread presence across Europe. A degressive cost compensation is not necessary to that end. As regards sectors offering substitutable products, sectors, once deemed eligible by EU authorities, should be compensated according to the same calculation methodology for determining the level of State Aid in each of the Member States that puts in place compensation schemes. Member States should not be allowed to pick and choose among eligible sectors nor to modulate the compensation levels between sectors.
23.14 - Manufacture of glass fibres	A degressive cost compensation scheme would negatively affect the sector's competitive environment. With negative margins as early as 2025 in a degressive scenario, the risk of relocation outside of the EU is high, making room for extra-EU players on the market.
23.31 - Manufacture of ceramic tiles and flags	The risk of competition distortion mainly comes from non-EU countries rather than between different EU countries. The absence of aid in an EU country would be in favour of non-EU manufacturers and would not exacerbate competition from other EU countries.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	Unless compensation for indirect costs is granted, competition will first emerge from extra-EU operators, especially close to EU borders or with high accessibility to bulk shipping, rather than from intra-EU players. A degressive cost compensation will only exacerbate this situation. Also, because concrete competes on the downstream construction market with steel, which is already eligible for indirect compensation, substitution between the two building materials could increase.
24.10 - Manufacture of basic iron and steel and of ferro-alloys	The steel sector is in high competition both within the EU and vis a vis third countries' producers. The extra-EU competition puts the whole EU market under great pressure and risk of carbon leakage.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	Compensation should remain at the maximum level and remain stable over the period.

24.42 - Aluminium production	With the high import rate of aluminium, the competition is not so much within European production, but rather between Europe and countries outside. The only effect of reducing aid is a huge cost and increasing risk of closure of capacity in Europe. aA reduction in production in one (non-compensating) Member State will not likely be replaced by increased production in another, but rather by increased imports from outside the EU.
24.43 - Lead, zinc and tin production	Given the global dynamics of the industry, EU production will be replaced by non-EU production. Companies without State Aid would likely close down somewhat earlier, to be replaced by non-EU production not impacted by the ETS.
24.44 - Copper production	For the European copper sector, the competition is on the global scale. If one smelter closes, its replacement will not be in EU but outside. Therefore, given our electro-intensive nature and price-taker status, the copper industry is particularly exposed to carbon leakage due to the indirect costs of the EU ETS.
24.45 - Other non-ferrous metal production	Nickel producers experience competition with producers outside EU. As we are a price-taker industry, we cannot pass on costs to our customers. It therefore is of critical importance that companies are fully compensated for indirect costs throughout the entire trading period. We also would like to stress that in a wide range of end use products such as e.g. tubular products or building and construction, we are in competition with a number of raw materials that are compensated for indirect emission costs – while we are not.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 9: Responses to targeted consultation question 14

Table 20: Responses to targeted consultation question 14
"Based on the situation of the sector concerned, what is the likelihood that – following the update of the efficiency benchmarks - further efficiency gains will be possible?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	The sector's competitiveness is different as far as production costs are concerned, which is driven by mainly energy costs. Due to the competitive pressures from foreign producers, the sector is constantly attempting to improve costs and hence energy efficiency. Following the update of the efficiency benchmarks, further gains could be possible as long as they are technically and financially feasible. At the same time, most emissions are due to direct emissions, so in terms of indirect emissions intensity there are limited reduction possibilities with current technologies.
07.29 - Mining of other non-ferrous metal ores	The sector's competitiveness depends on production costs, which are driven by energy, equipment and labour costs. Due to the competitive pressures from foreign producers, the sector is constantly attempting to improve costs and hence energy efficiency. Following the update of the efficiency benchmarks, further gains could be possible as long as they are technically and economically feasible.
08.91 - Mining of chemical and fertiliser minerals	Energy efficiency in the nitrogen fertilizer industry has significantly improved in the last 50 years. The most modern plants are close to the theoretical optimum, but for the others, energy gains are still possible. However, because 95% of the energy costs (including feedstock) comes from natural gas and only 5% from electricity, the energy efficiency improvement is not necessarily reflected in the specific electrical consumption. Furthermore, if the economic conditions are met, further decarbonization of the process could lead to an increase in electricity consumption.
08.93 - Extraction of salt	
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	
10.62 - Manufacture of starches and starch products	The sector's competitiveness depends on production costs, which are driven by energy and raw material costs. Due to the competitive pressures from foreign producers, the sector is constantly attempting to reduce costs and improve energy efficiency. Following the update of the efficiency benchmarks, some further gains could be possible if they are technically feasible, but these would lead to marginal improvements given the efforts already made on energy efficiency improvements. At the same time, most energy efficiency improvements would impact direct emissions, so in terms of indirect emissions intensity there are limited reduction possibilities with current technologies.
10.81 - Manufacture of sugar	Only small further efficiency gains are possible based on known and available technologies.

11.06 - Manufacture of malt	Our sector can be extremely affected by two factors: production costs, such as electricity, and competition from similar products, such as starch, from countries outside the EU. Hence, our sector will be available and willing to invest in measures for enhancing energy efficiency only if such measures could be technically feasible and financially viable.
13.10 - Preparation and spinning of textile fibres	N/A
13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	The electricity consumption efficiency benchmarks should take into account the most energy efficient product specific technology. But they should be equal within the whole European Union and updated over time.
17.11 - Manufacture of pulp	The sector has improved energy efficiency on average by 8% since 2010. Electricity intensity also improved by 12% over the same period. Although we are not in a position to forecasts future efficiency gains, it is likely that these gains will continue in the future. However, past performance trends are not necessarily valid indicators of future performance. Finally, as other examples have shown, the marginal improvements will diminish, since efficiency improvements become more difficult over time.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	Since 1992, the energy efficiency in refining has improved continuously. As technology improves the refiners are also improving their operation via investments in energy saving projects to reduce costs and improve competitiveness. As innovation continues, the same trend is to be expected in the future, if investments can be maintained inside the EU.
20.11 - Manufacture of industrial gases	The sector's competitiveness depends on production cost, which is driven mainly by energy costs. Due to high share of electricity costs, the sector is constantly attempting to improve energy efficiency. Following the update of the efficiency benchmarks, there are only limited additional efficiency gains possible in industrial gas production as production is already close to optimal efficiency.
20.12 - Manufacture of dyes and pigments	The probability is low because the process is already mature and no major technological improvements are expected.
20.13 - Manufacture of other inorganic basic chemicals	Due to economic interests, plant operators have already explored energy efficiency gains from efficiency measures. In the absence of technology breakthroughs, resulting incremental additional improvements can be realized albeit with a decreasing or even negative cost-benefit relationship.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals

20.15 - Manufacture of fertilisers and nitrogen compounds	Energy efficiency in the nitrogen fertilizer industry has significantly improved in the last 50 years. The most modern plants are close to the theoretical optimum, but for the others, energy gains are still possible. However, because 95% of the energy costs (including feedstock) comes from natural gas and only 5% from electricity, the energy efficiency improvement is not necessarily reflected in the specific electrical consumption. Furthermore, if the economic conditions are met, further decarbonization of the process could lead to an increase of electricity consumption.
20.16 - Manufacture of plastics in primary forms	Energy efficiency measures are realized by companies in their own financial interest. No trigger via indirect compensation is needed. Electricity consumption efficiency benchmarks need to reflect the technological reality and need to be achievable. They shall not be used indirectly, to regulate the level of compensation. Therefore benchmarks need to be realistic and technologically achievable. They have to be oriented by their economic feasibility.
20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	Benchmark updates must be realistic and technically feasible: Unrepresentative, unduly low benchmark values e.g. derived from exceptional, local constellations will lead to systematic undersupply of compensation/allocation, exposing affected companies to the risk of carbon leakage.
21.10 - Manufacture of basic pharmaceutical products	As they are the only producer in Europe, there is no benchmark for the sector. Nevertheless the best available techniques are implemented during investments.
23.11 - Manufacture of flat glass	The flat glass sector is not in the list of sectors eligible for indirect compensation under Phase III, therefore, no flat glass electricity efficiency benchmark was presented in the Commission Guidelines on certain State Aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012. Most plants in Europe's flat glass sector function at largely equivalent energy efficiency levels due to the thorough implementation of best available technologies. Yet, Glass for Europe members permanently seek solutions to optimize their operations and minimize energy costs now and for the future.
23.14 - Manufacture of glass fibres	The sector has already made significant efforts to reduce both direct and indirect emissions. Considering the current penetration levels of BATs (above 80%) and the fact that breakthrough technologies will not be implemented before the end if the ETS IV period, future efficiency gains seem quite limited.
23.31 - Manufacture of ceramic tiles and flags	There is limited technological capability for further efficiency improvements to be made in the coming years as most BATs are already being deployed in the industry.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	Further efficiency gains both on electric and thermal energy are limited in the cement sector. Nevertheless, given that energy costs make up a significant share of operating costs in the cement industry, producers that do not invest into energy saving face competitive disadvantage.

24.10 - Manufacture of basic iron and steel and of ferro-alloys	Since the sector is electro-intensive and electricity costs are high, it has incentives to reduce its electricity consumption. Due to that, it has significantly invested in energy efficiency measures, which leads to the sector being close to the technical limits and with limited abatement potential.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	Product benchmarks should be updated on the basis of real data from companies in more recent years.
24.42 - Aluminium production	To stay competitive the producers are continuously reducing the production cost, and for the most electro-intensive industries this means improved energy efficiency. However, for the smelting process, the electricity intensity is close to technical limits. Further energy efficiency gains are possible but require huge investments and external contribution (e.g. from public budget). The new EU innovation fund could be a good instrument in this sense.
24.43 - Lead, zinc and tin production	Over the past decade, the positive effect of energy efficiency measures were neutralized by energy consumption and environmental measures. The process as it stands today has already a very high thermodynamic yield and as such does not leave much opportunity to improve. In theory, it should be possible to make some significant savings by changing the anode material. However, 40 years of efforts have only shown that it is still not possible to make this work in practice. It seems as difficult as developing a nuclear fusion reactor.
24.44 - Copper production	We have strong reservations over the possibility of making compensation conditional upon energy efficiency investments. Industry with significant electricity cost has inherent interests in improving energy efficiency and has already made significant efficiency improvements. Further efficiency improvements are subject to diminishing returns without adequate indirect compensation.
24.45 - Other non-ferrous metal production	The nickel industry is on a permanent basis improving its energy efficiency. As energy is a major cost element in our production cost, this is permanently ongoing process. The improvements made in our industry are moreover sometimes diminished by requirements in other areas of EU legislation. Moreover, we would like to stress the heterogeneity within the industry. Setting benchmarks is therefore impracticable and does not result in realistic energy efficiency targets.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 10: Responses to targeted consultation question 15

Table 21: Responses to targeted consultation question 15
"What are the merits of modulating the aid intensity based on the different sectors' trade intensity?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	It contributes to preserving internationally competitive industries within the EU.
07.10 - Mining of iron ores	Trade intensity, an indicator of exports level in relation to imports, is not a measure of carbon leakage exposure risk. The carbon leakage exposure risk assessment should focus on three pillars, as described in the framework for qualitative assessments: abatement potential, market characteristics, profit margins.
07.29 - Mining of other non-ferrous metal ores	Trade intensity, an indicator of exports level in relation to imports, is not a measure of carbon leakage exposure risk. The carbon leakage exposure risk assessment should focus on three pillars: abatement potential, market characteristics, profit margins.
08.91 - Mining of chemical and fertiliser minerals	In EU-ETS the carbon leakage list is key for the allocation of free allowances. It is to be preferred to avoid new/additional criteria for the indirect costs compensation.
08.93 - Extraction of salt	If funds to compensate for carbon leakage risks exist it seems logical to compensate sectors more that have high trade intensity and high carbon leakage risk. We propose that if there is carbon leakage risk beyond a certain level then compensation is needed.
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	Trade intensity is not a measure of carbon leakage exposure risk. The carbon leakage exposure risk assessment should focus on three pillars: abatement potential, market characteristics and profit margins.
10.81 - Manufacture of sugar	As there is no modulation planned for the Carbon Leakage risks sectors in the free allocation, it would not be suitable for indirect cost compensation.
11.06 - Manufacture of malt	Trade intensity is not a measure of carbon leakage exposure risk. The carbon leakage exposure risk assessment should focus on three pillars: abatement potential, market characteristics and profit margins.
13.10 - Preparation and spinning of textile fibres	N/A
13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A

16.21 - Manufacture of veneer sheets and wood-based panels	N/A
17.11 - Manufacture of pulp	The ETS directive does not allow for modulation of protection against the risk of carbon leakage. There is no reason or legal basis for introducing such modulation in aid intensity for indirect carbon costs leading to the risk of carbon leakage. Moreover, it is worth noting that trade patterns can change from one year to another due to a large variety of factors. And past trade patterns do not necessarily reflect future patterns.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	At first, trade intensity, as mentioned in the Delegated Act on the CL list for the Phase IV, is deemed to be "*the most complete and reliable data on the total values of exports to third countries and imports from third countries*" and is together with the indirect emission intensity a crucial element to identify eligible (sub) sectors. Nevertheless, we do not support modulating the amount of aid intensity based on trade intensity.
20.11 - Manufacture of industrial gases	Trade intensity is by itself not a measure of carbon leakage exposure risk. Other factors play a substantial role for example, abatement potential and the ability of customer sectors to bear the indirect emissions costs of suppliers of critical inputs such as industrial gases. Hence modulating the aid intensity based on different sectors' trade intensity would be inconsistent with policy intent and potentially distort the playing field between sectors.
20.12 - Manufacture of dyes and pigments	We consider that trade intensity is the better criteria to the indirect emission cost compensation and prevent carbon leakage.
20.13 - Manufacture of other inorganic basic chemicals	This parameter should not later be used to modulate aid intensity concerning indirect emissions.
20.14 - Manufacture of other organic basic chemicals	Same as 20.13 - Manufacture of other inorganic basic chemicals
20.15 - Manufacture of fertilisers and nitrogen compounds	In EU-ETS the carbon leakage list is key for the allocation of free allowances. It is to be preferred to avoid new/additional criteria for the indirect cost compensation.
20.16 - Manufacture of plastics in primary forms	The compensation should be comprehensive for all eligible sectors.
20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	Since sectors' eligibility for free allocation has been determined once for the coming ten years up front including trade intensity as a factor, again, this parameter should not later be used to modulate aid intensity concerning indirect emissions. Making the aid intensity different based on the trade intensity makes the system more complicated.

21.10 - Manufacture of basic pharmaceutical products	We consider the trade intensity is the better criteria to the indirect emission cost compensation and prevent carbon leakage. Nevertheless, it seems reasonable that the sectors the most exposed, receive more compensation aid.
23.11 - Manufacture of flat glass	Modulation of aid intensity based on different sectors' trade intensity does not have any merit in Glass for Europe's view. It is often claimed that it would provide more predictability to sectors if resources are limited and provided sectors' output can be estimated. Most importantly, introducing a differentiation in State Aid intensity between sectors entails two fundamental risks: 1°) To put at risk sectors with a reduced aid vis-à-vis non-EU competitors; 2°) To create an internal competition distortion between substitutable EU made products (e.g. plastics and glass products for transport, building and telecommunication).
23.14 - Manufacture of glass fibres	N/A
23.31 - Manufacture of ceramic tiles and flags	Trade intensity, as any other indicator, should not be used as a proxy to modulate aid intensity, as any reduction of the compensation could lead to an increase of carbon leakage risk.
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	We do not see any merit in modulating the aid intensity on such a basis. We do not consider that trade intensity should play a role again in assessing aid intensity of indirect compensation. In addition, modulating trade intensity could again create distortions of competition between materials used in the same downstream markets (e.g. construction).
24.10 - Manufacture of basic iron and steel and of ferro-alloys	The eligibility needs to be defined on the basis of robust and transparent methodology that takes into account both the trade intensity and the electro-intensity. Financial compensation needs to be allowed to the maximum extent for all eligible sectors, since the carbon leakage risk is not digressive. In any case, it should not be reduced at least to the sectors with 20% trade intensity and electro-intensity above 1 kg CO_2/GVA.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	A variable aid intensity depending on trade intensity and/or the Gross Value Added (GVA).
24.42 - Aluminium production	Eligibility should take into account both the importance of indirect costs in the cost structure and the ability to pass through costs. If the industry cannot pass through costs, then it is the carbon cost that leads to risk of carbon leakage, and not the trade intensity per se. The decisive factor to determine the level of compensation should be the relative significance of indirect costs for an undertaking. Aid intensity based on trade intensity only will have no impact on reducing the carbon leakage risk.
24.43 - Lead, zinc and tin production	Modulation based on trade intensity is likely not the best approach. Trade intensity is often a balance between the value of producing in different regions. If cost of production goes up, trade balances could change drastically. In a situation with rising costs, the considered historic trade intensity will not reflect the changes due to the increased cost.

24.44 - Copper production	This will make the system more effective. Indeed, given our price-taker status, we are automatically at the highest risk of carbon leakage. We agree that this should be reflected when deciding the aid intensity with price-taker sectors eligible to receive the highest level of compensation. The key criteria for deciding aid intensity should be; 1) price-taker status and 2) the relative importance of indirect ETS costs for a sector or company.
24.45 - Other non-ferrous metal production	NACE Code 2445 is characterized by its high trade intensities, showing the increasing global competition that European producers of nickel and other nonferrous metals are facing. As a price-taker industry, we are not capable of passing on any costs. In modulating aid intensity and deciding on the list of eligible sectors, two factors, the ability to pass through costs and the magnitude of indirect cost should be used.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 11: Responses to targeted consultation question 18

Table 22: Responses to targeted consultation question 18
"What are the merits of limiting the total amount of indirect emissions costs to be sustained by the beneficiary based on a certain percentage of the beneficiaries' gross value added (GVA) to address a particularly high carbon risk in a limited number of sectors?"

Sector	Summary of the responses
05.10 - Mining of hard coal	N/A
05.20 - Mining of lignite	N/A
07.10 - Mining of iron ores	Addressing carbon leakage risks by only taking one metric (e.g. GVA) may not be the most accurate approach because the market characteristics between sectors differ and are not comparable. Some sectors could have relative higher GVAs than other sectors, while having less risk to carbon leakage. Others could have relatively low GVAs and high carbon leakage risk. Therefore, establishing a specific level of aid based on GVA which would be applicable to all sectors could lead to unfairness in the distribution of aid.
07.29 - Mining of other non-ferrous metal ores	Addressing carbon leakage risks by only taking one metric (e.g. GVA) may not be the most accurate approach because the market characteristics between sectors differ and are not comparable. Some sectors could have relative higher GVAs than other sectors, while having less risk to carbon leakage. Others could have relatively low GVAs and high carbon leakage risk. Therefore, establishing a specific level of aid based on GVA which would be applicable to all sectors could lead to unfairness in the distribution of aid.
08.91 - Mining of chemical and fertiliser minerals	Limiting indirect CO_2 costs compensation will hamper investments in further electrification and innovation towards CO_2 neutrality.
08.93 - Extraction of salt	N/A
08.99 - Other mining and quarrying n.e.c.	Same as 07.29 - Mining of other non-ferrous metal ores
10.41 - Manufacture of oils and fats	N/A
10.62 - Manufacture of starches and starch products	Addressing carbon leakage risks by only considering one metric (e.g. GVA) is not the most accurate, comprehensive approach because the market characteristics between sectors differ and are not comparable. Establishing a specific level of aid based on singular factors such as GVA that would be applicable to all sectors could lead to unfairness in the distribution of aid.
10.81 - Manufacture of sugar	This could be done, but for eligibility, actual company data should be used and not sector data from Eurostat or other statistical sources, as this data does not reflect the actual and future situation of the sector.
11.06 - Manufacture of malt	Addressing carbon leakage risks by only considering one metric (e.g. GVA) is not the most accurate, comprehensive approach because the market characteristics between sectors differ and are not comparable. Therefore, establishing a specific level of aid based on singular factors such as GVA that would be applicable to all sectors could lead to unfairness in the distribution of aid.
13.10 - Preparation and	N/A

spinning of textile fibres	
13.95 - Manufacture of non-wovens and articles made from non-wovens, except apparel	N/A
14.11 - Manufacture of leather clothes	N/A
16.21 - Manufacture of veneer sheets and wood-based panels	N/A
17.11 - Manufacture of pulp	As a matter of equal treatment, there should be no discrimination among eligible sectors or within eligible sectors. All eligible installations should receive financial compensation for their indirect carbon costs, independently of their individual Electricity/GVA relation. In particular, we would like to stress that indirect compensation is granted to installations, while GVA and power cost is calculated by legal entity. Limiting compensation to certain beneficiaries within a given eligible sector, by taking into account power cost to GVA, would lead to major market distortions.
17.12 - Manufacture of paper and paperboard	Same as 17.11 - Manufacture of pulp
19.20 - Manufacture of refined petroleum products	A lack of compensation could tip an enterprise into a loss-making situation, sealing its fate of closure. Predicting which enterprises may or may not be affected is very difficult to judge - still less to compensate for in time to prevent closure. Ascertaining the correct percentage of GVA is almost impossible to make correctly. We are also not in favour of tiering the level of compensation available. Such a mechanism was rejected for free allocation for direct emissions carbon leakage. We do not see the merit of limiting the total amount of aid intensity based on trade intensity or GVA.
20.11 - Manufacture of industrial gases	There is an existing example of a mechanism which appears to operate effectively, namely the one that underpins the European Energy and Environmental State Aid Guidelines, (EEAG). EIGA believes that a similar approach in the case of compensation for indirect emissions could be effective in reducing the impact of carbon leakage.
20.12 - Manufacture of dyes and pigments	We consider trade intensity is a better criteria to the indirect emission cost compensation to prevent carbon leakage.
20.13 - Manufacture of other inorganic basic chemicals	N/A
20.14 - Manufacture of other organic basic chemicals	N/A
20.15 - Manufacture of fertilisers and nitrogen compounds	Limiting indirect CO_2 costs compensation will hamper investments in further electrification and innovation towards CO_2 neutrality.

20.16 - Manufacture of plastics in primary forms	The merits of such a system would be that SMEs would get no compensation in these sectors. How should the current installation level of the indirect cost compensation be transferred to a company level??
20.17 - Manufacture of synthetic rubber in primary forms	N/A
20.60 - Manufacture of man-made fibres	GVA can fluctuate very quickly when economic growth goes into economic recession. Therefore, historic allocation is not representative enough, and dynamic allocation will lead to a big administrative burden.
21.10 - Manufacture of basic pharmaceutical products	We consider trade intensity is a better criteria to the indirect emission cost compensation to prevent carbon leakage.
23.11 - Manufacture of flat glass	Modulation of aid intensity based on different sectors' GVA does not have any merit in Glass for Europe's view. It is often claimed that it would provide more predictability to sectors if resources are limited and provided sectors' output can be estimated. Most importantly, introducing a differentiation in State Aid intensity between sectors entails three fundamental risks: 1°) To put at risk sectors with a reduced aid vis-à-vis non-EU competitors; 2°) To create an internal competition distortion between substitutable EU made products; 3°) To rely heavily on statistical data not necessarily publicly available, thus indirectly rendering arbitrary decisions more likely.
23.14 - Manufacture of glass fibres	Gross Value Added (GVA) is an indicator composed of labour costs, depreciation and amortization that does not accurately reflect the industry's carbon leakage risk, since it would be correlated with economic cycles that may differ across sectors. Also, this would favour some sectors over others based on intrinsic features (e.g. low-capital sectors have lower GVA than capital-intensive industries). A tiered approach based on GVA does not appear as sufficient to ensure fair treatment across sectors.
23.31 - Manufacture of ceramic tiles and flags	Gross Value Added is an indicator composed of labour costs, depreciation and amortisation that does not accurately reflect the industry's carbon leakage risk. This would favour some sectors over others based on intrinsic features (e.g. low-capital sectors have lower GVA than capital-intensive industries).
23.43 - Manufacture of ceramic insulators and insulating fittings	N/A
23.51 - Manufacture of cement	The list of sectors eligible for indirect cost compensation is already a very narrow selection of a few sectors. Further discriminating between these sectors will only increase inter-sector competition distortions within the EU internal market.
24.10 - Manufacture of basic iron and steel and of ferro-alloys	Modulating aid intensity on the basis of the GVA of individual companies presents several limitations. The GVA of companies is highly dependent on their structure, including the configuration of the production steps where the higher share of value added is generated.
24.20 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	A variable aid intensity depending on trade intensity and/or the Gross Value Added (GVA).

24.42 - Aluminium production	European Aluminium and its members believe that there are merits in this approach. Aid intensity in current system is 85% decreasing to 75% for all sectors. Such equal reduction of aid leads to significant differences in indirect cost share of GVA after compensation is granted (e.g. if a beneficiary has 60% indirect cost of GVA, then indirect cost is 15% after compensation, while another beneficiary could have 2.5% indirect cost of GVA, then indirect cost is 0.6% after compensation).
24.43 - Lead, zinc and tin production	We believe this way of compensation will be the best methodology to minimize the risk of carbon leakage for all sectors, also the most electro-intensive which are the most exposed. Indirect costs as share of sales price and as share of GVA show a massive impact on competitiveness of non-ferrous metals.
24.44 - Copper production	We fully agree with the concept of limiting the total amount of indirect emissions costs to be sustained by the beneficiary based on a certain percentage of the beneficiaries' gross value added (GVA) to address a particularly high carbon risk in a limited number of sectors.
24.45 - Other non-ferrous metal production	We believe this way of compensation will be the best methodology to minimize the risk of carbon leakage for all sectors, also the most electro-intensive which are the most exposed. Such an approach is needed to prevent carbon leakage of Europe's most electro-intensive sectors. Indirect costs as share of sales price and as share of GVA show a massive impact on competitiveness on non-ferrous metals.
24.51 - Casting of iron	N/A
27.20 - Manufacture of batteries and accumulators	N/A
27.31 - Manufacture of fibre optic cables	N/A

Annex 12: CL Eurostat database

Table 23: CL Eurostat database

Tab	Criteria	Data	Sources / code Eurostat	NACE Code	Latest update from Eurostat when data was downloaded
Market Characteristics	Link between cost and output price	Output Prices (domestic and non-domestic market)	sts_inppd_a and sts_inppnd_a	NACE 4 digit	04/30/2019 05/20/2019[32]
		Import Prices	Metadata Comext DS-057009	NACE 4 digit	05/16/2019
	Bargaining position	Number of firms	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Number of firms per size of companies	sbs_sc_ind_r2	NACE 3 digit	03/21/2019
		Number of firms with foreign affiliates	fats_out2_r2	NACE 2 digit	01/28/2019
		Number of firms with foreign control	fats_g1a_08	NACE 2 digit	01/30/2019
		Number of employees	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Number of employees per size of companies	sbs_sc_ind_r2	NACE 3 digit	03/21/2019

[32] For the sectors 08.93, 10.81, 21.10, 23.51 and 24.20

		Number of birth of companies per size of companies	bd_9bd_sz_cl_r2	NACE 2 digit	03/29/2019
		Number of death of companies per size of companies	bd_9bd_sz_cl_r2	NACE 2 digit	03/29/2019
		Rate of companies survival in t per size of companies	bd_9bd_sz_cl_r2	NACE 2 digit	03/29/2019
		Production Value per size of companies	sbs_sc_ind_r2	NACE 2 digit	03/21/2019
	Trade patterns	Domestic Demand	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/2019 12/19/2019[33] 05/20/2019[34]
		Evolution in total production	DS-066342	PRODCOM	18/12/2018
		Sold Production	DS-066341	PRODCOM	12/19/2019 05/20/2019[34]
		Import & Export value	Metadata Comext DS-057009	NACE 4 digit	05/16/2019
		Import & Export volume	Metadata Comext DS-057009	NACE 4 digit	05/16/2019

[33] Sold production except for the sectors : 08.93, 10.81, 21.10, 23.51 and 24.20
[34] Sold production for the sectors : 08.93, 10.81, 21.10, 23.51 and 24.20

		Ratio Export/Sold production	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/2019 12/19/2019[33] 05/20/2019[34]
		Import penetration (Import/Domestic demand)	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/2019 12/19/2019[33] 05/20/2019[34]
		Trade intensity	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/201912/19/2019[33] 05/28/2019[34]
		Net trade balance	Metadata Comext DS-057009	NACE 4 digit	05/16/2019
Profit Margin	Investment in sector	Investments	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Production Value & Total Purchases Goods and Services & Turnover	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Turnover per size of companies	sbs_sc_ind_r2	NACE 3 digit	03/21/2019
		Turnover of companies with foreign affiliates	fats_out2_r2	NACE 2 digit	01/28/2019
		Turnover of companies with foreign control	fats_g1a_08	NACE 2 digit	01/30/2019
		Production Value per size of companies	sbs_sc_ind_r2	NACE 3 digit	03/21/2019

		Total Purchases Goods and Services per size of companies	sbs_sc_ind_r2	NACE 3 digit	03/21/2019
	Current situation of the sector	Gross operating rate and surplus	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Gross operating surplus by size class	sbs_sc_ind_r2	NACE 3 digit	03/21/2019
		Gross operating surplus of companies with foreign control	fats_g1a_08	NACE 2 digit	01/30/2019
		Value Added at factor cost	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Value added at factor cost per size of companies	sbs_sc_ind_r2	NACE 3 digit	03/21/2019
		Value added at factor cost of companies with foreign control	fats_g1a_08	NACE 2 digit	01/30/2019
	Long-term investment in EU ETS area	Domestic demand	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/201912/19/2019[35] 05/20/2019[36]
		Sold production	DS-066341	PRODCOM	12/19/2019[35]

[35] Sold production except for the sectors : 08.93, 10.81, 21.10, 23.51 and 24.20
[36] Sold production for the sectors : 08.93, 10.81, 21.10, 23.51 and 24.20

					05/20/2019[36]
		Import & Export value	Metadata Comext DS-057009	NACE 4 digit	05/16/2019
	Feasibility of relocation	Import & Export volume	Metadata Comext DS-057009	NACE 4 digit	05/16/2019 12/19/2019[35] 05/20/2019[36]
	Trade patterns	Ratio Export/Sold production	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/201912/19/2019[35] 05/20/2019[36]
		Import penetration (Import/Domestic demand)	Metadata Comext DS-057009 and DS-066341	PRODCOM and NACE 4 digit	05/16/201912/19/2019[35] 05/20/2019[36]
Abatement & Substitutability	Scope to reduce electricity consumption	Electricity consumption	DG CLIMA	NACE 4 digit	N/A
		Indirect Emission Costs as % of GVA	DG CLIMA	NACE 4 digit	N/A
		Direct emissions	DG CLIMA	NACE 4 digit	N/A
		Indirect emissions	DG CLIMA	NACE 4 digit	N/A
	Current fuel mix	Energy consumption	nrg_110a	-Code RAMON (aggregation of NACE Code 2 digit)	04/30/2019
	BAT		http://eippcb.jrc.ec.europa.eu/reference/		

CO_2 sensitivity		Indirect emission costs	DG CLIMA	NACE 4 digit	N/A
		Average Price of CO_2	Energy market prices	NACE 4 digit	
		Indirect emissions	DG CLIMA	NACE 4 digit	N/A
		Gross operating rate and surplus	sbs_na_ind_r2	NACE 4 digit	03/21/2019
		Turnover	sbs_na_ind_r2	NACE 4 digit	03/21/2019

Annex 13: Responses received from sectors

Table 24: Responses received from sectors

NACE code	Sector name	Response to Targeted Consolation received	Sector contacted for information + answers	Sector contacted for additional information + answers
14.11	Manufacture of leather clothes	No response was received	European Confederation of the Leather Industry- COTANCE : Replied that COTANCE is not competent for leather clothes. Suggested to contact Fur Europe and EURATEX. Fur Europe : Replied that Fur sector is not involved in ETS legislation as fur does not fall under scope of ETS directives. EURATEX: No response IndustriAll European Trade Union: No response IULTCS - International Union of Leather Technologists and Chemists Societies: No response	

24.42	Aluminium production	European Aluminium (EA) TALUM TRIMET Aughinish Alumina Mytilineos Hydro WVMetalle Alcoa Eurometaux ABIEC Federation of Norwegian Industries		
20.11	Manufacture of industrial gases	EIGA		
20.13	Manufacture of other inorganic basic chemicals	France Chimie Federchimica PIPC Inovyn ESD-SiC AlzChem Trostberg Evonik Industries AG VCI BASF SE Euro Chlor (part of CEFIC) CEFIC Federation of Norwegian Industries		
24.43	Lead, zinc and tin production	Eurometaux WVMetalle IZA		
17.11	Manufacture of pulp	COPACEL CEPI Assocarta Finnish Forest Industries Federation		

		Federation of Norwegian Industries		
07.29	Mining of other non-ferrous metal ores	EUROMINES		
08.99	Other mining and quarrying n.e.c	EUROMINES		
17.12	Manufacture of paper and paperboard	COPACEL Norske Skog Golbey Allard Emballages CEPI Assocarta Finnish Forest Industries Federation Federation of Norwegian Industries		
24.10	Manufacture of basic iron and steel and of ferro-alloys	Federation of Norwegian Industries Elkem ASA EUROFER EuroAlliages Uk Steel (MAKE) UNESID ABIEC		
20.17	Manufacture of synthetic rubber in primary forms	No response was received	European Rubber Chemicals Association: No response received.	
24.51	Casting of iron	No response was received	CAEF: No response received EUnited European Engineering Industries Association: No response received	
20.60	Manufacture of man-made fibres	CIRFS		CIRFS: Need to follow-up to organise call.

19.20	Manufacture of refined petroleum products	FuelsEurope & Concawe		Fuels Europe: Call on 3rd of June.
24.44	Copper production	Aurubis AG European Copper Institute Eurometaux		
20.16	Manufacture of plastics in primary forms	PlasticsEurope Federchimica PIPC France Chimie		
13.10	Preparation and spinning of textile fibres	No response was received	Euratex: No response CIRFS - European Man-Made fibres association : No response	
05.10	Mining of hard coal	No response was received	Euracoal: Sent the public response to the EEAG in 2014.	
24.45	Other non-ferrous metal production	Eurometaux Nickel Institute		
23.31	Manufacture of ceramic tiles and flags	Cerame-Unie		
20.12	Manufacture of dyes and pigments	No response was received	ETAD: Replied that they were a scientific association with no company data.	
13.95	Manufacture of non-wovens and articles made from non-wovens, except apparel	No response was received	EDANA: No response received	
23.14	Manufacture of glass fibres	GlassFibre Europe Eurima		
27.20	Manufacture of batteries and accumulators	No response was received	Eurobat: No response received EPBA - European Portable Battery	

			Association: No response received	
20.14	Manufacture of other organic basic chemicals	France Chimie Federchimica VCI PIPC CEFIC Federation of Norwegian Industries		
10.62	Manufacture of starches and starch products	Starch Europe		
20.15	Manufacture of fertilisers and nitrogen compounds	Fertiberia Fertilizers Europe APEP OCI Nitrogen PIPC Federation of Norwegian Industries Federchimica France Chimie		
23.43	Manufacture of ceramic insulators and insulating fittings	No response was received	European Industrial Insulation Foundation (EiiF): No response received	
10.41	Manufacture of oils and fats	No response was received	Fediol: Phone call on 25/04/19 with Fediol- will not submit data. Suggested to contact EFPRA. EFPRA: Replied that no indirect carbon leakage risk in their sector so not participating in consultation.	

27.31	Manufacture of fibre optic cables	No response was received	Europacable: No response received	
08.91	Mining of chemical and fertiliser minerals	APEP Fertilizers Europe	Fertilizers Europe: Fertilizers Europe does not cover the sector. Gave us contact of Mr Friedhelm Mester at K+S to redirect us to the potash mining sector.	
11.06	Manufacture of malt	EUROMALT		Euromalt: Call on 21 May and responses received to questions sent.
16.21	Manufacture of veneer sheets and wood-based panels	Finnish Forest Industries Federation	European Panel Federation: No response received FFIF: Response received from FFIF with contact for EU if needed.	
23.11	Manufacture of flat glass	ABIEC FEVE Glass for Europe		
05.20	Mining of lignite	Complexul Energetic Oltenia	Euracoal: Sent us the application for Carbon Leakage List from Euracoal related to Mining of lignite. DG CLIMA Qualitative assessment for carbon leakage list Phase IV.	
07.10	Mining of iron ores	EUROMINES		

21.10	Manufacture of basic pharmaceuticals products (prodcom 21.10.20.10 & 21.10.20.20)	Ajinomoto Animal Nutrition Europe (AANE) Ajinomoto Foods Europe (AFE)	DG CLIMA Qualitative assessment for carbon leakage list Phase IV.	21.10.20.10: Lysine: Ajinomoto Animal Nutrition Europe (AANE): Information received from sector. 21.10.20.20: Glutamate: Ajinomoto Foods Europe (AFE): Information received from sector.
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	No response was received		
23.51	Manufacture of cement	Mineral Products association Polish Cement Association European Cement Association- CEMBUREAU CEMENTOWNIA ODRA Cement plant Warta CEMEX Polska Dyckerhoff Polska OFICEMEN Cement Ożarów		
10.81	Manufacture of sugar	CEFS		CEFS: Need to follow up with Justine Richelle to provide detailed questions.
08.93	Extraction of salt	Eusalt	DG CLIMA Qualitative assessment for carbon leakage list Phase IV.	

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