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IMPACT ASSESSMENT

Accompanying the document

Commission Decision

determining, pursuant to Directive 2003/87/EC of the European Parliament and the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage for the period 2015-2019

Disclaimer: This report commits only the Commission's services involved in its preparation and does not prejudge the final form of any decision to be taken by the Commission.

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1. EXECUTIVE SUMMARY SHEET

Impact assessment on the Commission Decision determining, pursuant to Directive 2003/87/EC of the European Parliament and the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage for 2015-2019 (New Carbon Leakage list 2015-2019)

A. Need for action

Why? What is the problem being addressed?

The ETS Directive defines the potential risk of carbon leakage as an increase in greenhouse gas emissions in third countries where industry is not subject to comparable carbon constraints as in the EU. To diminish this risk, the ETS Directive foresees free allocation to all industrial sectors, and a higher level of free allocation for sectors on the carbon leakage list. The first such list was determined in 2009 and expires in 2014. A new list has to be determined for 2015-2019.The ETS Directive contains criteria to determine the list, but not all methodological elements for the calculations are defined. The problem to be tackled in the current impact assessment is to precisely define these methodological elements, taking into account new data available, and to calculate with highest possible accuracy the new carbon leakage list. Since allowances not allocated for free to industry are auctioned, and the revenues from auctioning go to Member States, the list directly affects industries covered by the EU ETS, and Member States' budgets.

What is this initiative expected to achieve?

The analysis focuses on the impacts of different methodological options for the new carbon leakage list calculations, within the limits of the ETS Directive, **not** on general competitiveness concerns. The general objective of EU climate policy is to ensure progress towards the Europe 2020 targets in the field of climate and energy. The specific objectives of the free allocation system are to address competitiveness of ETS industry and diminish the potential risk of carbon leakage, while incentivising emission reductions, transition to low carbon economy and avoiding over-compensation. The operational objective is is to determine a sound methodology for each of the elements needed for the calculations of the new carbon leakage list which are not pre-defined in the Directive, and subsequently calculate in the most accurate possible way within the criteria of the Directive, the new list, by using recent data and lessons learnt since 2009.

What is the value added of action at the EU level?

Article 10(a)13 of the ETS Directive requires the Commission to determine a new carbon leakage list for the next 5 year period, i.e. 2015-2019. Therefore, EU action is not only justified but it is required by the Directive. The carbon leakage list has to be determined at EU level to ensure the EU-wide application of the harmonised allocation rules and the level-playing field for EU industries. Therefore, the subsidiarity and proportionality principles are respected.

B. Solutions

What legislative and non-legislative policy options have been considered? Is there a preferred choice or not? Why?

The new carbon leakage list will, as required by the ETS Directive, take the form of a Commission Decision to be adopted via the framework in place for subsidiary acts – at present, comitology: adoption after a positive vote by Member States Climate Change Committee and scrutiny of European Parliament and Council. The Directive foresees that the list is "discussed" in the European Council, but its recital 26 of the Directive states that these discussions *'are of an exceptional character and in no way affect the procedures for the exercise of the implementing powers conferred to the Commission'.*

Who supports which option?

As demonstrated in the stakeholder consultation, industrial stakeholders very actively express their preference for a list as close as possible to the present one and including as many industrial sectors as possible. They have strong views on using a carbon price for the calculations which does not reflect market developments, which would lead to a maximisation of their costs and therefore the risk of carbon leakage they are deemed to be exposed to. Member States are moderately active and argue for some adjustments, including the carbon price, potentially leading to a list including fewer sectors. Civil society argues strongly that carbon leakage is a smaller problem and is in favour of price adaptation that would lead to a list covering much fewer sectors.

C. Impacts of the preferred option

What are the benefits of the preferred option (if any, otherwise main ones)?

The impact assessment outlines several option packages and concludes that the preferred option is the 'Projections A package' with the following elements: sectoral auctioning factors, emission factor of 423 gCO2/KWh, carbon price of 16.5€ trade intensity of EU-28 and EEA-EFTA states and a framework for qualitative assessments. The option has the benefit that it provides more targeted support to sectors deemed to be at risk of carbon leakage, increases the auctioning revenues of Member States. This option leads to a carbon leakage list covering about 59% of industrial GVA and 68% of allocation to industries, providing good balance between competitiveness and emission reduction incentives. It ranks high on efficiency and effectiveness because it uses the most updated data. This option is expected to increase the auctioning revenues of Member States with about 5.011 mio € with an assumed carbon price of 10€ for the whole period 2015 to 2019. All options option have limited macroeconomic impact and low administrative costs.

What are the costs of the preferred option (if any, otherwise main ones)?

The carbon leakage list determines the sectors that get more free allocation than otherwise would be the case, so all options imply gains to industry compared to no list at all. With more free allocation there is less auctioning revenue to the Member States. There are therefore distributional issues. The costs of too many sectors on the carbon leakage list and thus too high free allocation is that public resource are wasted, while the cost of too low allocation to industry is that there may be carbon leakage, which implies loss of industrial production in EU and increased global emissions. Overall ETS costs constitute a very small share of total costs for industrial sectors covered by the ETS. The preferred option, which implies fewer sectors on the list than the current list, will lead to reduced free allocation for those sectors off the list, by an average of 48.5% for the whole period 2015-2019. This will in turn increase the auctioning revenues for Member States by the same number of allowances, estimated to ca 5.011mio € for the whole period with a 10€ carbon price. A shorter carbon leakage list may also allow for a re-calculation of the cross sectoral correction factor, leading to increased free allocation to all sectors covered by the ETS (except those that are 'taken off' the carbon leakage list, which will perceive a net loss). The value of the free allocation which these sectors may lose if falling off the list is estimated to ca 0.1 – 4.4% of a sector's annual turnover.

How will businesses, SMEs and micro-enterprises be affected?

The carbon leakage list affects primarily companies which have installations in the scope of the EU ETS, and Member States. The amount of free allowances affects companies' cash-flows because depending on carbon efficiency and emissions, it determines the amount of allowances companies have to purchase. The amount of free allocation also affects Member States' fiscal situation because handing out allowances for free is de facto foregoing revenues. Very few SMEs are covered by the EU ETS due to the size thresholds, and many Member States have also used the possibility to exclude small installations from the EU ETS. Therefore the carbon leakage list is not expected to have any significant impact on SMEs, especially because in the sectors possibly affected by a shorter list very few SMEs are active.

Will there be significant impacts on national budgets and administrations?

No significant impact on administrative costs for Member States can be expected for any of the options proposed since the carbon leakage list enshrined in Commission Decision is directly applicable and the Benchmarking Decision foresees adaptation of the amount of free allocation per installation in accordance with the carbon leakage list. As described above, the auctioning revenues for Member States will be different for different options.

Will there be other significant impacts?

No other significant impacts can be expected.

D. Follow up

When will the policy be reviewed?

The ETS Directive foresees a new carbon leakage list every five years, so a revision can be expected in 2019, depending on the outcome from the debate on the 2030 framework on climate and energy.

GLOSSARY

Allocation: the total quantity of allowances allocated by the national competent authority to the operator of each installation.

Allowance (European Union Allowance (EUA): the tradable unit under the EU ETS, giving the holder the right to emit one tonne of carbon dioxide (CO_2), or the equivalent amount of two more powerful greenhouse gases, nitrous oxide (N_2O) and perfluorocarbons (PFCs).

Auctioning Factor: it represents the share of allowances the sectors eligible for free allocation would need to purchase if not on the carbon leakage list in order to cover their emissions stemming from activities eligible for free allocation. In a formula, the auctioning factor (AF) may be expressed as:

$$AF = \frac{Allowances\ to\ purchase}{Direct\ emissions} = 1 - \frac{Basic\ allocation}{Direct\ emissions}$$

Back-loading: the proposal by the European Commission to postpone the auctioning of 900 million allowances from the years 2013-2015 until 2019-2020 due to the surplus of allowances in the ETS.

Basic allocation: the quantity of allowances allocated for free to an installation if none of the activities it carries out are on the carbon leakage list

Carbon cost: the estimated maximum cost faced by a sector induced by the implementation of the EU ETS. It is calculated as the sum of:

- The direct costs associated with direct emissions, i.e. the emissions not covered by free allocation;
- The indirect costs associated with cost of indirect emissions (emissions from electricity consumption) as the result of potential increase of electricity prices induced by the inclusion electricity production in the scope of the ETS.

The possibility of certain sectors to (partly) pass through the ETS costs to their customers and any state aid provided pursuant to Article 10a(5) of the ETS Directive are not taken into account.

Cross-sectoral correction factor (CSCF): a backstop provision in the ETS Directive which caps the total amount of allowances that can be handed out for free to industry sectors in phase 3 (2013-2020). Because the aggregate amount of preliminary free allocation calculated by Member States in the NIMs exceeds the maximum amount of allocation available to industry, the allocation for all installations is reduced by the same proportion through the application of the cross-sectoral correction factor. According to Commission Decision 2013/448/EU, the factor is 5.7% (94.3% of preliminary allocation) in 2013 going to 17.6% (82.4% of preliminary allocation) in 2020.

Disaggregated-level assessment: assessment carried out at Prodcom level based on the quantitative or qualitative carbon leakage criteria. These can be carried out in exceptional cases when a certain product is characterised by significantly different characteristics than other products under the same NACE-4 code.

Emission factor for electricity production: expressed in grams of carbon dioxide per Kwh and is used to convert electricity consumption expressed in KWh into an indirect cost percentage. It represents the carbon intensity and the market functioning of electricity production.

EU emissions trading system (EU ETS): the cornerstone of the European Union's policy to tackle climate change and its key tool for reducing industrial greenhouse gas emissions cost-effectively. The first - and still by far the largest - international system for trading greenhouse gas emission allowances, it covers ca. 12,000 installations in 31 countries, as well as airlines.

ETS scope extension: The ETS scope was firstly defined in Directive 2003/87/EC and its scope has been amended by Directive 2009/29/EC, including some new activities (such as production and processing of non-ferrous metals, some chemicals etc.) and new greenhouse gases (nitrous oxide (N_2O) and perfluorocarbons (PFCs)) in the ETS scope. For more information, see Annex I of the Directive which lists the categories of activities to which the ETS currently applies.

Fall back approaches: Commission Decision 2011/278/EU describes the three fall back approaches to allocate free allowances if the product benchmarks are not applicable:

- Heat benchmark expressed in t CO2 / TJ of heat consumed where allocation is based on the amount of measurable heat consumed;
- Fuel benchmark expressed in t CO2 / TJ of fuel used where allocation is based on the amount of fuel consumed;
- Process emissions approach where process emissions occur outside the boundaries of a product benchmark and where allocation is 97% of historical emissions.

Free allocation: To address industry competitiveness issues or specific needs related to the transition to a low carbon economy, allowances can be allocated for free to industrial sectors falling under the scope of the EU ETS. The amount of free allowances for an installation is calculated according to the harmonised allocation rules outlined in the Benchmarking Decision (Commission Decision 2011/278/EU) and is in principle calculated by multiplying a benchmark value with the historic production data of the installation. If an installation also produces products not covered by a product benchmark, additional allowances will be provided based on heat or fuel used for those products or for process emissions (so-called fall back approaches). Besides, production from sectors and sub-sectors deemed to be exposed to a significant risk of carbon leakage will receive a higher share of free allowances

Gross value added (GVA): a measure in economics of the value of goods and services produced in an area, industry or sector of an economy. It is calculated as the output at market

prices minus intermediate consumption at purchaser prices. For the carbon leakage list, gross value added at factor costs is used which can be calculated by subtracting other taxes on production from GVA at basic prices and adding other subsidies on production.

Installation: according to the ETS Directive (Directive 2003/87/EC), an installation is a stationary technical unit where one or more activities under the scope of the ETS and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution.

NACE: is the nomenclature of economic activities in the EU. The term NACE is derived from the French ***N**omenclature statistique des **a**ctivités économiques dans la **C**ommunauté **e**uropéenne*. NACE is a four-digit classification providing the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics. For the compilation of the carbon leakage list in 2009, NACE rev.1.1. was used. For the compilation of the new list, NACE rev.2 in force since 2008 is the relevant classification to be used.

National Implementation Measures (NIMs): according to Article 15 of the Benchmarking Decision (Commission Decision 2011/278/EU), Member States have to notify to the Commission the list of installations covered by the EU ETS in their territory and the preliminary amount of free allowances to be allocated to these installations for the period 2013 to 2020 calculated on the basis of the Union-wide harmonised rules for free allocation.

Phases 1, 2 and 3 of the ETS: The first trading period or phase 1 lasted from the launching of the ETS in 2005 until the end of 2007. The second trading period began in 2008 and ended in 2012. In phase 1 and phase 2, the amount of allowances to be allocated for free to industry was decided on national level. The main differences between phases 1 and 2 and the current phase 3 (2013-2020) is that there is no free allocation for electricity production (with some exceptions for electricity modernisation in the new Member States) and that the free allocation to industry is based on EU harmonised rules outlined in the Benchmarking Decision.

PRODCOM: statistics on the production of manufactured goods. The term comes from the French "PRODuction COMmunautaire". The PRODCOM headings are coded using an eight-digit numerical code, the first four digits of which are identical to the respective NACE code.

Product benchmarks: a product benchmark is based on a value reflecting the average greenhouse gas emission performance of the 10% best performing installations in the EU producing that product. A benchmark represents a value used to calculate free allocation per installation.

Quantitative assessment: an assessment carried out according to the quantitative criteria laid down in paragraphs 15 and 16 of Article 10(a) of the ETS Directive. A sector has to meet these quantitative criteria to be deemed exposed to significant risk of carbon leakage:

- direct and indirect costs as share of GVA above 5% AND trade intensity above 10%; OR
- direct and indirect costs as share of GVA above 30%; OR
- trade intensity above 30%.

Qualitative assessment: an assessment carried out according to paragraph 17 of Article 10(a) of the ETS Directive. Qualitative assessments are carried out when a sector is borderline on the quantitative or when there is missing data. A sector has to meet the following qualitative criteria to be deemed exposed to significant risk of carbon leakage:

- The extent to which it is possible for individual installations to reduce emission levels or electricity consumption;
- Current and projected market characteristics, including when trade exposure or costs increase;
- Profit margins as indicator for long-run investment and relocation decisions.

Surplus of free allowances: In the ETS, each installation has to surrender a number of allowances corresponding to its emissions. The allowances allocated for free, but exceeding the emission levels are in surplus and imply an over-allocation of the EU ETS installations. This accumulation is due to mainly to the economic crisis and the improvement in energy efficiency.

Total surplus of allowances: The allowances allocated for free and auctioned, and international credits used, but exceeding the emission levels are in surplus. Currently, the surplus allowances in the system are over two billion. This accumulation is due to several factors: economic crisis, improvement in energy efficiency, record use of international credits. This surplus of allowances led to big drop of the EU allowances price in the carbon market.

Trade intensity: measures the importance of imports and exports in relation to the domestic market. The formula for the calculation of the trade criterion is the following:

$$Trade\ intensity = \frac{Imports + Exports}{Turnover + Imports}$$

Imports represent total imports expressed in value, exports represent total exports expressed in value and turnover represents the domestic production in value, based on Eurostat (COMEXT) data.

Turnover: the domestic production in value comprising the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties (Eurostat SBS).

COMMISSION STAFF WORKING DOCUMENT

PROPORTIONATE IMPACT ASSESSMENT

Accompanying the document

COMMISSION DECISION DETERMINING, PURSUANT TO DIRECTIVE 2003/87/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL, A LIST OF SECTORS AND SUBSECTORS WHICH ARE DEEMED TO BE EXPOSED TO A SIGNIFICANT RISK OF CARBON LEAKAGE FOR THE PERIOD 2015-2019

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Identification

Lead DG: CLIMA

Agenda Planning/WP Reference: 2013/CLIMA/014

1.2. Organisation and timing

DG CLIMA has the lead on this impact assessment. Other Commission services (Secretariat-General, Legal Service, DG AGRI, DG COMP, DG ECFIN, DG EMPL, DG ENER, DG ENTR, DG ENV, DG RTD, DG TAXUD and DG TRADE) were consulted in the Impact Assessment Steering Group. A meeting was held on 29 May 2013 presenting the process and discussing the online stakeholder consultation questionnaire. At a second meeting on 19 July 2013, comments were exchanged which were taken into account to the extent possible, and a third meeting took place on 13 September 2013. Minutes from the second and the third meetings are attached as Annex I.

1.3. External expertise

In 2011-2012, DG CLIMA commissioned a study to a consortium of consultancies to explore data sources, academic literature and different options for the methodological elements needed for the calculations for the determination of the new carbon leakage list. This study, hereafter called 'Carbon leakage methodology study', is available on DG CLIMA website[1], and it also included a framework for qualitative assessment.

In 2011-2013, Member States submitted to their National Implementation Measures (NIMs) to the Commission pursuant to Commission Decision 2011/278/EU, which contain verified, detailed and sensitive data on preliminary free allocation to industrial installations in the EU Member States.[2] These were checked for compliance with the harmonised allocation rules. Aggregated extracts from these data can be used for some of the calculations for the new carbon leakage list as it is directly related to the free allocation to industrial installations.

[1] 'Support to the Commission for the determination of the list of sectors and subsectors deemed to be exposed to a significant risk of carbon leakage for the years 2015-2019 (EU Emission Trading System)'. Available at: http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/carbon_leakage_list_en.pdf

[2] EEA-EFTA states submitted their NIMs to the EFTA Surveillance authority. The assessment of those NIMs was supported by the technical assistance of the same consortium.

In 2012-2013, DG CLIMA is being assisted by consultants to perform the actual calculations for the new carbon leakage list, using the methodological elements which are in the present impact assessment.[3]

1.4. Consultation

The stakeholder consultation was conducted for 12 weeks from 6 June to 30 August via questionnaire using the Interactive Policy Making tool. The questionnaire consisted of 14 multiple choice questions with possibility to motivate answers. The answers will be analysed according to respondent profile and to topic below. Multiple stakeholders from various backgrounds have expressed the view that a pure statistical analysis of the replies is not meaningful and therefore a qualitative analysis of the responses has been made. For the analysis of the stakeholder consultation, 405 replies are taken into account. The table below illustrates the participation of stakeholders by group.

Table 1: Summary of stakeholder consultation responses

	Number	% of total
Total business related	374	92%
Government/regulatory authority	8	2%
Civil society	23	6%
Total non-business	31	8%

Given the prevailing participation of business oriented stakeholders, it could be argued that over 90% of the respondents have strong interest in an interpretation of the ETS Directive criteria leading to a broader coverage of the carbon leakage list and higher amount of free allocation. A very wide range of industrial sectors represented by national and European sector associations, but also a high number of individual companies responded to the public consultation.

On the evolution of the risk of carbon leakage, the majority (90%) of industrial stakeholders see a significant or slight increase, while the majority of Member States and civil society respondents see slight or significant decrease. The arguments for the perceived increase are related to the international context (lack of binding international agreement on climate matching EU policy, lower energy prices in other parts of the world, global competition and growth of emerging economies compared to shrinking EU ones) and the domestic context (EU rules on free allocation, indirect costs due to high electricity prices and not sufficiently compensated, lack of predictability on the carbon market and new entrant allocation rules).

On the other hand, the arguments for a perceived decrease are the generous free allocation, the surplus of allowances in the system and the low carbon price. An argument made is that the risk of carbon leakage has been exaggerated in the past, leading to over-allocation and reducing incentives for cost-effective emission cuts by large emitters and several industries have profited from unjustified free allocation. There is also a view that this risk depends on a number of factors, including the carbon intensity of production, carbon price, degree of international competition and cost pass through rates and the decreasing carbon price indicates reduction of the risk, but there is no information on the other parameters.

[3] Another study performed by the same consortium is worth mentioning, which is a fact-finding study looking at evidence for carbon leakage in the period 2005-2012. The results provide interesting insights on the cost structure and competitiveness situation of different industrial sectors subject to ETS. The study produced set of factsheets for a selection of sectors. The factsheets present historical data and assess the degree to which carbon leakage may have occurred in the sector. They were assembled using publicly available data, draft versions were commented by European industry representatives. Available at: http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf

Concerning free allocation, both industrial stakeholders and Member States show high degree of acceptance and find it an adequate method to address the potential risk of carbon leakage. Industry makes some comments on the adequacy: on the benchmark values for some products which are perceived as too strict[4]; natural and geographical conditions are not taken into account and activity levels should be based on actual production. Civil society is most critical towards the adequacy of free allocation with the main argument that it needs to be applied more restrictively because as it stands now it is too generous, redistributing potential government revenues to industry and thus constituting a hidden subsidy.

On the length of the carbon leakage list, 60% of the industrial respondents find the list of adequate length. One quarter of industrial stakeholders as well as the majority of Member States, find the length of the list an irrelevant indicator since its determination is a technical exercise reflecting the Directive criteria, therefore its length cannot be judged. The majority of civil society respondents, on the other hand, find the list too long with the argument that the criteria unnecessarily overestimate the risk of carbon leakage, the trade criterion alone is irrelevant and the phase II surplus of allowances are not taken into account and therefore argue strongly for revision of the list to reflect reality better.

Concerning the ambition of domestic climate policies around the globe and their evolution since 2009, the majority of all respondents (industry, Member States and civil society) respondents perceive some increase. Industry and Member States are a bit more critical recognising the efforts but focusing on the lack of international climate agreement, while civil society is more positive looking at the domestic climate policies achievements since 2009. As for the comparability of climate policies, industry sees no comparable policy to the EU ETS worldwide, while Member States and civil society see some comparable elements in several countries' policies.

On the level of analysis, industry expresses its views most actively and there seems to be a preference for analysis at NACE-4 level shared by broader range of stakeholders, also supported by some Member States and a share of the civil society respondents. The main arguments supporting this choice are that NACE-4 is best targeted analysis and best available data and it was used in 2009. Some stakeholders, notably the ceramic industry and some chemical companies, prefer analysis at NACE-3 level.

On the auctioning factor, civil society does not have strong views, while industrial stakeholders are split between uniform factor for all sectors (32%), NACE-3 level factor (32%), and NACE-4 level factor (14%). NACE-4 is the most supported choice by Member States, but also the other options find some support. Notable is the lack of opinion in about half of the civil society respondents and about one fifth of industrial stakeholders with the frequent comments that the auctioning factor should correspond to the level of analysis.

On the carbon price, the vast majority of industrial stakeholders believe the 30€ is adequate, with the argument of the reference of the ETS Directive. Some industrial stakeholders express a view that a price above 30€ should be considered to ensure the EU is "resistant to carbon leakage" until the time horizons of new investments (2020-2040). The majority of Member States and civil society, on the other hand, find the 30€ inadequate, with the argument that it is too high compared to reality, that it artificially inflates the costs of sectors including them

[4] The benchmark values are in genera based on the average of the 10% best industrial installations producing the product in question, i.e. on real production and efficiency data. Installations that meet the benchmarks, and are thus among the most efficient in the EU, will in principle receive all the allowances they need. Those that do not reach the benchmarks will receive fewer allowances than they need. These installations will therefore have to reduce their emissions, or buy additional allowances or credits to cover their emissions, or combine these two options. For more details see section 2.1, and here
http://ec.europa.eu/clima/policies/ets/cap/allocation/index_en.htm

unduly in the carbon leakage list and thus foregoing revenues from governments in times of crisis. They argue that the price value should be the result of more accurate modelling and consider market forecasts over time, impact of Phase II surplus and current growth projections. It is important to keep in mind the reasoning behind this answer: a higher carbon price would lead to higher costs calculated according to the Directive criteria and thus more industrial sectors could end up on the carbon leakage list.

The answer of most industrial respondents on the emission factor for electricity is that about three quarters show preference for the highest option (the marginal electricity generation in the current system). A comment made by some industrial stakeholders is that the marginal factor would be too complex to calculate correctly, albeit its theoretical relevance, so an average one is preferable. Member States and civil society also prefer the average factor of the total fuel mix with the argument this the most accurate number taking into account all forms of electricity generation, including renewables and low carbon technologies.

Concerning the ETS Directive criteria for qualitative assessment, industrial stakeholders see profit margins as most measurable, relevant and important; market characteristics emerge as an indicator with low measurability, medium relevance and importance while emission reduction possibilities are perceived as an indicator with medium measurability and high relevance and importance. Member States on the other hand see all three criteria as equally relevant; emission reduction potential is seen as slightly less measurable, while profit margins are seen as slightly less important. Civil society has a different view: emission reduction potential is seen as most measurable, relevant and important, while market characteristics and profit margins are seen as less measurable, relevant and important. Such views may be logical, given that industry focuses on profits and market conditions for investments, while civil society is primarily looking at environmental integrity and emission reductions. Member States have a balanced view recognising the importance of all three criteria. There are comments made from all sides concerning the vagueness of the criteria.

As for the proposed framework for qualitative assessment, industrial stakeholders show a more critical stance, Member States see it in general as adequate and useful and civil society has no particular opinion, albeit the general positive views. According to the comments made, a number of industrial stakeholders support in principle the introduction of a structured and harmonised framework, as long as all indicators in such framework are taken into account and all steps of the step-wise approach are followed. This view is also shared by Member States which in general support the European Commission in making the qualitative assessment more harmonised, structured, robust and transparent. Civil society and some Member States urge the publication of all qualitative assessments in their entirety to ensure transparency of the process.

The expressed views have been considered to the extent possible in the context of this impact assessment.

1.5. Scrutiny by the Commission Impact Assessment Board

The Impact Assessment Board of the European Commission assessed a draft version of the present impact assessment and issued its opinion on 8 November 2013. The Impact Assessment Board made several recommendations which were addressed throughout the text. In particular, at the recommendation of the Board, the final version further develops the following aspects. It clarifies the need for review of the carbon leakage list in case an international agreement is concluded. It describes in further detail the modalities for the qualitative assessment (see mainly section 6.5 and other relevant parts of the text) and quantifies the magnitude of the trade-off between the coverage of the carbon leakage list and the auctioning revenues for Member States and explains any potential effects on the carbon price. It also explains any potential risk of overcompensation, as well as elaborates in further

detail and quantification the impacts of the list on industrial sectors. It also provides more information on allocation above emissions level during phase 2 (2008-2012) of ETS (surplus of allowances). It also clarifies the effectiveness and efficiency criteria and elaborates more on the scope, timing and purpose of evaluation of the efficiency of the methodology and the list.

2. CONTEXT

Climate change is one of the major current challenges that mankind is facing and scientific evidence indicate that it will be further exacerbated in the future. Tackling it has clearly become an EU policy priority, subject to considerable efforts worldwide and widely discussed in international organisations and fora.

2.1. EU ETS and free allocation

The EU Emissions Trading System (ETS) is the cornerstone of the EU's policy to combat climate change and is a key tool for reducing industrial greenhouse gas (GHG) emissions cost-effectively. It aims at addressing the negative externalities of GHG emissions and ensures respecting the polluter pays principle in a market-based way. The EU ETS works as a 'cap and trade' system: a 'cap', or limit, is set on the total amount of GHG emissions which are allowed under the system to ensure a progressive reduction of emissions with 1.74% annually. Within the cap, companies receive or buy emission allowances, which they can trade as needed. After each year a company must surrender allowances to cover all its emissions. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or sell them to another company that is short of allowances.

In phase 1 (2005-2007) and phase 2 (2008-2012) of the EU ETS, the amount of allowances to be allocated for free to industry was decided on national level. The main differences between phases 1 and 2 and the current phase 3 (2013-2020) is that there is no free allocation for electricity produced (with some exceptions for electricity modernisation as per Article 10c of the Directive) and that the free allocation to industry is based on rules harmonised across the EU to prevent any competition distortions.

The main legislative document outlining the principles of the ETS is Directive 2003/87/EC[5] (hereafter 'the Directive'). The Directive is implemented by a number of legislative instruments, including Commission Decision 2011/278/EU determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC (hereafter 'the Benchmarking Decision')[6]. This Decision contains harmonised allocation rules according to which allowances are distributed for free to sectors carrying out an industrial activity outlined in Annex I of the Directive. There are 52 product benchmarks, some of which also take into consideration the exchangeability of fuel and electricity where relevant, and there are special benchmarks for refineries and aromatics. In case an installation produces a product for which there is no product benchmark, free allocation is calculated based on the 'fall-back benchmarks' based on heat or fuel consumed, or on process emissions. Generally speaking, a product benchmark is based on a value reflecting the average greenhouse gas emission performance of the 10 % best performing installations in the EU producing that product. The benchmark values do not represent an emission limit or even an emission reduction target, but merely a value used to calculate free allocation per installation. The benchmarks were developed per product, to the extent feasible, and were established on the basis of the principle of 'one product = one benchmark.' This

[5] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0029:EN:NOT
[6] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011D0278:EN:NOT

means the benchmark methodology does not differentiate according to the technology or fuel used, nor the size of an installation or its geographical location.

The allowances are distributed free of charge based on the abovementioned product benchmarks and taking into account recent production of the installations[7]. The aim of free allocation is to address competitiveness concerns of industry, while maintaining the incentive to decrease GHG emissions, facilitating transition to a low carbon economy, and avoiding over-compensation. The legal text foresees that if the amount of preliminary free allocation calculated bottom-up overshoots the top-down predefined share of allowances attributed to industry in the total amount of allowances available in the system (the cap), a uniform cross-sectoral correction factor needs to be applied to ensure the amount of free allocation is in line with the ETS targets. [8]

The basic rule is that the amount of free allowances per installation decreases from 80% of the basic allocation in 2013 to 30% in 2020 to ensure the gradual implementation of the polluter pays principle.

For sectors deemed to be exposed to a significant risk of carbon leakage according to the criteria laid down in the Directive[9], the amount of free allowances remains 100% of the preliminary base value calculation for that period. **The determination of this list is the subject of this impact assessment.**

Basic allocation is the final amount of allocation per installation for each year of the period 2013 to 2020 assuming non-carbon leakage status and, taking into account application of the uniform cross sectoral correction factor. This amount of allowances refers only to the free allocation determined in phase 3, and does not take into account the surplus carried over by many sectors deemed to be exposed to significant risk of carbon leakage from the 2008-2012 period, which *de facto* adds free allowances for the 2015 -2019 period for concerned sectors.

In total the amount of surplus allowance carried over by industrial installations from phase 2 is ca. 1 billion EUAs. The amount of surplus allowances in the system compromises the emission reduction incentives and the path to low carbon growth. For detailed figures on the amount of surplus allowances per sector, see Annex II.

2.2. Carbon leakage criteria

In the Directive, carbon leakage is defined as an increase in greenhouse gas emissions in third countries where industry would not be subject to comparable carbon constraints[10]. According to Article 10(a), paragraphs 15 and 16 of the Directive, a sector can be deemed to be exposed to a significant risk of carbon leakage if it fulfils the following criteria:

- The sum of direct and indirect additional costs for an industry sector induced by the implementation of the directive would lead to a cost increase of at least 5 % of its Gross Value Added (GVA) AND the respective sector has a trade intensity (total value of exports

[7] To determine the amount of free allocation for the period 2013-2020, operators could choose which production figures to be used – a baseline period of either 2005-2008 or 2009-2010, whichever period has higher production.

[8] According to Article 15, paragraph 3 of the Benchmarking decision, the uniform cross-sectoral correction factor is calculated by the Commission and applied if the amount of preliminary free allocation overshoots the 'industry cap' calculated on the basis of Article 10(a)5 of the ETS Directive. For more information see, Commission Decision 2013/448/EU concerning national implementation measures for the transitional free allocation of greenhouse gas emission allowances (hereinafter 'NIMs decision'). Available at: http://ec.europa.eu/clima/policies/ets/cap/allocation/docs/20130905_nim_en.pdf

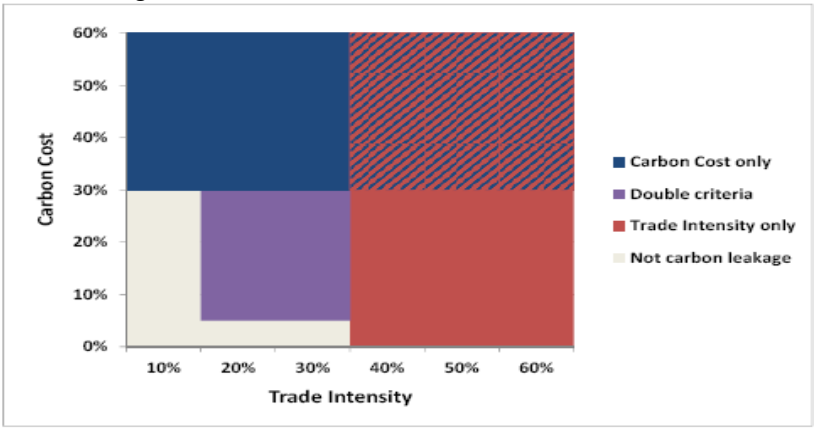
[9] See below, section 2.2

[10] See recital 24 of the Directive.

and imports divided by the total value of its turnover and imports) exceeding 10 % (i.e. combined criterion); **OR**

- The sum of direct and indirect additional costs induced by the implementation of the directive would lead to a cost increase of at least 30% of its GVA (i.e. cost criterion); **OR**
- The respective sector has trade intensity exceeding 30 % (i.e. trade intensity criterion).

Figure 1: Carbon Leakage criteria



Source: Carbon leakage methodology study

In case the assessment of a sector leads to the establishment of borderline values on the above criteria, or in case of serious data gaps, a qualitative assessment can be carried out according to the criteria outlined in Article 10(a) paragraph 17 of the Directive (abatement potential, market characteristics and profit margins).

The abovementioned criteria and thresholds are set in the Directive and are not subject to discussion in this impact assessment. However, there are several methodological choices and elements necessary for the application and calculation of the Directive criteria, which are not defined in the legal text. **These methodological elements are the subject of the current impact assessment and are presented as options.**

2.3. Subsidiarity and procedure

Article 10(a) paragraph 13 of the Directive requires the Commission to compile a list of sectors and subsectors deemed to be exposed to significant risk of carbon leakage in 2009 and every five years thereafter. The first carbon leakage list was determined in Commission Decision 2010/2/EU and is valid until the end of 2014. The Commission has a legal obligation to determine a new carbon leakage list valid for the period 2015-2019.

The new carbon leakage list will take the form of a Commission Decision to be adopted via the framework in place for subsidiary acts – at present, comitology: adoption after a positive vote by Member States Climate Change Committee and scrutiny of European Parliament and Council. The Directive foresees that the list is "discussed" in the European Council, but its recital 26 states that these discussions *'are of an exceptional character and in no way affect the procedures for the exercise of the implementing powers conferred to the Commission'.*

To determine the list applicable for 2009-2014, an impact assessment was carried out by the Commission in 2009.[11] **The current impact assessment builds to a considerable extent on the previous one, taking into account lessons learnt and new data available,[12] and reviewing the methodological elements under this prism.**

[11] C(2009)10251 final http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/sec_2009_1710_en.pdf
[12] In 2009**,** due to lack of data, for instance on the amount of free allocation, assumptions had to be made.

2.4. International efforts

The EU has played a leading role in international efforts to tackle climate change and recently an increasing number of countries have recognised emission trading systems and other climate policies as effective way to cut emissions: Switzerland, Australia, a number of US states and parts of Canada have ETS in place, while Korea, China and Chile plan to implement such systems.

Article 10(b) of the Directive foresees that international agreement or *'any binding sectoral agreements which lead to global greenhouse gas emissions reductions of the magnitude required to effectively address climate change, and which are monitorable, verifiable and subject to mandatory enforcement arrangements shall also be taken into account'*. The on-going international negotiations aim at an agreement coming into force in 2020 which is beyond the validity of the new carbon leakage list, and thus not pertinent to this impact assessment. If an international agreement or sectoral agreement(s) meeting the conditions of Article 10(b) come into force in the period of validity of the new list (2015-2019), this will require additional analysis and assessment of impacts.

2.5. EU Member State legislation

Article 10(a) paragraph 6 of the Directive foresees that Member States may adopt financial measures to compensate certain energy intensive sectors for the indirect costs induced by the EU ETS[13]. Such compensation has to be in line with EU State aid rules, notified and assessed by the Commission according to the detailed Guidelines.[14] A list of eligible sectors was established for these 'ETS State Aid Guidelines', based on the indirect costs related to electricity consumption and without prejudice to the carbon leakage list subject to this impact assessment. Annex II of the ETS State Aid Guidelines contains the list of eligible sectors: 13 sectors and 7 sub-sectors.[15]

2.6. Other EU climate policy initiatives

There are a number of on-going short and long term initiatives in EU climate policy: the proposal on the timing of auctioning of allowances ('back-loading'), the debate on the 2030 framework for climate and energy policy, and on-going work on structural measures regarding the functioning of the EU ETS.

As a short-term measure related in part of the general economic situation, the Commission proposes deferring auctioning of 900 million allowances from the years 2013-2015. This 'back-loading' does not reduce the overall number of allowances to be auctioned during phase three (2013-2020), but only the distribution of auctions over the period. A proportionate impact assessment was made for this initiative[16] demonstrating that it can rebalance supply and demand, reduce price volatility and also strengthen government revenues early in phase three without any significant impacts on competitiveness. It also indicates that an increase in the expected carbon price compared to the situation without back-loading would not have any significant negative effects on competitiveness. This proposal is now under discussion by the European Parliament and the Council.

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[13] Since from 2013 electricity production is generally subject to full auctioning, i.e. not receiving free allowances as in phases 1 and 2 of the ETS, there are some costs which can be expected to be passed to the industry via the electricity prices.

[14] **Communication from the Commission — Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012 (SWD(2012) 130 final) (SWD(2012) 131 final)** http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012XC0605%2801%29:EN:NOT

[15] The sectors are defined at NACE-4 level, while the sub-sectors at Prodcom-8 level. For more details on statistical classifications, see box in Section 5.

[16] http://ec.europa.eu/clima/policies/ets/cap/auctioning/docs/20121112_swd_en.pdf

Reflection is on-going within the Commission and with stakeholders on a sustainable solution to the growing imbalance between supply and demand which requires structural action. In November 2012, the Commission published its first report on the state of the European carbon market[17] where it identifies six options which could potentially address the surplus. These ideas are currently under discussion. These initiatives might have some impact on the functioning of the EU ETS throughout 2015-2019, but it is hard to predict and quantify their effects in relation to the new carbon leakage list.

The Commission is also currently reflecting on a framework for climate and energy policy for the horizon 2030[18] aiming for regulatory certainty on the levels of emission reductions, beyond the default in the Directive. Given the long-term nature of this initiative, it is not relevant for the present impact assessment and it does not coincide with the validity of the new carbon leakage list.

The initiatives outlined above are subject to separate impact assessments and have different time horizons so will not be analysed again here, especially given the proportionate nature of the current impact assessment aiming solely to implement a provision of the ETS Directive, i.e. to determine the new carbon leakage list valid for 2015-2019.

The carbon leakage list of sectors also impacts, albeit indirectly, companies owning installations out of the scope of the EU ETS, depending on the outcome of the proposal for Energy Taxation Directive,[19] which currently foresees the possibility for some tax exemptions depending on the carbon leakage status. Given the on-going negotiations on this legislation, this effect cannot be analysed further.

3. PROBLEM DEFINITION

The analysis below is to a considerable extent based on the one carried in the 2009 impact assessment, accounting for the evolution of the context and problem drivers.

3.1. The problem that requires action

The problem that requires action is the potential risk of carbon leakage as defined in the ETS Directive: carbon leakage is defined as an increase in greenhouse gas emissions in third countries where industry would not be subject to comparable carbon constraints. This problem is underpinned by two elements: EU policies and international context.

To address the risk of carbon leakage, the ETS Directive sets out certain criteria to determine the list of sectors to be exposed to such risk. The ETS Directive foresees compensating sectors for such risk by distributing to them a higher share of free allocation than to others, non-exposed, sectors. However, there are certain methodological elements needed for the application of the criteria which are not clear from the legal text and need to be determined.

The methodological elements for which options are developed below are:

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[17] COM(2012) 652 final http://ec.europa.eu/clima/policies/ets/reform/docs/com_2012_652_en.pdf

[18] The aim is to identify a coherent set of policy instruments to ensure progress towards new targets and equitable distribution of efforts in a way best-suited to simultaneously promote growth, competitiveness, sustainability and security of supply. The debate also aims to provide certainty and reduced regulatory risk for investors and to mobilise the funding needed, to support progress towards a competitive economy and a secure energy system and to establish the EU's 2030 ambition level for GHG emission reductions in view of a new international agreement on climate change foreseen for 2015. Such an agreement is expected to come into force after 2020, and in this case some further reflection may be necessary on the need for free allocation and on the risk of carbon leakage. For more information: http://ec.europa.eu/clima/policies/2030/index_en.htm

[19] For details, see http://ec.europa.eu/taxation_customs/taxation/excise_duties/energy_products/legislation/

- auctioning factor: the share of allowances sectors eligible for free allocation would need to purchase in order to comply with the EU ETS if not on the carbon leakage list. For more details, see part 6.1
- emission factor for electricity used to convert electricity consumption to an indirect cost percentage needed for the calculation of the cost criterion. For more details, see part 6.2
- carbon price needed for the cost criterion calculations. For more details, see part 6.3
- trade intensity coverage. For more details see part 6.4. and
- qualitative assessment options, for more details see part 6.5

The parameters for the cost calculations (auctioning factor, emission factor and carbon price) have relatively low sensitivity in terms of number of sectors added to the list, because of the dominating influence of the trade intensity criterion in that respect. In 2009, 258 sectors were assessed at NACE-4 level. Out of those, 132 sectors were added to the list based on the trade intensity above 30% criterion alone, and additional 14 sectors were added altogether based on the cost and the combined criteria[20]. In terms of impacts, these latter 14 sectors cover ca. 59% of allocations, and ca. 5.5% of industrial GVA.[21]

The problem to be tackled in the present impact assessment is to determine the above methodological elements and thus to implement with highest possible accuracy the criteria outlined in the ETS Directive, taking into account new data available and lessons learnt since the first list was determined in 2009.

Given the setup of the EU ETS, the methodological choices for the calculations (and the resulting carbon leakage list) will impact the distribution of the financial resources constituted by the allowances between industry and Member States' budgets.

3.2. Lessons learnt from the carbon leakage list 2009-2014

While the existing carbon leakage list has been in force since 2009, it will only apply to the allocation years 2013 and 2014, and therefore there are limited lessons to be learnt from it. In terms of scope, the list determined in 2009 and its subsequent additions covers more than 97% of total industrial emissions covered by the ETS. Thus, virtually all sectors eligible for free allocation are on the carbon leakage list. So, while for a sector to be on the carbon leakage list is described in the recitals of the Directive as an exception, it has, because of the criteria in the Directive, the methodological elements chosen in 2009 and the lack of harmonised assessment methodology, rather become a very over-arching exception applying to virtually all industry covered by the ETS. Nevertheless, it needs to be borne in mind that legally, carbon leakage status is derogation to the rules of harmonised free allocation and as such needs to be interpreted restrictively.

[20] One sector was found to have cost intensity above 30% and trade intensity above 10%: 2415 Manufacture of fertilizers and nitrogen compounds (this sector thus met both the cost alone and the combined criteria); 11 sectors were added based on the combined criterion only: 1562 Manufacture of starches and starch products; 1583 Manufacture of sugar; 1595 Manufacture of other non-distilled fermented beverages; 1592 Production of ethyl alcohol from fermented materials; 2112 Manufacture of paper and paperboard; 2320 Manufacture of refined petroleum products; 2611 Manufacture of flat glass; 2613 Manufacture of hollow glass; 2630 Manufacture of ceramic tiles and flags; 2721 Manufacture of cast iron tubes; 2743 Lead, zinc and tin production; and two sectors were added based on the cost above 30% criterion: 2651 Manufacture of cement and 2652 Manufacture of lime.

[21] For the new list, 245 sectors have been assessed. The number of sectors assessed at NACE-4 level is lower than in 2009 only due to changes in statistical classification. The analysis covers all mining and manufacturing industries, just as the analysis carried out in 2009.

The current carbon leakage list is valid only for allocation in 2013 and 2014, therefore it does not provide vast insights from the effects of its application and the experience gathered is rather on the exercise of determination of the list. One element which is evident, however, is that the length of the carbon leakage list had an impact on the cross-sectoral correction factor: the increased amount of allocation for nearly all industrial sectors led to an increase of the amount of free allocation overshooting the industry cap, and a proportional reduction in the form of the cross-sectoral correction factor foreseen in the Directive, needed to be applied.

Concerning free allocation as a tool to address competitiveness concerns, experience exists since 2005, when ETS started to operate. During the period 2005 to 2012, free allocation was decided by Member States, based on projected production data, and after scrutiny by the Commission[22]. This method revealed that the allocation in general was too generous, as it took into account over-optimistic projections from industry aiming to maximise the amount they would receive. It also provided all sectors with the same degree of free allocation, regardless of their ability to pass on the carbon costs. This method of free allocation, coupled with the economic crisis and ample access to international credits led to the accumulation of considerable surpluses of free allowances by industrial sectors: the total amount of surplus allowances allocated for free to industrial sectors are around 1 billion EUAs. Most of the energy intensive sectors have accumulated considerable surplus of free allowances which they would be able to use for compliance in the period 2013-2020 and these amounts are expected to alleviate considerably their need to purchase allowances. Detailed numbers on sectoral level are available in Annex II.

These two elements led, in the 2009 revision of the ETS Directive, to the creation of harmonised system, based on historical data, and aiming at only providing the more generous free allocation to sectors that really needed it.

A fact-finding study[23] looking at evidence for carbon leakage in the period 2005-2012 provided interesting insights on the cost structure and competitiveness situation of different industrial sectors subject to ETS. Its main conclusion is that there is no evidence detected for the occurrence of carbon leakage as defined by the ETS Directive in the abovementioned period. In some assessed sectors increasing imports and/or decreasing exports were observed, driven mainly by global demand developments, and input price differences. In any case, the study is looking at the past when a different free allocation system applied, so its conclusions may need to be taken with some caution regarding carbon leakage in the period of validity of the new list 2015-2019 and potentially beyond.

From the same study, the cost structure of major industrial sectors reveals that ETS costs are a very minor element and did not constitute a driver for relocation. The study could not provide data of the isolated ETS costs of industries, but it is logical to be assumed that ETS has rather been a benefit since ample free allocation was given to cover all emissions. The lack of adjustment in case of decreasing production also meant that the high level of free allocation was kept when production was decreasing, leading to the accumulation of surplus of allowances which constitute an asset and potential profit when sold. Even the total energy costs including fuel, in most cases (iron and steel, chemicals, glass, clay building materials, paper) are of the range of less than 20% of total costs. So, in most cases, due to the accumulated surplus of allowances, ETS has rather been a benefit than a cost to energy intensive industries. For more detailed figures, see Annex II.

As explained above, there is differing perspective on the scope of coverage of the list – the majority of industrial stakeholders support that the list is a product of technical application of

[22] For difference between phases 1 and 2 of ETS and the current phase 3, see section 2.1
[23] Available at: http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf

the Directive criteria and its length is irrelevant and cannot be judged, while the view that the list is too long, i.e. its coverage is too broad, is supported by certain Member States, environmental NGOs and academia, who also argue that a shorter list could be defended based on the criteria. All stakeholders find free allocation very adequate tool for addressing carbon leakage, but there are differing opinions concerning the increase or decrease of the risk of carbon leakage since 2009: industrial stakeholders see it increasing, while all other stakeholders see a decrease. The criticism of free allocation expressed by civil society is that it is too generous, constitutes a hidden subsidy and foregoes revenues from state budgets.

One element which needs recognition is that the current free allocation system treats sectors in a binary manner: either exposed or non-exposed, and contains no degree or nuance to reflect specific sector situations. Another element is brought forward by quite some stakeholders, industrial and from the civil society, is that the criteria may not be fully adequate since they look at costs and trade sometimes isolated, while what is important is their interaction in conjunction. These elements, however, could only be addressed with a Directive revision and are therefore not analysed further.

The first time the carbon leakage exercise was done in 2009 certain data deficiencies and statistical issues were revealed. For instance, since the exact amount of free allocation was not yet known, several assumptions had to be made, mainly on the auctioning factor value. For some other data points, such as direct and indirect emissions, full coverage was not always possible to reach. This was not judged to have a material impact, but improvements would be desirable. During the assessments of the requests for annual additions to the list, useful operational experience was acquired and some practice was established as to when disaggregation is justified. Concerning qualitative assessments, the lack of harmonised methodology made ensuring consistency of applications difficult, and this unavoidably led to an increased role of politics in the decision-making process. The practice surrounding the annual additions revealed the need for a structured and harmonised framework allowing equal treatment, clarity and transparency of such assessments.

3.3. Underlying drivers of the problem

1.1.1. International context

In a globalised economy, national or regional climate policies aiming at GHG emissions reductions could, under certain conditions and if poorly designed, even lead to an overall increase in emissions. This could be witnessed, for instance, if production facilities are relocated from a country or region with an absolute cap on emissions to a country or region without such cap. This is a particular concern for the emission-intensive industries.[24] Such relocation is undesirable both from economic and environmental point of view.

Despite intensive research, no empirical evidence for carbon leakage has been identified: academic literature and stakeholders find no evidence that relocation due to climate policies would have occurred in the years since the EU ETS was implemented.[25] This can of course be thanks to the adequacy of free allocation as measure to preventively address such risks.[26]

Since 2009, the increasing global uptake of emission trading systems and other climate policies is a positive development which can be expected to decrease the potential risk of carbon leakage. The ETS Directive calls for an analysis of the situation upon conclusion of

[24] For literature review on carbon leakage, see Carbon leakage methodology study, Task 6

[25] For more details, see Carbon leakage methodology study, Task 6, and especially Sartor (2012), Reinaud (2008), Kenber, Haugen and Cobb (2009), Lacombe (2008), Martin, Muûls, de Preux and Wagner (2012). These views are shared by civil society stakeholders and environmental NGOs.

[26] According to the results from the public consultation, free allocation is perceived by the majority of stakeholders as adequate or very adequate means to address potential risk of carbon leakage.

global climate agreement and/or binding sectoral agreements[27], and despite the complexities surrounding such an agreement, the domestic GHG emission regulation efforts of many countries are not to be neglected since they illustrate that climate change is a pertinent problem requiring urgent and ambitious action.

The international context is therefore a clear driver to the problem at stake.

1.1.2. EU context

Emission reduction targets should, on the one hand, incentivise emission reductions of industry and ensure transition to low-carbon technologies and, on the other hand, consider competitiveness and avoid excessive burden through emission reduction measures. To address both aspects, the ETS Directive foresees free allocation of allowances to ease the cost impacts of the EU ETS on European industries while maintaining adequate incentives for green growth.

The amount of free allowances is calculated based on benchmarks, taking into account recent production and providing for one-off adjustments in certain cases of significant production increases and decreases. Hence, free allocation *per se* is a pro-competitiveness measure. In an extra pro-competitiveness step, industries included in the list of sectors and subsectors deemed to be exposed to a significant risk of carbon leakage ('the carbon leakage list') receive a higher share of free allocation.

Therefore, it is evident that the EU context is an important driver of the problem at stake.

It is important to note that the ETS is constructed in such a way that the allowances that are not allocated for free to industry are auctioned by the Member States. The revenues from auctioning are directed to Member States' budgets in predefined shares and they have agreed that at least 50% of those revenues should be used to combat climate change in Europe and internationally.[28] The total amount of allowances available in the system is limited and determined by the EU-wide cap. Thus, the more allocation is given out for free to industry, the fewer allowances remain to be auctioned and vice versa.

One claim brought forward by industrial stakeholders in a broader competitiveness debate is that carbon costs are the reason for decrease of production, lack of investment and relocation. However, according to recent studies[29], carbon costs constitute generally a very small part of industries' costs, so it is hypothetical to explore whether this undesirable evolution is indeed due to carbon costs, or rather to more general economic occurrences such as economic and financial crisis, labour costs, growing non-European markets etc**.**

The aim of the current analysis is not to focus on general competitiveness concerns, but to analyse the impacts of different methodological options needed for the new carbon leakage list calculations, within the limits set by the ETS Directive.

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[27] As explained in section 2.4, Article 10(b) of the Directive foresees that international agreement or 'any binding sectoral agreements which lead to global greenhouse gas emissions reductions of the magnitude required to effectively address climate change, and which are monitorable, verifiable and subject to mandatory enforcement arrangements shall also be taken into account'. However, current international negotiations work towards an agreement coming into force in 2020 which is beyond the validity of the new carbon leakage list and thus not subject to the current impact assessment. The conclusion of such an agreement before would require major thinking and analysis of free allocation, carbon leakage and international industrial competitiveness issues.

[28] Member States are obliged to inform the Commission of how they use the revenues.

[29] Recent assessment of the overall cumulative cost of environmental regulation to the European steel industry conducted by the Centre for European Policy Studies (see http://ec.europa.eu/enterprise/sectors/metals-minerals/files/steel-cum-cost-imp_en.pdf), preliminary results from a similar exercise for the aluminium industry and "Carbon Leakage Evidence Project: Factsheets for selected sectors, Ecorys, 23 September 2013" available at http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf. For more details, see Annex II.

3.4. Direct and indirect effects

Free allocation and the carbon leakage list directly affect primarily industrial installations covered by ETS and EU Member States' budgets, as well as the same entities in EEA-EFTA States applying the ETS. The carbon leakage list has an effect on companies' cash-flows because it affects the amount of allowances they receive for free. Their carbon efficiency and level of emissions affect the amount of allowances they have on purchase on the market.

As explained above, the amount of free allocation also affects Member States' fiscal situation because handing out allowances for free is *de facto* foregoing revenues. The amount of revenues at stake obviously depends on the market price for allowances.

As mentioned, the carbon leakage list of sectors also indirectly impacts companies owning installations out of the scope of the EU ETS, depending on the outcome of the proposal for Energy Taxation Directive[30], which currently foresees the possibility for some tax exemptions depending on the carbon leakage status, but given the progress of the negotiations this effect will not be analysed further.

To the extent it has some influence on companies' costs, it can be argued that free allocation also affects companies' clients and ultimately consumers depending on the ability of each element of the supply chain to pass on costs downstream. Inasmuch free allocation has some influence on Member States' budgets, it can be reasoned it also affects citizens, since the more free allocation is given; the less revenues from auctioning remain to be redistributed to the society. Due to the multiple variables and uncertainties (ability to pass on costs, investment decisions, government policies and priorities, level and type of taxation), however, it is not possible to quantitatively assess these effects so they will not be taken into account in the analysis of impacts.

3.5. Evolution of the problem and EU right to act

Article 10(a) paragraph 13 of the Directive and recital 24 of Commission Decision 2010/2/EU foresee that the carbon leakage list determined in 2009 is valid for allocation in 2013 and 2014. Therefore, if no new carbon leakage list would be determined in 2014, no industrial sectors would be deemed to be exposed to a significant risk of carbon leakage after 2014, so all industrial sectors under the ETS would receive free allocation decreasing from ca 68% of the "basic allocation" in 2015 to ca 36% in 2019. Given the legal text, not determining a new list would also constitute a breach of the Directive. It is thus not a possible option and will not be analysed further.

In other words, the Directive makes it clear that the Commission has the legal obligation to determine a new carbon leakage list for the next 5 year period, i.e. 2015-2019. Therefore, EU action is not only justified but it is required by the Directive. The carbon leakage list has to be determined at EU level to ensure the EU-wide application of the harmonised allocation rules and the level-playing field for EU industries. Therefore, the subsidiarity and proportionality principles are respected.

The baseline option in this context is not to take into account new data and from the determination of the first carbon leakage list in 2009 and the annual additions. As outlined in detail below, this amounts to an assumption of a uniform auctioning factor of 75%, an average emission factor of the whole electricity production mix based on 2005 data, a carbon price as used in 2009, EU-27 trade coverage and no guidance on qualitative assessments.

[30] For details, see http://ec.europa.eu/taxation_customs/taxation/excise_duties/energy_products/legislation/

4. OBJECTIVES

4.1. General policy objectives

The general objective of EU climate policy is to ensure progress towards the Europe 2020 targets of reducing GHG emissions, increasing the share of renewable energy in the energy mix and improving energy efficiency. The general objective is also be coherent with subsequent policy objectives of the Union, such as emission reduction by 80-95% by 2050, in the international context of necessary reductions by developed countries as a group to limit global warming to below 2ºC.

4.2. Specific policy objectives

A further development of the general objective are the specific objectives of free allocation as part of EU ETS. These are:

i) addressing competitiveness concerns of industry

ii) diminishing the potential risk of carbon leakage;

iii) incentivising emission reductions and transition to a low carbon economy and

iv) avoiding over-compensation**.**

Free allocation is designed to ease the cost impacts on European industries and this sheltering from costs is even greater for industries on the carbon leakage list. The determination of this carbon leakage list is done within the remit of the Directive criteria.

As explained in the problem definition, since the construction of the EU ETS (limited total amount of allowances in the system determined by the EU-wide cap) means that allowances which are not given out for free are in general auctioned, another aspect of the problem to be tackled by this impact assessment is an optimal distribution of the financial resources which allowances constitute, between Member States and industry. In that sense, the general objective can be deemed achieved when resources are optimally distributed in a way that they are likely to be used in a way most coherent with the general policy objectives of EU climate policy.

4.3. Operational policy objectives

The operational objective stemming from achieving the specific one is to determine a sound methodology for each of the elements needed for the calculations of the new carbon leakage list which are not pre-defined in the Directive, and subsequently calculate in the most accurate possible way within the criteria of the Directive, the new list, by using recent data and lessons learnt since 2009. The new list will be a technical product framed by the Directive criteria, resulting from applying the methodological elements to the most recent data available.

The Directive assumes that a sector is not exposed to carbon leakage unless it is deemed to be the case against the criteria or can be otherwise proven on qualitative grounds, and that the linearly decreasing free allocation is sufficient to address its competitiveness concerns. The carbon leakage status is a derogation from the rule of transitional free allocation and as such needs to be interpreted strictly. Article 10(a) paragraph 13 of the Directive gives the possibility of annual additions of sectors to the list, but not of the opposite, therefore only sectors for which there is high degree of certainty that they fulfil the criteria shall be added to the carbon leakage list. Borderline cases can always be subject to more in-depth assessment. Thus, only clear-cut cases fulfilling the criteria can be included in the list to avoid incorrect application of the Directive provisions. In this sense, avoiding double counting and over-compensation are also part of the operational objectives.

Regulatory predictability is an important concern raised by industry. However, the Directive clearly requires the determination of a *new* list every five years, so it can be expected that a new assessment is to be carried out taking into account new data. Therefore, it cannot be excluded, and cannot be considered unwarranted, that the new data changes the exposure situation of certain sectors and this does not compromise the regulatory predictability.

The proposed objectives are in line with the scope of the impact assessment, as well as with the general objectives of EU climate policy.

5. LEVEL OF ANALYSIS AND SCOPE OF DATA

Recital 24 of the Directive foresees that the analysis for the carbon leakage list should be made 'as starting point, at a 3-digit NACE level (NACE-3 code) or, where appropriate and where the relevant data are available, at a 4-digit level (NACE-4 code)'. For the 2009 list, it was deemed appropriate to analyse sectors at NACE-4 level as a general rule. In some cases, the analysis was more detailed[31] because of the heterogeneity within one sector even at 4-digit NACE level. For the new list it is deemed most appropriate to keep the same approach and do the analysis at NACE-4 level as a general rule. Keeping this approach is also supported by the majority of stakeholders.[32]

As done in 2009, the analysis will focus on 245 industrial sectors[33] classified under NACE rev.2. Considerable data availability constraints and statistical classification problems make the same analysis of agricultural sectors unfeasible.[34]

The text of the Directive and of Decision 2010/2/EU, and the practice of further analysis of sectors with special circumstances which presented their applications to be added to the carbon leakage list in the period 2009-2012, have outlined several conditions which need to be fulfilled for a sector to be analysed in a disaggregated manner. Firstly, any disaggregation is an exception to the rule of the Directive and thus needs to be applied restrictively[35].

[31] See the Commission Decisions 2010/2/EU, 2011/745/EU, 2012/498/EU and 2014/9/EU available here http://ec.europa.eu/clima/policies/ets/cap/leakage/documentation_en.htm
There were cases when sub-sectors and products were analysed defined in the Prodcom classification (http://epp.eurostat.ec.europa.eu/portal/page/portal/prodcom/introduction). As suitable level of analysis was deemed Prodcom-6, for instance for "155153 Casein" and Prodcom-8, for instance for "26821620Exfoliated vermiculite, expanded clays, foamed slag and similar expanded mineral materials and mixtures thereof".

[32] The ceramics sector is the only one preferring analysis on NACE-3 level. The vast majority of industrial sectors, national governments (for instance UK) and NGOs (examples) prefer NACE-4 as most accurate level of analysis.

[33] There are 18 sectors classified under division B 'Mining and Quarrying' and a total of 221 sectors classified under division C 'Manufacturing'. There is a difference of the overall number of sectors assessed due to the differences between the NACE rev 1.1. and NACE rev. 2 statistical classifications: merging, splitting, deletion and addition of codes.

[34] There are 45 sectors classified under NACE division A 'Agriculture', but there is no Gross Value Added data for them, which renders impossible the calculation of the cost criterion. As for trade, the COMEXT and Prodcom statistics data sources used for mining and manufacturing do not contain data for agriculture. There are some alternative data sources (Economic Accounts for Agriculture) but they require complex matching, contain some serious data gaps and in sum are not suitable for the calculation of the trade criterion. Nevertheless, the impact of these data gaps are not significant since agriculture is not subject to ETS, and therefore the carbon leakage analysis is not highly relevant for these sectors, apart from few sectors carrying out some combustion activities above 20 MWh. As for manufacturing and mining, there is always the possibility for sub-sector(s) to submit an application for (disaggregated) assessment, be it quantitative of qualitative, containing official and/or verified data building a solid case proving that they satisfy the ETS Directive criteria.

[35] Any analysis at Prodcom level (i.e. at levels further disaggregated than 4-digit NACE) must be robustly justified, for instance with substantially different production, trade, energy consumption and emissions profile characteristics in the context of a heterogeneous NACE-4 code. The product in question should match the description of an existing Prodcom code derived from the respective NACE-4 code

Secondly, representative and official (or independently verified) data should be available to assess the sub-sector against the criteria laid down in the Directive.

The Directive requires the use of data 'from the three most recent years for which data are available'. In the present case, these are 2009, 2010 and 2011 for which Eurostat has published official data on turnover, GVA, imports and exports. The data are available according to the NACE rev.2 classification, therefore for the 2015-2019 carbon leakage list this statistical classification is used. The NACE Rev.2 classification differs from the previously used NACE rev.1.1 classification in several ways: some codes have been merged, others have been split, etc.

Therefore, a straightforward direct comparison between the 2009 list and the new list is very difficult to make but an approximate comparison between the results of the assessments done at NACE-4 level based on the quantitative criteria in 2009 vs. in the present exercise are presented in Annex VI.

6. POLICY OPTIONS

As explained above, Article 10(a) paragraphs 15 and 16 of Directive foresees two criteria for the quantitative assessment: cost criterion and trade criterion.

The formula for the calculation of the **cost criterion** is the following:

$$Carbon\ costs = \frac{Direct\ costs + Indirect\ costs}{GVA}$$
$$= \frac{(Direct\ emissions * AF + Electricity\ consumption * EF\ ) * CO2\ price}{GVA}$$

In this formula:

- **Direct costs** are the costs associated with direct emissions, i.e. the emissions not covered by free allocation.

- **Indirect costs** are associated with cost of indirect emissions (emissions related to the production of electricity consumed) considered the result of potential increase of electricity prices if costs induced on electricity producers in ETS are passed on the electricity consumers.

- **Gross value added (GVA)** has the standard definition used by Eurostat.[36]

On the remaining elements (**auctioning factor, emission factor, carbon price**), the Directive does not provide detailed guidance and therefore mandates the Commission to address these issues in the respective implementing measure.

Trade intensity measures the importance of imports and exports in relation to the domestic market. The formula for the calculation of the **trade criterion** is the following:

$$Trade\ intensity = \frac{Imports + Exports}{Turnover + Imports}$$

In this formula:

- **Imports** represent total imports expressed in value.

- **Exports** represent total exports expressed in value.

[36] GVA at factor costs can be derived by subtracting other taxes on production from GVA at basic prices and adding other subsidies on production. Eurostat Glossary: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Gross_value_added

- **Turnover** represents the domestic production in value.[37]

Data on imports, exports and turnover are published by Eurostat[38]. The same data sources were also used for the compilation of the list in 2009.

Below, policy options are developed for these four main methodological elements, as well as for the qualitative assessment. The elements will be analysed separately from each other, because they are underpinned by different economic, theoretic, data and feasibility concerns and are not directly interlinked. For the purpose of calculating the list, i.e. achieving the specific objective, the elements will be grouped in policy packages. For each element, discarded options will be presented.

One view could be that the baseline scenario should be the absence of any carbon leakage list, since the Directive clearly foresees the 5-year validity of the list without any provision for renewal. Therefore, the 'do nothing' option is to not take any action for determination of a new list.

Another view supported in this impact assessment is that the baseline scenario includes the same elements as the ones used for the 2009 carbon leakage list, and complements them with new data. Namely, this baseline updated scenario contains:

- carbon price of 30€;
- uniform auctioning factor of 53% calculated from Phase 3 allocation and historical emissions data;
- emission factor for electricity of 423g CO2/kWh based on the average electricity generation mix in 2008-2010;
- trade intensity coverage of EU-28 + EEA-EFTA states.

6.1. Auctioning factor

The auctioning factor represents the share of allowances sectors eligible for free allocation would need to purchase in order to comply with the EU ETS if not on the carbon leakage list. This percentage value depends on the amount of allowances that would be allocated for free if sectors were not on the carbon leakage list on the one hand, and on the total emissions from activities eligible for free allocation under Article 10a of the ETS Directive on the other.

In a formula, the auctioning factor (AF) may be expressed as:

$$AF = \frac{Allowances\ to\ purchase}{Direct\ emissions} = 1 - \frac{Basic\ allocation}{Direct\ emissions}$$

In this formula:

- **Direct emissions** represent the emissions related to ETS activities eligible for free allocation under Article 10a of the ETS Directive.

- **Basic allocation** means (in the formula and hereinafter) the amount of free allocation assuming non-carbon leakage status.[39]

[37] For definition of turnover according to the Eurostat metadata on the structural business statistics see http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/sbs_esms.htm. If turnover data cannot be found in Comext, SBS database can be used for gap filling.

[38] The data is collected at product level rather than at an activity level (NACE code). There is a concordance between the Prodcom classification and the NACE classification which allows by adding up the figures for the products include in one activity to obtain n data at NACE level. Data can be found here http://epp.eurostat.ec.europa.eu/newxtweb/. Eurostat Glossary: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:PRODCOM

[39] The effect of the cross-sectoral correction factor is taken into account.

The above ratio reflects only to the free allocation determined in phase 3, and does not take into account the surplus carried over by many sectors from the second trading period.

The value is expressed in percentage and is included in the direct costs part of the cost criterion calculation:

$$Direct\ costs = \frac{Direct\ emissions\ [tCO2] * AF\ [\%] * CO2\ price\ [\frac{EUR}{tCO2}]}{GVA\ [EUR]}$$

In 2009, the Benchmarking decision and the harmonised allocation rules, including the benchmark values, were still under discussion. Hence, the amount of basic allocation to sectors was not yet known and therefore an assumption was made as to the value of this factor. A uniform factor of 75% was taken as the best estimate in 2009 (i.e. de facto it was assumed that free allocation in 2013-2014 would cover 25% of emissions from eligible activities if no sectors were on the carbon leakage list).

For the present impact assessment, data availability is considerably higher. The assumption made in 2009 was the best available estimate at the time, but **can in no case be considered accurate with the current data availability.** The benchmark values are set in the harmonised allocation rules[40] and basic allocation for all installations is determined.[41] The available data make it possible to calculate the shortage of allowances (i.e. the amount of allowances to purchase) and the auctioning factor itself with high degree of accuracy.[42]

Stakeholders' views on the auctioning factor are quite diverse: civil society does not have strong opinion, Member States seem to support more a sectoral approach, while industrial stakeholders are equally split between a uniform and sectoral approach with about one fifth commenting that the auctioning factor should correspond to the level of analysis.

6.1.1. Time scope

Given that basic allocation and emissions vary from year to year, there is a time element to be considered when calculating the auctioning factor. It can be calculated either as progressively increasing annual factors or one single factor for the whole 5-year period. However, since the Directive requires the Commission to determine a list for the whole five-year period, 2015-2019 in the current case, it would not be consistent to use annually varying auctioning factors, and therefore the possibility to apply annual parameters is dismissed.

6.1.2. Sectorial scope

A second methodological choice for the calculation of the auctioning factor is whether there should be one uniform factor applying to all sectors, or multiple ones; and if so, what would be the appropriate level of aggregation for multiple factors.

Sector-specific factors reflect to a maximum extent the specific situations of different sectors and the particular share of emissions as compared to basic allocation for each sector.[43] Sensitivity analysis has demonstrated that cost criterion calculations at NACE-4 level are

[40] Commission Decision 2011/278/EU of 27 April 2011

[41] Commission Decision 2013/448/EU of 5 September 2013

[42] Free allocation per installation is available also in the public version of the NIMs. Emissions can be taken from EUITL, as well as from NIMs.

[43] The necessary inputs are the emissions stemming from the activities and the corresponding basic allocation per NACE code. The EUTL contains information on the past emissions of each installation for each year when they were subject to the EU ETS, but as this data is always in line with the scope of the EU ETS at the time, it is not in all cases directly usable for this calculation due to the change of scope of ETS from phase 2 to phase 3. NIMs contain information on past emissions in the baseline period chosen by the operators (either 2005-2008 or 2009-2010) for all installations eligible for allocation according to the scope of the EU ETS in the 3rd trading period.

relevant for the 24 biggest emitter sectors[44]. For maximum accuracy and feasibility, sectoral auctioning factors could be proposed for all these 24 sectors[45].

For more details, see Annex III.

6.1.3. Data on emissions and free allocation

For the calculation of the auctioning factor, data on free allocation data can be obtained from the NIMs for the years concerned (2015-19)[46], and the amount of allocation operators would receive if not on the carbon leakage list can be calculated.

Emissions data are obviously available for the past only. The auctioning factor can be calculated by comparing basic allocation data to emissions experienced in the past.

Four options are considered depending on which years' emissions data are used for the comparison, and whether or not a sectoral approach is taken. All four reflect the effect of ETS scope extension from Phase 2 to Phase 3.[47]

a) Uniform factor based on average 2009-2011 emissions

In order to ensure coherence with the data used for the other variables in the cost criterion calculation (GVA), the average 2009-2011 verified emissions can be taken into account for the calculation of the auctioning factor.

b) Uniform factor based on average 2010-2012 emissions

In line with the spirit of the Directive requiring the use of most recent and reliable data and jurisprudence of the ECJ[48], the average verified emissions in the period 2010-2012 can also be taken into account for the calculation of the auctioning factor.

c) Sectoral factors based on average 2009-2011 emissions

Same as under to point a), but calculated for individual sectors at NACE-4 level.

d) Sectoral factors based on average 2010-2012 emissions

Same as under to point a), but calculated for individual sectors at NACE-4 level.

Table 2 Auctioning factor values

	Avg 2009-11 emissions	**Avg 2010-12 emissions**
Uniform factor	53%	53%
Sectoral factors	0% - 72%	0% - 72%

6.2. Emission factor for electricity

The emission factor for indirect emissions is used to convert electricity consumption to an indirect cost percentage needed for the calculation of the cost criterion.

This can be represented by the formula:

[44] In the case of other sectors either the cost to GVA ratio remains below 5% even assuming full auctioning, 30 EUR carbon price and 690 gCO2/kWh for the indirect cost calculations, or they are on the list based on trade intensity above 30%

[45] For the other NACE-4 codes a separate common auctioning factor can be calculated, which might be useful for analyses at disaggregated (Prodcom) levels

[46] These data will also become available in EUTL upon Member States final allocation decisions.

[47] The adjustment of EUTL data to reflect the ETS scope extension is possible based on emissions data reported in the NIMs

[48] See Case T-183/07 Poland v Commission

$$Indirect\ costs = \frac{Electricity\ consumption\ [MWh] * EF\ \left[\frac{tCO2}{MWh}\right] * CO2\ price\ [\frac{EUR}{tCO2}]}{GVA\ [EUR]}$$

One important aspect related to the emission factor is the choice between average and marginal factor. The 2009 impact assessment analysed the difference between marginal and average values to be used for the emission factor and an average value was chosen. It could be held that the marginal emission factor is a better indicator for the costs being faced, since industrial indirect costs depend on the prices for electricity and these prices are frequently set by the marginal electricity provider at any given time. An accurate determination of a marginal emission factor nevertheless requires huge amount of data analysing the electricity markets at national or regional level.

Another relevant element for the calculation of the emission factor is which fuel mix for the production of electricity the factor should reflect: the total fuel mix, including renewable energy generation, or only the fossil fuels mix. Given the constantly increasing renewable energy generation, and that in 2010 electricity generated from renewable energy sources contributed to one-fifth of the EU-27's gross electricity consumption,[49] it could be argued it is methodologically incorrect to disregard renewable energy sources. Even more, a fossil fuel mix approach does not take into account nuclear energy, which amounts to 27.3% of the net electricity generation in EU-27 in 2010.[50] On the other hand, it can be claimed that despite the growing role of renewables and the share of nuclear energy, fossil fuels maintain a higher relative importance because they are usually price setters in a marginal cost context. However, recent (2013) very low or even negative wholesale prices of electricity due to renewable production with 0 marginal costs demonstrate the quick developments in this area. Therefore, an option analysing only the fossil fuel mix has to be taken with significant caution.[51]

The general approach for calculating the emission factor is to divide the overall annual CO_2 emissions of the electricity system by the overall net electricity generation. This leads to three possible options for the emission factor.

Stakeholder are divided in two main groups concerning the emission factor: the majority of industrial respondents show preference the marginal electricity generation in the current system as the highest option, while Member States and civil society prefer the average factor of the total fuel mix with the argument this the most accurate number taking into account all forms of electricity generation, including renewables and low carbon technologies. A comment made by various stakeholders, including industrial ones, is that the marginal factor would be too complex to calculate correctly, albeit its theoretical relevance.

[49] In Austria (61.4 %), Sweden (54.5 %) and Portugal (50.0 %); at least half of all the electricity consumed was generated from renewable energy sources, largely as a result of hydropower and biomass. The growth in electricity generated from renewable energy sources during the period 2000 to 2010 largely reflects an expansion in two renewable energy sources; namely, wind turbines and biomass. Although hydropower remained the single largest source for renewable electricity generation in the EU-27 in 2010 (58.4 % of the total), the amount of electricity generated in this way in 2010 was relatively similar to that a decade earlier, rising by just 4.5 % overall. By contrast, the quantity of electricity generated from biomass more than trebled, while that from wind turbines increased almost seven-fold. The relative shares of wind turbines and biomass in the total quantity of electricity generated from renewable energy sources rose to 21.8 % and 18.9 % respectively in 2010. Source:

[50] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Net_electricity_generation,_EU-27,_2010_(%25_of_total,_based_on_GWh).png&filetimestamp=20121012130734

[51] A claim for not taking into account nuclear and renewable energy is that they are not price setting in an electricity market. However, there are multiple arguments, such as low or even negative prices of renewable energy, that advocate against this claim.

a) Baseline option

In 2009, an emission factor of 465g CO_2/kWh applicable for all Member States was calculated referring to the average electricity generation mix based on 2005 data.[52]

b) Updated baseline option

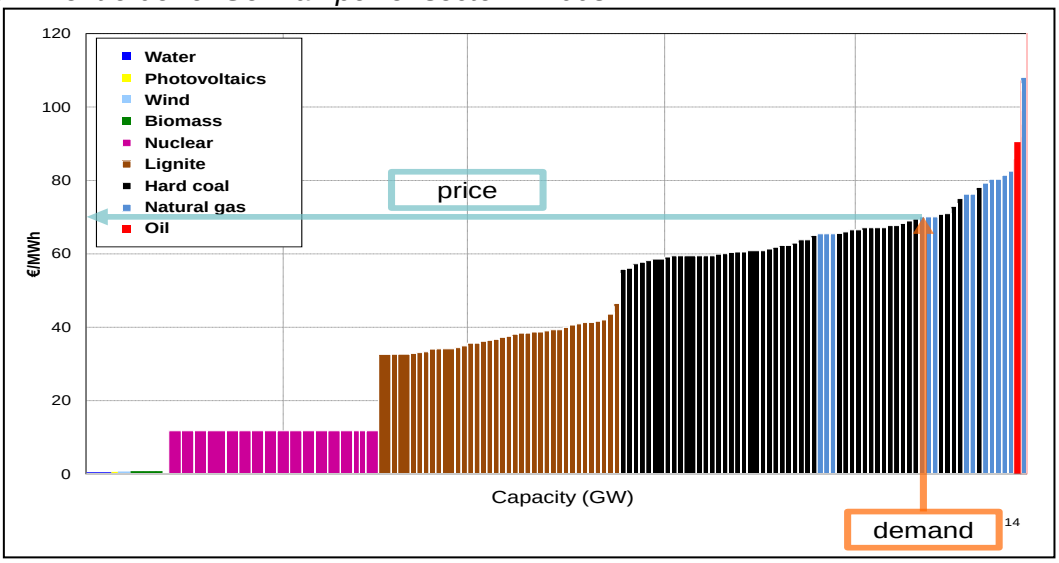
Due to growing renewable energy generation, the average emission factor for the EU-28 is decreasing over time.[53] There are annual variations of the CO_2 intensity due to different fuel mixes, and especially different shares of hydropower depending on weather conditions, therefore an average for three years is taken.

According to the IEA data for EU-27 complemented with EEA states and Croatia, the resulting emissions factor for 2008-2010 is 423 gCO_2/ kWh.[54]

c) Marginal electricity generation in current system

The average generation mix uses average CO_2 emissions of the power sector, but the actual CO_2 emissions depend on the type of power plant dispatched in each point in time. Thus, power plants can be ranked according to their short-term marginal generation costs including fuel and CO_2 costs. An example for Germany can be seen below:

Figure 2 Merit order of German power sector in 2008



Source: Carbon leakage methodology study, *Öko-Institut PowerFlex model*

This ranking means that power plants with low marginal generation costs (renewable, nuclear, lignite) are preferentially dispatched. Only with higher system load, hard coal-fired power plants are dispatched and eventually, natural gas-fired and fuel oil power plants are used. The system load and the related emission factor depend on the load pattern of the electricity system over time.[55] To calculate the average marginal electricity generation emission factor

[52] As referenced in the Carbon Leakage Methodology study, Capros (2008): Model-based Analysis of the 2008 EU Policy Package on Climate Change and Renewables

[53] This option takes into account electricity generated from electricity plants, combined heat and power (CHP) plants from main activity producers as well as auto-producers. It is based on International Energy Agency data for 2008-2010 extracted in 2012 with a weighted average calculated for the EU27, Croatia, EEA-EFTA states.

[54] The most recent publication from IEA, the 2013 "'CO2 emissions from fuel combustion" reports annual emission factors with a stable decreasing trend: from 387 gCO_2/ kWh in 2005 to 347 gCO_2/ kWh in 2010, and an average of 352 gCO_2/ kWh for 2009-2011 due to change of methodology for CHP accounting, See http://www.iea.org/publications/freepublications/publication/name,43840,en.html

[55] The system load depends on the day time, the week day and the season. For instance, power plants dispatched during the night, are mostly baseload power generators such as nuclear or lignite, whereas in peak hours during day natural gas-fired power plants may be dispatched.

for the total fuel mix of EU-28 a European electricity market model with very significant amount of data is needed. Calculating annual average for the marginal emission factor for the EU would suppose detailed knowledge of hourly power generation schemes by operating units across every Member State as well as specific efficiency assumptions for the different power generation assets. Whereas the Third energy package has done much to improve the transparency of the EU power markets, such data is currently not available for large parts of the EU.

Given that such data collection is neither feasible, nor foreseen for the present impact assessment, an approach to calculate a customised emission factor could be based on the marginal emission factor approach chosen in the ETS State aid Guidelines. Regional or national emission factors were calculated based on weighted average of the marginal CO_2 emission factors derived from electricity produced from fossil fuels and not from the whole electricity mix including renewable energy. The maximum values range from 560 to 1120 gCO_2/kWh. A weighted average derived from these figures is 690 gCO_2/kWh. These values were based on 2009 data. However, for the eligibility of sectors for compensation, the emission factor is based on the EU average leading to 13 sectors and 7 sub-sectors eligible for compensation.

It is worth mentioning that both the average and the marginal electricity generation mix as described above relate to the current electricity system. However, load demand by a certain activity does not only influence *operation of current power plants*, but also the *construction of new power plants*. The so-called built marginal emission factor can be derived from the trend of the types of power plants currently under construction. Data advocates that the majority of new capacity is based on natural gas. Using the harmonised efficiency reference values[56], the average specific emissions of newly built marginal power plants can be calculated.[57]Data for the year 2009 suggests a CO_2 emission factor of 420 g CO_2/kWh.

These results advocate that a proper calculation of a marginal emission factor requires significant amount of recent data and for methodological accuracy needs to be based on the total electricity generation mix. Thus, looking at the EU average and the trend of recently built plants, a value of 690 g CO_2/kWh seems unrealistically high.

In sum, these elements result in the following values for the emission factor.

Table 3 Emission factor values

Baseline (average total electricity generation mix, '05 data)	465 gCO_2/kWh
Updated baseline (average total electricity generation mix, '08-'10 data)	423 gCO_2/kWh
Marginal EF of fossil fuel electricity generation in current system (2009 data)	690 gCO_2/kWh

We also note that there is a systemic feature that contains a possible overestimation of the carbon costs. This is because the auctioning factor has no impact on the calculation of costs due to indirect emissions, i.e. de facto an auctioning factor of 100% is assumed for the indirect costs despite the fact that some of them may actually be compensated to a

[56] Assuming that power plants have the same operating hours per year and an efficiency of 51.7% for new gas-fired power plants (As a proxy for the mixture of new CCGT, GT and CHP plants.) and 42.7% for new hard coal fired power plants and 40.3% for lignite fired power plants.

[57] Capros 2008, DG Competition 2011, Platts, calculations by Öko-Institut. Efficiencies are based on the harmonized efficiency reference values for the year 2001 in Annex 1 of Commission Implementing Decision (C 2011, 9523 final). The document includes higher efficiency values for later years. In order to do a conservative assessment the lower efficiency values resulting in a higher emission factor were chosen. This means the calculated specific emissions slightly overestimate the real specific emissions. The following fuel types and emission factors are used: lignite: 0.112 t CO_2/TJ, hard coal: 0.094 t CO_2/TJ and natural gas 0.056 t CO_2/TJ. Considering the electrical efficiency, this results in the following specific CO_2 emission per kWh electricity produced: lignite 1,000 g CO_2/kWh, hard coal: 793 g CO_2/kWh and natural gas: 390 g CO_2/kWh.

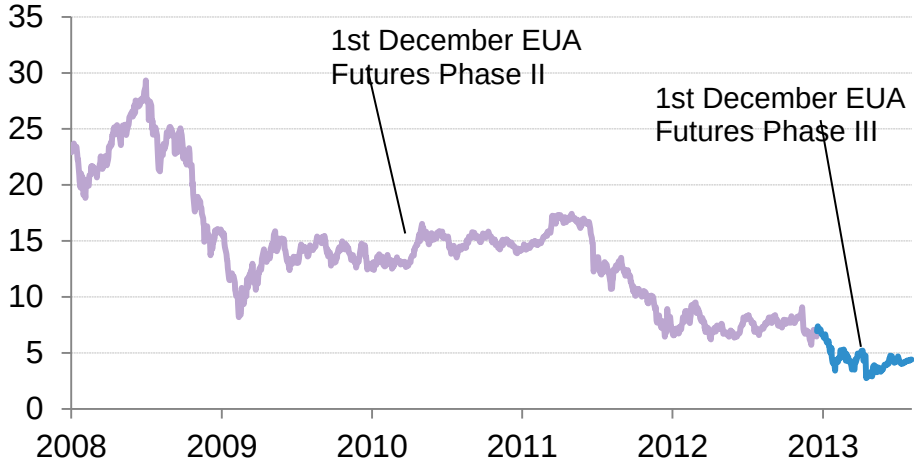
considerable extent via subsidies under the ETS State aid guidelines. In some cases the indirect costs present a significant share in total carbon costs.

6.3. Carbon price

For the calculation of the carbon costs for the list in 2009, a carbon price of 30€ was used. According to Article 10(a) 14 of the Directive, '*these assessments shall be based on the average carbon price according to the Commission's impact assessment accompanying the package of implementation measures for the EU's objectives on climate change'*. Since the text of the Directive does not include a concrete figure, further analysis is deemed necessary, especially given various views of stakeholders on the interpretation of this text.

There has been substantial evolution of the carbon price since 2009 when the impact assessment for the carbon leakage list for 2009-2014 was drafted. The graph below illustrates the carbon price evolution from 2008 to August 2013, based on future prices for delivery in December of the year in question from the latest Bloomberg New Energy Finance / ICE data.

Graph 1: Allowance price



Source Bloomberg New Energy Finance/ICE data

The previous list was being determined at times when the current carbon price of about 15€, thus the 30€ projections for 2020 determined at the time, seemed reasonable and were indeed reflected in the impact assessment for the climate and energy package. These were also the general expectations shared by market analysts. However, as seen in the graph above, carbon price values above 20€ were peaks not sustained after 2008. Even values above 15€ were rather exceptional after 2009.

Calculations from market price data show that the average carbon price was 6.67 €/t in 2012, 10.78 €/t in 2011 and 13.67 €/t in 2010. The downward trend is clearly visible, and up to August, the average price for 2013 is 5.49 €/t.

Table 4 Average annual allowance prices

Year	Average allowance price
2008	19.41
2009	14.04
2010	13.67
2011	10.78
2012	6.67
2013	5.49

Source: Calculations from Bloomberg New Energy Finance/ICE data

These facts clearly illustrate the rapid policy and market developments, which make questionable whether using a 30€ carbon price for cost calculations is realistic and based on best available data.

Since the Directive does not mention explicitly a value to be used for the price the interpretation is that the Commission must determine it based on the guidance given in the Directive. The text in the Directive can either be interpreted as referring to a specific, now outdated impact assessment, or be interpreted as making reference to the general methodology of that impact assessment[58].

In this context it can be noted that impact assessments *'are key tools for ensuring that Commission initiatives and EU legislation are prepared on the basis of transparent, comprehensive and balanced evidence'*[59] and *'can be updated'*. The objective of the impact assessment system is to '*facilitate better-informed decision making' 'based on sound analysis supported by best available data'*. [60]

Stakeholders were very active in expressing their views on the carbon price: some, mainly industrial sectors, advocate a 30€ price, while others, mainly Member States, NGOs and academia, support the use of a value reflecting market reality.

In the context of the cost criterion analysis, one fundamental question is if the risk of carbon leakage is determined independently of the carbon price, or whether this risk is related to the carbon price: e.g. is the risk of carbon leakage higher with a carbon price of 5€ than with 30€. The approach taken in this impact assessment is that the risk is related to the current market and expected carbon price.

Current market expectations taking into account the surplus of over 2 billion allowances point to low price levels when compared to historical perspective, reflecting the longer term impacts of the carry-over of surplus allowances suppressing carbon prices and prospects of moderate growth[61] in the EU from 2014. [62]

In the Commission's staff working document accompanying the Commission Regulation to determine the volumes of GHG emission allowances to be auctioned in 2013-2020, several market forecasts are quoted. Two of them, the forecasts of Barclays and Thomson Reuters, include values for the whole period 2015-2019. The table below show the predicted values.

Table 5: Carbon price forecasts without and with back-loading (prices in €, nominal)

Author	2015	2016	2017	2018	2019	2020	Average 2015-2019
Carbon price forecasts without back-loading (prices in €, nominal)							
Barclays	4.5	4.5	4.5	5	7	10	5.1
Thomson Reuters Point Carbon	5	6	8	9	10	12	7.6
Carbon price forecasts with back-loading (prices in €, nominal)							
Barclays (700 Mt)	11	8	7	7	8	10	8.2
Thomson Reuters Point Carbon (900 Mt)	11	5	5	6	6	8	6.6

Source: Adapted from Annex VI of Commission's staff working document accompanying the Commission Regulation to determine the volumes of GHG emission allowances to be auctioned in 2013-2020

[58] SEC(2008) 85/3 http://ec.europa.eu/clima/policies/package/docs/sec_2008_85_ia_en.pdf.
[59] https://webgate.ec.europa.eu/fpfis/wikis/display/REGISTRY/Home , Impact Assessment page
[60] SEC(2009) 92 http://ec.europa.eu/governance/impact/commission_guidelines/docs/iag_2009_en.pdf
[61] http://ec.europa.eu/economy_finance/publications/european_economy/2013/pdf/ee2_en.pdf
[62] According to Thomson Reuters Point Carbon data, an average price calculated on futures with delivery in December 2015 since end 2011 up to August 2013 is 7.38€/tCO2. An average price calculated on futures with delivery in December 2016 since end 2012 up to August 2013 is 5.10€/tCO2.

As visible, in all those projected cases, the values for 2020 are in the order of 10€.

Notwithstanding that there might be different legal arguments, three options for the carbon price to be used in the calculations have been assessed:

a) Baseline scenario

The baseline scenario is the 30€/tCO_2 carbon price used for the determination of the list in 2009. As visible from the Graph 1, at the time of drafting, the current market price was above 15€/tCO_2 and the highest ever peak of 28.77€/tCO_2 was reached in June 2008. Thus, projections based on data up to 2008 would result in the 30€ price which looked plausible.

b) Projections used in impact assessment 'Going beyond 20%' and in Roadmap 2050

In 2010, the impact assessment of options to move beyond the 20% emission reduction goal[63] analyses the level of targets post-Copenhagen summit and takes into account the effects of the economic crisis. It concluded that the most likely carbon price for 2020 is 16.5 €/tCO_2.

Another impact assessment reaching the same conclusion is the one made in 2012 for Roadmap 2050.[64] The modelling exercise includes a reference scenario for the carbon price development of the EU ETS until the year 2050. The PRIMES model derives the carbon price associated with domestic emission reductions while also accounting for the use of flexibility mechanisms. It also accounts for the recent economic crisis and reaches the same carbon price of 16.5€/tCO_2 for 2020.

c) New EU reference scenario 2013 (Trends to 2050)

The New reference scenario for 2013 is derived from the 'EU Energy, Transport and GHG Emissions Trends to 2050: EU Reference Scenario 2013'.[65] This document is developed under coordination of DG's ENER, CLIMA and MOVE, and consulted with Member States. It evaluates for EU policy making the consequences of implementing policies adopted by late spring 2012 including the Energy Efficiency Directive and the achievement of the legally binding targets for GHG and renewable energy sources. This new reference scenario is the starting point for various policy scenarios for the 2030 Framework for climate and energy policy.

In this modelling, the carbon price in 2020 is expected to be 10€/tCO_2 and 5 €/tCO_2 in 2015.

In sum, these elements result in the following option values for the carbon price. The 16.5€ and 10€ options take into account the potential impact of back-loading and certain ideas of structural measures, because if these were not taken into account, the expected price options would be of the range 5-7€ as visible from Table 5 above.

Table 6 Carbon price values

Method	Value
Baseline	30.0 €/tCO_2
Projections for Going beyond 20% and Roadmap 2050	16.5 €/tCO_2
New EU reference scenario for 2013 (trends to 2050)	10.0 €/tCO_2

[63] SEC (2010) 650 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0265:FIN:EN:PDF
[64] COM(2011) 112 final
[65] http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf

6.4. Non-third countries in trade intensity calculations

6.4.1. Coverage of trade intensity calculations

Article 10(a) paragraph 18 of the Directive indicates that trade intensity should be calculated after an assessment of other countries' climate policies. Therefore, there is a choice as to which countries are considered as third countries and which as domestic for the calculation. The Article mentions three relevant aspects: whether countries have committed firmly to reducing emissions, whether the countries represent a decisive share of global production and whether the carbon efficiencies are comparable to the ones of the EU. In those cases, the trade between EU and these countries shall therefore be considered as intra-EU trade because it does not lead to carbon leakage.[66]

The majority of all respondents perceive some increase of the ambition of domestic climate policies around the globe. Industry stakeholders see no comparable policy to the EU ETS worldwide, while Member States and civil society see some comparable elements in several countries' policies.

To assess the **comparability** of emission reduction policies for the trade intensity calculations, several characteristics of the system may be taken into account, such as environmental ambition, monitoring, reporting and verification requirements, institutional and political framework and market oversight framework. An analysis of core systemic elements can help establish comparability of emission reduction policies.

Concerning **carbon efficiencies**, data on industrial GHG intensities that can be used for cross-country comparisons is limited, with certain exceptions. [67] The overall picture shows that European production is not always the most GHG efficient one. Therefore relocation would not necessarily always lead to increasing global emissions.

Since the vast majority of European industry is on the 2009 carbon leakage list, it is most relevant to compare the whole industrial base of a country or region to the whole EU one.

'**Decisive share of global production**' can be interpreted as a comparison with total industrial CO_2-emissions. This approach has high data accuracy and is in line with the aim and spirit of the Directive.[68]

Based on this approach, a selection of countries could be made.

6.4.2. Calculation approach

There are two possibilities to adjust the trade intensity formula to account for countries with emission reduction policies.

One is a "**bubble approach"** where data on all components of the trade intensity and the cost criterion equation are included: EU imports from and exports to these countries would be treated as internal trade and both production data and trade from non-EU countries with

[66] Since these countries or regions have an emission reduction system in place which puts an absolute cap of emissions, relocation of production cannot lead to uncontrollable increase of emissions.

[67] According to the carbon leakage methodology study, data shows that cement is produced in Central America and Africa within +/-5% of the EU emission intensity, in South America and India on average even better than Europe, and in Japan, Australia and New Zealand with intensity 6% higher than in EU. So, the global emission intensity of cement is comparable to the EU one. Concerning aluminium, the EU GHG intensity is comparable to that of the Russian Federation, significantly higher than Norway, and significantly lower than that of the USA and China. Therefore, aluminium in some parts of the world is produced more efficiently than in the EU.

[68] Another approach could be to compare with total industrial production, but industrial production for different sectors cannot be simply aggregated due to the different nature of the products and therefore this approach is dismissed. Alternatively, total industrial energy consumption IEA data could be used.

comparable efforts to other countries outside the EU would be added to the calculation. The formula will then be:

$$TradeIntensity = \frac{Imports_{ExtraBubble} + Exports_{ExtraBubble}}{Production_{Bubble} + Imports_{ExtraBubble}}$$

Alternatively, a "**deduction approach**" can be applied and trade flows with comparable effort countries need to be deducted from imports to and exports from the EU. This approach can be deemed more suitable for countries without a common market with the EU and with different trade flows due to geographic location. The relevant trade volume is reduced to trade with countries without comparable effort and the domestic market remains unchanged because it is assumed that goods imported into countries with comparable efforts are not re-exported to the EU. Therefore the imports in the nominator are adapted while the imports in the denominator remain unchanged, resulting in the formula:

$$TradeIntensity = \frac{Imports_{CountriesWithoutComparableEfforts} + Exports_{CountriesWithoutComparableEfforts}}{Production_{EUETS} + Imports_{ExtraEUETS}}$$

The bubble approach is methodologically sound for countries within the same geographical area which can be expected to have similar trade patterns, since it adapts all parameters to the extent possible. The deduction approach is more suitable for countries or regions with distinctly different trade patterns than the EU and it can be applied when there are significant data gaps. However, it has to be noted that the deduction approach contains an inconsistency which can lead to a lower estimate of the trade intensity.

With this analysis in mind, four options could be considered at first stage, but three of them are discarded since they are premature and pose some data difficulties in the concrete calculations:

a) Baseline updated scenario (EU28 + EEA/EFTA countries)

Croatia is an EU Member State since 1 July 2013 and is applying EU ETS since 1 January 2013. Iceland, Liechtenstein and Norway apply the EU ETS since 2007.[69] Both Croatia and the EEA-EFTA States have notified their NIMs to the Commission and to the EFTA Surveillance Authority respectively, and installations in their territory are participants in the EU ETS. There is public data on all elements for the application of the carbon leakage criteria, so a bubble approach can be applied with reasonable accuracy. Since these States apply the EU ETS, an assessment of comparability of efforts is not necessary. The calculation of the trade intensity for this option will follow the 'bubble' approach.

b) Countries applying EU ETS and countries with mandatory ETS in effect (EU-28, EEA-EFTA states and Switzerland)

The Swiss ETS started in 2008 with a voluntary phase and from 1 January 2013 it was converted to a mandatory system. The scheme is very similar to the EU ETS and linking negotiations are on-going.

However, there are considerable data deficiencies not allowing the application of the bubble approach to all countries in this group: a possible calculation of the trade intensity for this option would require bubble approach for EU-28 and EEA states and deduction approach for Switzerland. This, coupled with the current lack of clarity, leads to the conclusion that it may

[69] The agreement on the European Economic Area (EEA), which entered into force on 1 January 1994, brings together the then 27 EU Members and 3 EFTA countries (Iceland, Norway and Lichtenstein) in a single internal market ("EEA-EFTA countries"). The agreement also provides for the extension to the three states of EU legislation in several fields, including EU ETS.

be not opportune to consider Switzerland at this moment of time, but that such assessment may need to be made in the future.

c) Countries and regions applying EU ETS, countries with mandatory ETS in effect and countries with ETS in implementation (EU-28, EEA-EFTA states, Switzerland, California, Quebec and Regional Greenhouse Gas Initiative (RGGI)[70])

California and Quebec started their first compliance period in ETS in 2013. RGGI is the first mandatory ETS in the US since 2009. It is now in its second compliance period and based on program review in 2011 and 2013, the new changed program will start in 2014 with a more stringent cap.

Given that the system is still in implementation phase, it may be premature to already consider the regions in question as comparable to the EU ETS. Furthermore, there is considerable lack of trade data on regional level, which renders impossible the application both of the bubble and the deduction approach with the necessary accuracy. Therefore, this option can be dismissed due to feasibility concerns.

d) All countries applying measures to reduce greenhouse gas emissions or firmly committed to reductions as reflected by their Copenhagen Accord pledges

The Directive foresees that the outcome of the Copenhagen summit is worth of consideration. Currently, there are 15 Annex I parties with quantified emission reduction pledges, including the EU and EEA-EFTA states and 45 non-Annex I parties with nationally appropriate mitigation actions. [71] Despite the significant geographic coverage of those climate policies and their political importance, their policy elements do not advocate full comparability to the EU ETS, and also pose very strong concerns of data availability and feasibility. Therefore this option will not be explored further.

6.5. Qualitative assessment framework

Article 10(a) 17 of the Directive foresees that the carbon leakage list can be amended based also on a qualitative assessment of sectors and sub-sectors which can be assessed according to the following criteria:

'a) the extent to which it is possible for individual installations […] to reduce emission levels or electricity consumption, including as appropriate the increase in production costs that the related investments may entail, for instance on the basis of the most efficient techniques;

b) current and projected market characteristics, including when trade exposure or direct and indirect costs are close to one of the thresholds mentioned in paragraph 16;

c) profit margins as potential indicator for long-run investment and relocation decisions.'

The Directive is silent concerning data sources, indicative values or thresholds or further details for the application of these criteria. In 2009 and in the annual additions, sectors were analysed qualitatively when there were borderline values on the quantitative assessment or where data, for instance on trade, was missing.[72] General summary results of these analyses

[70] RGGI started its first compliance period with the 10 North-Eastern US states: New York, New Jersey, Massachusetts, Maine, New Hampshire, Vermont, Rhode Island, Connecticut, Delaware and Maryland. In 2011, New Jersey withdrew.

[71] For a detailed list, see http://unfccc.int/meetings/copenhagen_dec_2009/items/5264.php and http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5265.php

[72] Qualitative assessments have been done for the following cases 1730 Finishing of textiles; 2020 Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards; 2416 Manufacture of plastics in primary forms; 2640 Manufacture of bricks, tiles and constructions products, in baked clay; 2653 Manufacture of plaster; 2662 Manufacture of plaster products for construction purposes; 2751 Casting of iron; 2753 Casting of light metals

were published.[73] However, the lack of detail in the Directive leaves the criteria open to considerable margin of interpretation in a non-transparent manner, which may trigger criticism for unequal treatment of sectors. A framework for qualitative assessments was therefore elaborated as part of the carbon leakage methodology study, taking into account the qualitative assessments practice since 2009 and organising the Directive criteria in a comprehensive and logical manner. The framework is intended as general guidance aiming to reflect the approach of the Directive criteria, and it can be enriched with further indicators corresponding to the specific situation of the sector concerned. Also, in the work for the ETS State aid guidelines, qualitative assessments of sectors were carried out and some quantification of the criteria was introduced.

Qualitative assessments could be particularly interesting for sectors with borderline values on the quantitative assessment and for sectors with missing data. The Directive does not contain eligibility criteria for qualitative assessments, so technically any sector can submit an application providing data for the whole EU, but it is highly unlikely that it would meet the criteria if the cost and trade intensity values are not close to the Directive thresholds.

In terms of timing, the qualitative assessments can only start once the quantitative parameters discussed in this impact assessment are decided and the quantitative assessment at NACE-4 level is carried out, because only then there will be clarity which sectors do not meet the quantitative criteria, and especially which ones have values close to the borderline.

To ensure equal treatment of all sectors, the applications for quantitative assessment have to be submitted by EU sector associations and will be assessed to the Commission in accordance with the Directive criteria. It is the responsibility of EU sector associations to submit any applications for assessments and to argue their case because the carbon leakage status is derogation from the rules of free allocation and needs to be interpreted restrictively, so a sector is deemed not exposed unless it can prove otherwise.

In terms of flexibility, Article 10(a)13 of the ETS Directive foresees possibility for annual additions to the list, so in case the competitiveness situation of a sector evolves, it can always submit a (new) application. Any such new data needs to be at EU level, be official and/or verified accordingly and cover a sufficient time period allowing robust conclusions (the last three years for which data are available). The qualitative assessment contains some flexibility, but should respect the ETS Directive criteria, and the cases should be robust enough to go successfully through positive Member States vote in Climate Change Committee and scrutiny by European parliament and Council.

The methodology for the qualitative assessments does not have competition distortion potential and does not risk to disproportionately affecting certain sectors. It is intended as general methodology and the specific situation of sectors can always be reflected within this framework with the use of the relevant indicators.

There are diverging views concerning the measurability, relevance and importance of the ETS Directive criteria for qualitative assessment. Industrial stakeholders see profit margins as most measurable, relevant and important; Member States see all three criteria as equally relevant; and civil society considers emission reduction potential as most measurable, relevant and important. Such views may be logical, given that industry focuses on profits and market conditions for investments, while civil society is primarily looking at environmental integrity and emission reductions. Member States have a balanced view recognising the importance of all three criteria. There are comments made from all sides concerning the vagueness of the criteria.

[73] http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/annex_ii_v3_en.pdf

As for the proposed framework for qualitative assessment, industrial stakeholders have a more critical stance, Member States see it in general as adequate and useful and civil society has no particular opinion, albeit the general positive views. Civil society and some Member States urge the publication of all qualitative assessments in their entirety to ensure transparency of the process.

Thus, there are three options for qualitative assessments for the new carbon leakage list:

a) Baseline scenario

As in 2009 and annual additions, ad-hoc assessments of sectors and sub-sectors without a harmonised framework can be done.

b) Harmonised qualitative framework

The framework (see Annex IV) has been developed as part of dedicated study and has been tested by consultants. It was part of the public consultation on the methodology for the new carbon leakage list and stakeholders actively expressed their views.

The three-step approach allows all Directive criteria to be seen cumulatively, presenting an accurate picture of the sector in question and allowing cross-sector comparability. In brief, the first part of the qualitative assessment provides a further interpretation of the quantitative carbon cost ratio. Starting from the direct and indirect costs determined in the quantitative assessment, it extends and refines this indicator by looking at the abatement potential and associated costs and the (in)direct carbon costs from suppliers, for instance raw materials from supplier sectors (upstream). Indirect costs from electricity consumption are not intended here, as these are already included in the induced carbon cost ratio.

The second step explores the extent to which a sector is able to pass these costs on to its customers which depends on various market characteristics, such as bargaining power of sector in value chain, import intensity, export specialisation position, transportability and homogeneity of produce. This is an indicative list of indicators aiming to provide a full picture of the market characteristics of the sector to determine its ability to pass through the additional carbon costs.

Even if carbon costs faced by the sector are high (step 1) and the ability to pass these costs through is low (step 2), it could be argued that the risk of carbon leakage is low if the sector can either absorb these costs e.g. because of sufficiently high profit margins, or if substitution of the product overall leads to a lower carbon footprint. Therefore, the third step looks at the cost absorption potential as illustrated by the profit margins and the share of additional carbon costs. It also looks at the carbon intensity of likely substitutes.

The indicators of the three-step approach are the minimum relevant elements necessary to form a complete picture of the sector situation, and every sector can of course also present further indicators pertinent to their situation.

c) Harmonised qualitative framework with some quantification

The harmonised qualitative framework can be further complemented with the tests used in the ETS State aid Guidelines.

The first test aims to ensure eligibility for assessment. A sector would have to fall under one or more of the following criteria to be qualitative assessed:

- borderline cases, i.e. carbon costs of at least 3% and trade intensity of at least 8%;

- poor quality or missing official data;

- insufficient representation by the quantitative assessment.

The second test mirrors the Directive's criteria and can introduce a quantification element, for instance:

- cost-related – as the cost threshold is 5%, a value of 2.5% as half of it can be considered justified;

- market related – evidence that the sector cannot pass costs as shown by screening with a 25% trade intensity and then analysing in depth with the use of elasticities of demand where available.[74]

- further quantification on the elements of the harmonised qualitative framework.

7. OPTION PACKAGES

With view of achieving the specific and operational objective of this impact assessment, from the multiple options for the different elements outlined above, six packages are designed to assess the concrete cumulative impacts of all the elements.

The main criterion for naming the options is the carbon price, to which other variables are coupled. Although with the options for all five elements a very high number of packages can be developed, for feasibility purposes they are limited to six, taking into account the most efficient proposed option for each element, except for the marginal emission factor package which takes into account the options leading to broadest possible coverage of the list without consideration of their merits.

It is noteworthy that the Directive provides for annual additions to the list, while there is no mechanism to exclude a sector. Significantly fewer sectors included in the list compared to the current one might lead to a decreased magnitude of the cross-sectoral correction factor, which currently reduces free allocation for all industrial installations. Robust data and cautious interpretation are key to an accurate and fair application of the Directive.

The baseline updated package will be used for comparing the impacts of the other option packages. It consists of the same elements used for the calculations in 2009, updated with new data and applied to the NACE rev.2 classification currently in force. The marginal fossil fuel EF package aims at preventing the theoretical risk of carbon leakage to a maximum extent, i.e. aims at the longest possible list. These packages keep roughly the same number of sectors on the carbon leakage list, therefore cannot lead to a potential revision of the cross-sectoral correction factor.

The projections A and B packages aim at achieving an optimal balance. The new reference scenario A and B packages aim at maximising the efficiency of the ETS and free allocation system, i.e. at the shortest possible list. These packages lead to a shorter carbon leakage list and could lead to a decrease of the cross-sectoral correction factor.

From the results presented in section 1.4 and Annex I, it can be seen that the baseline updated and the marginal fossil fuel emission factor (EF) (No. 1 and 2) packages gather the support of the majority of industrial stakeholders. This is logical, since these packages are likely to lead to a carbon leakage list with broad coverage and more free allocation to industry and thus can be seen as favouring the interests of industrial stakeholders.

[74] Commission assessments or relevant geographical markets in merger cases can be taken into account, as well as antidumping proceedings illustrating trade dynamics. Competition with products on the carbon leakage list or size of the sector are not in principle relevant for eligibility. For more details see **Communication from the Commission — Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012 (SWD(2012) 130 final) (SWD(2012) 131 final)** http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012XC0605%2801%29:EN:NOT

The projections A and B (No.3 and 4) and the new reference scenario A and B packages (No.5 and 6) gather the support of the civil society and most of the Member States replying to the questionnaire. This can also be expected because these packages are likely to lead to a narrower coverage of the carbon leakage list, thus less free allocation to industry and more auctioning revenues for Member States, therefore in line with the broader public interest of civil society.

Table 7 Option packages

No.	Name	Auctioning factor	Emission factor	CO_2 price	Trade coverage	Qualitative assessment
1	Baseline updated package	53%	423g/kWh	30 €/tCO_2	EU-28 + EEA	Framework
2	Marginal fossil fuel EF package	53%	690g/kWh	30 €/tCO_2	EU-28 + EEA	No guidance
3	Projections package A	sectoral AFs	423 g/kWh	16.5 €/tCO_2	EU-28 + EEA	Framework
4	Projections package B	53%	423 g/kWh	16.5 €/tCO_2	EU-28 + EEA	Framework + thresholds
5	New reference scenario package A	sectoral AFs	423 g/kWh	10 €/tCO_2	EU-28 + EEA	Framework + thresholds
6	New reference scenario package B	53%	423 g/kWh	10 €/tCO_2	EU-28 + EEA	Framework + thresholds

8. ANALYSIS OF IMPACTS

8.1. Economic impacts

Concerning impacts on the functioning of the internal market and competition, since the carbon leakage list is part of the harmonised free allocation rules and it applies in the same manner to all Member States, it can be reasoned that such EU/EEA-wide list based on the Directive's criteria has no potential of competition distortion within the EU/EEA.

The more accurately and transparently the Directive's criteria are applied, the more level is the playing field among industries, while excessive flexibility in interpretation could result in distorting competition between industries. This is in particular true for the qualitative assessment which contains greater flexibility and thus more potential for competition distortion in case of overly-lax application. However, this concerns relatively small number of sectors.

Furthermore, the legislators in the Directive have mandated the Commission to assess sectors based on a pre-defined set of criteria and thresholds. This exercise is meant as comparison of the specific sector situation to the given thresholds, and not as a comparison between sectors to determine which is the most or the least affected by carbon costs and trade exposure. Similarly, the Directive does not foresee speculative assessment of potential substitution of products which could happen between sectors on and off the list competing on the same markets.

Generally, the methodological elements determining the calculations for the carbon leakage list have very limited macroeconomic impact[75], but the list can have some limited re-distributional impact of resources between industry and Member States.

[75] The impact assessment carried out in preparation of the proposal for the revised Directive demonstrated that the differences in impact on the GDP between full auctioning and full free allocation are in the order of magnitude of 0.1% of the GDP. The Analysis of options to move beyond 20% emission reduction goal estimated

There is no straightforward link between the coverage of the carbon leakage list and the carbon price because the total amount of allowances available (the cap) is not affected by the carbon leakage list, but rather the fewer allowances are given out for free, the more are auctioned. There are also many other interfering factors such as the surplus of allowances in the system, the individual surplus or deficit of each sector, the level of industrial production, the carbon efficiencies and the level of emissions etc. It can be argued that a list with less coverage could lead to a stronger interest in reducing emissions, and therefore a decrease in the carbon price and a list with broader coverage could be expected to lead to the reverse dynamics. Another viewpoint is that a list with less coverage could lead to some carbon price increase, since fewer allowances will be allocated for free and sectors may need to purchase more allowances, which would increase demand. On the other hand, supply would also increase because these allowances would be available for auctioning. In any case, no quantification can be derived and the link between the carbon leakage list and the carbon price is not direct.

The table below illustrates the magnitude of the carbon leakage list in terms of allowances and monetary value. The numbers refer to the total ETS allowances handed out for free to industry in millions. The monetary value depends on the actual carbon price. As visible from the table below, the current list is very close to all sectors being on the carbon leakage list, i.e. is very close to assuming all European industry is at significant risk of carbon leakage. The difference between the current list and the one with the Projections A scenario without annual additions is of the approximate magnitude of 501 mio allowances for the whole period, amounting to 5.011 mio € with an assumed actual carbon price of 10€.[76] These figures give an order of magnitude for the economic impacts of the carbon leakage list as a whole.

Table 8: Effect of carbon leakage list: million allowances allocated for free[77]

	2015	2016	2017	2018	2019	TOTAL
Without CL list	586	512	440	371	305	**2.214**
Projections A	765	724	684	646	608	**3.427**
Baseline updated, no additions	830	801	773	745	718	**3.867**
Current list	836	810	785	761	737	**3.928**
All sectors CL	850	824	800	776	752	**4.002**

Table 9: Value of allowances allocated for free in million EURs

Assumed carbon price:	5 €	10 €	15 €
Without CL list	11.070	22.139	33.209
Projections A	17.133	34.266	51.399
Baseline updated, no additions	19.333	38.667	58.000
Current list	19.639	39.277	58.916
All sectors CL	20.008	40.016	60.024

that the costs of achieving the 20% GHG emission reductions has decreased 30% compared to the estimate in 2007. The SWD accompanying the same document shows somewhat bigger difference in the magnitude of 1.2 percentage points, with auctioning improving the overall macroeconomic results given the way revenues are recycled (see p. 54 of http://ec.europa.eu/clima/policies/package/docs/sec_2010_650_part2_en.pdf)

[76] With the current carbon price of ca.5€, the actual difference is ca 2.506 mio €.

[77] Source: NIMs

As explained above, the ETS setup and the carbon leakage list implies a trade-off: the allowances which are not given for free to industry are auctioned by Member States. The impact of the scenarios above on the Member States auctioning revenues can be seen in the following table. The Projections A option can generate additional revenue for Member States from 2.506 mio € for the whole period with a 5€ carbon price to 7.517 mio € with a 15€ carbon price. With the current list, these 2.506-7.517 mio € are distributed to industry instead. Since 50% of the auctioning revenues have to be spent to combat climate change, an increase of these resources should lead to more funds for climate change adaptation and mitigation actions.

Table 10: Total additional auctioning revenues for Member States compared to current list

Assumed carbon price:	**5 €**	**10 €**	**15 €**
Without CL list	8.569	17.138	25.707
Projections A	2.506	5.012	7.517
Baseline updated, no additions	305	611	916
Current list (no difference)	-	-	-
All sectors CL (decrease)	-369	-739	-1.108

In terms of impacts on industrial sectors, as explained above, all industrial sectors in ETS receive transitional free allocation for phase 3 of the EU ETS. For sectors on the list, this allocation is 100% of the basic allocation amount, while for sectors not on the list, it progressively decreases from 80% in 2013 to 30% in 2020, or ca. 51.4% over the period 2015-2019. Therefore, the impact of being or not on the list can be quantified as this percentage difference (i.e. 100% vs. 51.4%) for industrial sectors.

It has to be noted that since the cost criterion focuses on the costs induced from the application of the Directive, sectors with high costs will be on the list, i.e. will be compensated for their costs. Sectors with low costs and without trade exposure, i.e. with high possibility to pass those low costs, may not qualify, but they would also not need the additional compensation beyond the 80% to 30% free allocation.

Some calculations can be made for the most energy intensive sectors with high costs by comparing the value of free allocation not received if the sector is not on the carbon leakage list to the turnover of the sector based on average 2009 to 2011 data. The value of the free allowances is calculated with assumed carbon price of 10€. The table below shows to what share of the sectoral turnover would amount the free allocation not given because of the change of carbon leakage status. The calculations are made for sectors concerned by the choice between 30€ or 16.5€ price options.

Table 11 Difference in allocation between being on or off the carbon leakage list for sectors concerned by the choice between 'Projections A' and 'Baseline updated' option packages for the entire period 2015-19

	Total additional allocation for 2015-2019 (EUAs)	**Value of difference of allocation as share of turnover with a carbon price of 10€**	**Allocation difference, minus surplus allocation for the period 2008-12 (EUAs)**
23.51 Manufacture of cement	331.5 mio	4.4%	94.6 mio
23.52 Manufacture of lime and plaster	62.6 mio	4.0%	14.2 mio
23.13 Manufacture of hollow glass	19.9 mio	0.4%	11.2 mio
23.11 Manufacture of flat glass	13.6 mio	0.8%	3.6 mio
10.62 Manufacture of starches	7.6 mio	0.2%	2.2 mio
24.43 Lead, zinc and tin production	4.9 mio	0.1%	na

The table shows the same data (additional allocation as share of turnover) for the sectors concerned by the choice between 16.5€ or 10€ price options.

Table 12: Difference in allocation between being on or off the carbon leakage list for sectors concerned by the choice between 'Projections A' (CO2 price: 16.5€) and 'New reference A' (CO2 price: 10€)option packages

	Total additional allocation for 2015-2019 (EUAs)	**Value of difference of allocation as share of turnover with a carbon price of 10€**	**Allocation difference, minus surplus allocation for the period 2008-12 (EUAs)**
24.10 Manufacture of basic iron and steel and of ferro-alloys	422.2 mio	0.6%	~132-212
19.20 Manufacture of refined petroleum products	250.6 mio	0.1%	185.7
17.12 Manufacture of paper and paperboard	65.3 mio	0.2%	16.7
24.42 Aluminium production	28.5 mio	0.2%	22.0

Regardless of their costs, sectors with significant trade exposure can be proactively shielded from any costs, no matter how low costs they may be facing, by meeting only the trade intensity criterion. In addition, the possibility for annual additions to the list allows for close examination of specific cases and inclusion in the list in case they meet the Directive's quantitative or qualitative criteria. For these sectors, the free allocation in question is expected to amount to even smaller share of their turnover.

Furthermore, as explained above and also as illustrated by the figures in Annex II, ETS costs constitute a marginal share of the total costs for many industrial sectors and thus are just one small element of the competitiveness position of the sector. There are major developments affecting EU competitiveness, such as the shale gas revolution in the US, globalisation of

trade patterns, low transport costs and the economic situation in general. All these have affected the competitive position of some industrial sectors, but the EU ETS does not influence those developments. EU still provides excellent conditions for industrial production in terms of political stability, educated workforce, the world's largest internal market etc, which is reflected in a continuous high trade surplus for industrial goods.

The risk of overcompensation for industrial sectors via the additional allocation stemming from the carbon leakage list and potential subsidies granted under the ETS State aid guidelines is rather limited. The provision of aid is strictly on case by case basis and it pays due attention to keeping the aid to the minimum necessary, especially concerning cumulation with other sources of financial support. The maximum aid intensities are also designed to avoid overcompensation and the eligible costs are the ones related to increase of electricity prices. To the moment, very few Member States have indicated intention to grant such aid.

As explained above, trade intensive sectors are the majority of sectors on the list: 132 in 2009, and 122 for the new list. Based on Eurostat data, the share of employment related to sectors assessed for inclusion on the list was calculated. There is a positive correlation between GVA and employment: trade intensive sectors included on the list regardless of their costs generate ca. 52% of industrial GVA and ca. 51% of employment, and receive only ca. 20% of free allocation to industry. On the other hand, non-trade intensive sectors which may qualify based on the combined criteria generate ca. 5% of industrial GVA but receive 72% of free allocation to industry.

However, given the complexity and the multitude of elements interlinked to the competitive position of a sector, the methodological elements of the carbon leakage list cannot be assessed separately for social or employment impacts.

A shorter carbon leakage list could open the possibility to review the Commission decision on the cross-sectoral correction factor with a view to lowering the factor for 2015 to 2019.

Some installations covered by the EU ETS can be considered SMEs. However, SMEs and micro-enterprises are not particularly affected by any of the options since because the thermal input threshold and activities to be carried out requiring the inclusion of installation in the ETS are more relevant for heavy industrial activity and thus larger companies. In any case, Article 27 of the Directive foresees the possibility of exclusion from ETS of small installations which are subject to national equivalent measures. Several Member States have used this opportunity.

No significant impact on administrative costs for Member States, can be expected for any of the options proposed since the carbon leakage list enshrined in Commission Decision is directly applicable and the Benchmarking Decision foresees adaptation of the amount of free allocation per installation in accordance with the carbon leakage list. The proposed options do not entail any significant difference in data collection or administrative effort from the competent authorities or the operators. The only difference is that in case of changed carbon leakage status, a one-off change in the national implementation measures is needed.

The indicator quantifying the economic impacts of the option packages is the GVA covered by each package.

8.2. Environmental impacts

Since the cap of total allowed emissions in the ETS is set, the length of the carbon leakage list will not directly impact on emission reductions. One view is that a shorter carbon leakage list will incentivise emission reductions in industry, because if fewer allowances are received for free, it could increase the economic incentive to reduce emissions rather than to buy the remaining allowances on the market. The wide diversity of efficiency values for individual

installations in some sectors as revealed by the steepness of the benchmark curves suggests that there are emission reduction potentials in the EU industry, and it can be assumed that whether or not such investments are undertaken is a rational economic decision.[78]

On the other hand, a too short carbon leakage list not including sectors that, with the combination of free allocation and expected carbon price, would still be exposed to a significant risk of carbon leakage, would not fulfil one of the general objectives of the Directive of addressing the risk of carbon leakage and thus could lead to lower industrial production in EU and increased global emissions.

The length of the carbon leakage list could have some indirect environmental impacts due to the link between free allocation and auctioning revenues for Member States which have to be spent on combatting climate change. Such impact, however, cannot be accurately quantified due to multiple associated uncertainties (carbon price, concrete actions etc.).

Therefore, although not a prefect measurement, the starting point for the analysis of possible economic, social and environmental impacts of the methodological choices (option packages) are impacts on the carbon leakage list in terms of free allocation and GVA[79].

The share of free allocation covered is an indicator of environmental impacts of the list, because these indicate the amount of emissions for which the application of the polluter pays principle is subdued for competitiveness reasons.

The share of GVA indicates the economic impact of the list, indicating the value added generated by the industries included in the list with each option package.

This analysis will be complemented with a qualitative comparison of the separate elements of the option packages outlined below. The feasibility in view of data availability was also assessed, and some were dismissed on this basis when presenting the options.

8.3. Qualitative assessment of the option elements' impacts

It is noteworthy that the parameters for the cost calculations (auctioning factor, emission factor and carbon price) have relatively low sensitivity in terms of the number of sectors added to the list. This is because of the dominating influence of the trade intensity criterion for the determination of the number of sectors on the list.

The 2009 list consists of 151 sectors at NACE-4 level and 13 sub-sectors at Prodcom level[80]. Out of those, 132 sectors qualified based on the above 30% trade intensity criterion, 3 sectors qualified based on the standalone cost criterion, 11 sectors got on the list because of the combined cost and trade criterion, and 5 based on the qualitative criteria. The cost and combined criteria sectors amount to ca. 59% of free allocations to industry (and ca. 5.5% of industrial GVA).

For the new carbon leakage list, the statistics are very similar: the vast majority (ca. 54%) of sectors assessed are concerned by the trade criterion, and about 5% of all sectors assessed are concerned by the cost criterion.

8.3.1. Auctioning factor

As explained above, the baseline option of a uniform factor of 75% based on an estimate that was made for the determination of the first carbon leakage list at the time when detailed

[78] Today's price signal in the ETS does not significantly incentivise low carbon investments and the carbon price is of decreasing importance for investment decisions, according to Thomson Reuters Point Carbon, Carbon 2012, 21 March 2012, http://www.pointcarbon.com/news/1.1804940 as quoted impact assessment accompanying the Commission Regulation to determine the volumes of GHG emission allowances to be auctioned in 2013-2020.

[79] For the sake of comparison, emissions and GVA from industrial sectors for 2009-2011 will be taken.

[80] Not taking into account subsequent annual additions

information on phase 3 allocation was not yet available. The data available now make it possible to calculate the shortage of allowances (i.e. the amount of allowances to purchase) and the auctioning factor with a high degree of accuracy. Therefore, now it is not justifiable to base calculations on a simple estimate.

One option is to calculate a uniform auctioning factor based on precise data available. A new uniform auctioning factor has the advantages of coherence, high data availability and straightforward calculation, but on the other hand, as any average value a uniform factor does not reflect sector specific situations.

The shortage of allowances per sectors can be calculated with a high degree of accuracy also on sectoral level. This calculation method reflects sector specific situations and ensures that the specific position of each sector in terms of difference between emissions and basic allocation is taken into account.

Using average 2010-2012 emissions data for the determination of the auctioning factor(s) is in line with the principle of most recent data available and represents the average three years closest to the years of allocation (2015-2019). On the other hand, using emissions from 2009-2011 has the advantage of coherence with other parameters and data used for the other calculations.

In terms of underlying methodology, accuracy and effectiveness in achieving the operational objective, all options, excluding the baseline, can be considered as effective. Applying a sector-specific approach is considered the most effective.

In terms of quantitative impacts, as explained above, the different values of the updated auctioning factors may have a direct impact on the total estimated carbon costs. In needs to be kept in mind that this impact also correlates with the carbon price and the emission factor chosen.

To determine the isolated impact of the choice between a uniform auctioning factor of 53% and the sectoral auctioning factors, a comparison between the Projections A (No.3) and Projections B (No.4) packages was made. It showed that the choice of auctioning factor between those two packages did not have an impact on which sectors meet the criteria.

8.3.2. Emission factor for electricity

The baseline option used in 2009 and the updated baseline option have the significant merits of straightforward calculations based on official data sources including the total electricity generation mix, which depicts the most comprehensive overall picture, taking into account the growing role of renewable energy sources. Thus, the updated baseline option can be considered a highly effective and methodologically sound one.

From a theoretical perspective some stakeholders argue that a marginal emission factor could be considered more correct because it refers to the carbon cost included in the spot price for electricity reflecting the carbon intensity of the last power plant deployed to satisfy electricity demand, i.e. the power plant at the margin. However, according to Commission experts, calculating annual average for the marginal emission factor for the EU-28 would suppose detailed knowledge of hourly power generation schemes by operating units across every Member State as well as specific efficiency assumptions for the different power generation assets. Whereas the Third Energy Package has done much to improve the transparency of the EU power markets, such data is currently not available for large parts of the EU. In view of the above, the use of annual average emission factor can be recommended. Furthermore, industry does not always pay a price related to the marginal cost due to multiple long-term, base-load contracts, regulated tariffs and special deals where these electricity costs do not depend on the volatile spot prices.

Also, an emission factor based only on the fossil electricity generation has the shortfall of not reflecting electricity generation from renewable sources and nuclear energy and assuming that electricity produced from coal is always at the margin. However, this is not always fully the case, because as illustrated by negative electricity spot prices,[81] the short-term marginal costs of renewables are near to zero and therefore they are placed at the very beginning of the merit order curve and pushing expensive generation capacities out of the market. Therefore, a marginal emission factor of fossil electricity has considerable accuracy issues and can have negative environmental impacts because it ignores renewable energy sources.

The value of 690 g/kWh stems from 2009 data, so it does not fully reflect the 'best data available' principle. An indication of a marginal value calculated with more recent data is the one of newly built capacity. This value (ca. 420 g/kWh) is considerably lower than the marginal fossil fuel value, showing that the newly built plants have lower emissions, corresponding to gas-fired plants or to renewable energy production plants.

The ETS State Aid Guidelines approach for regional and national emission factors, although preferred by many industrial stakeholders,[82] is not possible in the context of the harmonised allocation rules which need to apply the same approach to the whole EU. For the state aid context where national compensation is voluntary, it seems more logical to have an approach reflecting specific conditions in (a group of) Member States[83], while in the harmonised context of free allocation such an approach can lead to competition distortions.

In sum, the updated baseline option is deemed highly efficient in applying the Directive criteria.

The emission factor for electricity has particularly low sensitivity as calculation parameter for the majority of industrial sectors: indirect costs are the main eligibility criterion for subsidies under the ETS State aid guidelines where only 13 sectors and 7 subsectors are deemed eligible for this extra compensation. In comparison with the direct costs, indirect costs are very low for the majority of sectors. Furthermore, as explained above, a *de facto* 100% auctioning factor is assumed for indirect costs, therefore there is an element of possible over-estimation.

To determine the isolated impact of the emission factor, a comparison was made between the baseline updated package (No.1) and the marginal fossil fuel emission factor package (No.2). It showed that the choice of emission factor between those two packages did not have an impact on which sectors meet the criteria.

8.3.3. Carbon price

The carbon price has relatively high impact on the calculations of the cost and combined criterion, but it is irrelevant for the trade intensity calculations, i.e. for the majority of the sectors assessed. The choice of carbon price concerns 10 of the 245 sectors assessed although those sectors are responsible for the majority of free allocation and industrial emissions.

The 30 €/tCO_2 used for the determination of the list in 2009 was derived from the impact assessment accompanying the climate and energy package. At the time of drafting of the impact assessment for the 2009 carbon leakage list, the market price was above 15 €/tCO_2 and with projections based on data up to 2008, the 30 €/tCO_2 projected price looked plausible.

[81] See, for instance, http://www.ceps.eu/content/what-make-negative-electricity-prices

[82] The majority of industries prefer the marginal fossil fuel mix because it is the highest value, while Member States and civil society argue for the average factor of the total fuel mix as the most accurate one also reflecting renewables and low carbon energy sources.

[83] Using different emission factors for Member States would mean that data availability would have a high influence on the CO_2 intensity of a given sector. No data availability in a country with a high emission factor would lead to a lower CO_2 intensity than in reality and no data availability in a country with a low emission factor would lead to an increased CO_2 intensity.

This option has the advantage that it was used last time, but has the disadvantage of not being based on best available data and not reflecting the current market reality.

The claim has been made that a textual rather than purposive approach should be taken, by reference only being made to the value of 30€ from the climate and energy impact assessment of five years ago. Another legal reading of the Directive is that it refers to the methodology of using modelling projections in the more recent Commission impact assessment(s) related to climate and energy policy. In this context, it has been argued that the principle of using best available data is applied to all other elements so it is logical to apply it also to the carbon price discussion. This principle is further supported by ECJ jurisprudence on the ETS[84].

Since 2008, emissions in the EU ETS have experienced a large drop mainly due to the economic crisis which was not anticipated in the economic growth assumptions of the climate and energy package impact assessment. The current imbalance of supply and demand in the EU carbon market have led to low prices at present and price levels of 30 €/tCO_2 are not expected to be reached during the validity of the second carbon leakage list (2015-2019). An update of the price would mirror the market developments and may be argued to provide a carbon leakage list that reflects the cost realities for industrial sectors. Therefore, the baseline updated option does not look realistic with best available data and is rated as having very low effectiveness in achieving the best possible interpretation of the Directive's criteria. This conclusion is nevertheless subject to modification in case of a modified policy framework.

The use of projected prices for the impact assessment of going beyond 20% has the advantage of a transparent methodology similar to the one of the impact assessment for the climate and energy package, while taking into consideration the impact of the economic crisis. This value of 16.5€ has further been confirmed in the impact assessment for the Roadmap 2050 and is the result of robust modelling. However, if compared to current market expectations, this value could be considered quite high.

The new reference scenario including policy developments up to spring 2012 is the latest update of the carbon price, amounting to a value of 10€. It could be deemed as based on best available data as it is most in line with current market expectations. However, it must also be taken into account that political discussions on a 2030 climate/energy framework are currently ongoing, and the outcome of any decision in this area might have an impact on the expected future carbon price. For this reason a 10€ carbon price may not be fully adequate.

In terms of quantitative impacts, as explained above, the carbon price is the element in the cost calculations with the biggest potential impact on the list, but only concerning the sectors included based on the cost or combined criterion.

To determine the isolated impacts of the carbon price, a comparison between the Baseline updated (No.1) and the Projections B (No.4) packages was made. It illustrated that the choice between 30€ and 16.5€ price affects the following 6 sectors:

23.51 Manufacture of cement

23.52 Manufacture of lime and plaster

23.13 Manufacture of hollow glass

23.11 Manufacture of flat glass

10.62 Manufacture of starches

24.43 Lead, zinc and tin production

[84] See Case T-183/07 Poland v Commission

These sectors receive 24.7% of free allocation to industry and generate 1.1% of industrial GVA.

A comparison between the Projections A (No.3) and the New Reference scenario A (No.5) package illustrates that the difference between the 16.5€ and the 10€ price affects four sectors:

24.42 Aluminium production

24.10 Manufacture of basic iron and steel

19.20 Manufacture of refined petroleum products

17.12 Manufacture of paper and paperboard

These sectors receive 42.7% of free allocation to industry and generate 3.8% of industrial GVA.

The results above show small variations of GVA covered with every price option. On the other hand, there is a large difference in terms of free allocation covered, representing emissions which are thus relieved from the full carbon costs.

8.3.4. Non-third countries in trade in trade intensity calculations

Given that 132 sectors included in the 2009 carbon leakage list fulfilled the trade intensity criterion, i.e. their trade intensity is above 30%, changes to this methodological option can be expected to have consequences for more sectors than changes to the other parameters (auctioning factor, emissions factor and carbon price).

It has to be noted that when sectors qualify on the basis of the trade criterion alone, they may be facing very low carbon costs or even not having installations falling under the scope of ETS and thus receiving free allocation. It could be argued that their competitive position is less exacerbated by additional carbon costs induced by ETS than the one of sectors qualifying for the carbon leakage list based on combined criteria.

The baseline scenario calculates trade intensity based on imports, exports and turnover data for EU-27 for the past three years for which data are available. This approach was taken in 2009, but has the disadvantage that it does not correspond to the geographical coverage of the EU and the application of ETS as it stands in 2013, and thus repeating the same approach would not be legally sound anymore.

Taking data from EU-28 Member States and the EEA-EFTA States (Norway, Iceland and Lichtenstein[85]), i.e. the 31 countries participating in EU ETS, is a legally and logically coherent option meeting the requirement for best available data. The 'bubble approach' applied to the calculations is internally coherent, accurate and with substantial work the data gaps have been restricted to statistically non-significant ones. Thus, this option can be considered highly effective.

To determine the isolated quantitative impacts of the trade intensity coverage, i.e. the variations of GVA and emissions covered by the list caused only by changes of the trade intensity coverage, a simulation is made with the baseline option. Therefore, no major economic impacts can be expected from the choice of any option for this element and the selection can be made respecting the principle of using the most recent data available and taking into account the most accurate and methodologically sound approach.

[85] Due to the negligible size of industry located in Lichtenstein, there is extremely limited data availability. This does not make a difference in practice, because the missing data is not statistically significant.

8.3.5. Qualitative assessments

In 2009 and in the subsequent additions, the qualitative assessments concerned only 8 sectors. Due to the qualitative nature of the assessment reflecting in detail the specific circumstances of each sector, it is very difficult to assess any quantitative impacts of the proposed options, but in any case such impacts would be very limited due to the scarce application of this assessment.

The option of not providing any guidance to sectors for the application of the qualitative criteria of Article 10(a) 17 of the Directive allows for maximum flexibility. Nevertheless, it has considerable drawbacks: it does not take into account lessons learnt from qualitative assessments made in the past, lacks transparency, contains potential for unequal treatment of sectors, is more costly for sectors submitting applications, and requires a more resource and time-consuming assessment. Being overly flexible, it also has the potential of negative economic impact of distorting competition between sectors.

The harmonised qualitative framework is streamlined and structured, allowing a transparent, defendable and coherent approach for all sectors, which will enhance equal treatment. In practical terms, it will facilitate sector associations in clarifying the data and arguments, and it will allow the Commission to ensure continuity and transparency. As such, this option is a highly effective one.

The harmonised qualitative framework with quantitate thresholds as used in the ETS State aid Guidelines allows for a pre-screening, very well-structured work, transparent and objective judgment, but can be perceived as too rigid by sectors. This option is also highly effective, but caution should be exercised in maintaining a qualitative approach to such assessments.

9. COMPARING THE OPTION PACKAGES

The option packages will be assessed according to their effectiveness ranked from Low to High.

Effectiveness is understood as achieving the specific and operational objectives of the exercise: apply with maximum accuracy the criteria of the Directive, using a sound methodology and most recent data for each of the elements needed for the calculations. Therefore, each element taking into account new data as compared to the baseline updated scenario contributes to the effectiveness score.

Efficiency in terms of share of GVA vs free allocation covered is also assessed. It is understood as the balance between the share of industrial economic activity and free allocation to industry expressing industrial emissions being shed from carbon costs by free allocation, i.e. being shed from the full application of the polluter pays principle. It is rated from Low to High. It has to be noted that the balance element is key, and options leading to either very broad or very narrow coverage of the list in terms of sectors included are considered less efficient than ones leading to a good balance between free allocation and GVA covered. The efficiency criterion also measures to what extent the objectives of addressing competitiveness concerns and diminishing the potential risk of carbon leakage have been balanced with incentivising emission reductions and avoiding over-compensation. This approach is based on the observation by most non-industry stakeholders that the current carbon leakage list has a too broad coverage in terms of free allocation, and that it thus does not reflect a balanced judgement as concerns the real risk of carbon leakage. While the opposite view of most industry stakeholders also is to be taken seriously, it needs also be noted that they have a strong interest in taking such a position.

The baseline updated option is not ranked, as other options are compared to it. This should not be interpreted as this is the option with the minimum score, but rather as the benchmark for comparison of the other options.

The comparison of the option packages confirms the conclusions of the isolated comparison and impacts of the elements.

Table 13 Comparison of option packages

N	Option package	Effectiveness	Share of industrial GVA covered	Share of free allocation to industry covered	Efficiency	Total score
1	**Baseline updated** *53% AF, 423 g/kWh, 30 €/tCO_2, EU28 + EEA trade, framework for qualitative*	Medium	57.0%	92.3%	Low	Medium /Low
2	**Marginal fossil fuel EF** *53% AF, 690 g/kWh, 30 €/tCO_2, EU28+EEA trade, no guidance on qualitative*	Medium	57.0%	92.3%	Low	Medium / Low
3	**Projections A** *Sectoral AFs, 423g/kWh, 16.5 €/tCO_2, EU28+EEA trade, framework for qualitative*	Medium / High	55.9%	67.6%	Medium / High	Medium / High
4	**Projections B** *53% AF, 423g/kWh, 16.5 €/tCO_2, EU28+EEA trade, framework for qualitative with thresholds*	Medium / High	55.9%	67.6%	Medium / High	Medium / High
5	**New reference scenario A** *Sectoral AFs, 423g/kWh, 10 €/tCO_2, EU28+EEA trade, framework for qualitative with thresholds*	Medium	52.1%	25.0%	Medium / Low	Medium
6	**New reference scenario B** *53%AF, 423g/kWh, 10 €/tCO_2, EU28+EEA trade, framework for qualitative with thresholds*	Medium	52.1%	25.0%	Medium / Low	Medium

In terms of effectiveness (new elements taken into account) as compared to the baseline updated package used as benchmark, the score of Projections A (No.3) and Projections B (No.4) packages allows them to be classified as the most effective ones, making best use of new data and lessons learnt. The new reference scenario A&B packages (No 5 and 6) score medium effectiveness, meaning that they also reflect new data and lessons learnt, albeit to lesser extent. The marginal fossil fuel emission factor package (No. 2) scores very low since it takes very limited new information and lessons learnt into account.

In terms of efficiency (achieving the objectives in a balanced manner), the baseline updated package (No.1) is used as starting point for the comparison. It cannot be judged as the one achieving the worst balance and having the lowest score as it is the starting point for the

comparison. The marginal fossil fuel EF (No.2) has negative efficiency since it does not provide optimal balance in terms of GVA and free allocation covered, and does not balance the specific objectives of the exercise successfully as it could lead to overcompensation and does not incentivise emission reductions. The new reference scenario A and B packages (No. 5 and 6) score higher on efficiency, but they can be considered as giving not enough attention to the competitiveness objectives and thus score a medium to low. However, they avoid overcompensation and incentivise emission reductions. The most efficient packages are the Projections A (No. 3) and Projections B (No.4) packages which both have medium to high efficiency. The Projections A package (No.1) is slightly superior due to the use of the sectoral auctioning factors that allow for higher accuracy.

As visible from the table above, a comparison between the packages No.1 and No.4 shows an impact of 1.1% in terms of industrial GVA covered translating into 24.7% difference of free allocation to industry covered. In practice, the difference between the two packages is which carbon price is used (30€ vs. 16.5€) and this affects the six sectors mentioned in section 8.3.3.[86] The very small difference in terms of GVA contrasts the significant difference of free allocation: the sectors generate small amount of GVA, but consume about a quarter of the total free allocation to industry reflecting also their carbon emissions. Clearly, with giving more free allocation to sectors already with considerable surpluses, package 1 does not incentivise emission reductions and does not avoid over-allocation.

A comparison of Projections A package (No.3) and New Reference Scenario A package (No.5) reveals the joint impact of a price of 10€ as compared to a price of 16.5€ coupled with a sectoral auctioning factor: a difference of 3.8% of GVA and 42.6% of free allocation covered. This comparison concerns four sectors.[87] As with the comparison between the 30€ and the 16.5€ packages, these sectors generate relatively small amount of industrial GVA, but consume a bit less than half of the total free allocation to industry and are responsible for the same amount emissions.

A comparison between the Baseline Updated package (No1) and New Reference Scenario B (No.6) shows the difference between a 30€ and 10€ price: 67.3% in terms of free allocation to industry and 4.9% in terms of industrial GVA.

As concluded for the isolated impact of the carbon price, the results show small variations of GVA covered with every price option (30€, 16.5€ and 10€), but, free allocation fluctuates considerably.

The new reference scenario packages (No.5 and 6) are considered less efficient than the projections packages (no.3 and 4), because of the balance between free allocation and GVA covered. It could be considered that while the GVA coverage, i.e. the economic activity, decreases with about 3.8% compared to the Projections packages, the coverage of free allocation decrease considerably with about 42.6%. This may be interpreted as not providing sufficient protection against the potential risk of carbon leakage to highly emitting and trade intensive sectors.

It has to be noted that due to the significant changes in statistical classification (migration from NACE rev.1.1. to NACE rev.2) leading to splitting, merging, deletion and creation of new codes there is no one to one comparison between the 2009 list and the proposed options. The approximate differences between the 2009 list and the proposed option packages have nevertheless been assessed and are presented in Annex VI.

[86] 23.51 Manufacture of cement; 23.52 Manufacture of lime and plaster; 23.13 Manufacture of hollow glass; 23.11 Manufacture of flat glass; 10.62 Manufacture of starches and 24.43 Lead, zinc and tin production

[87] 24.42 Aluminium production; 24.10 Manufacture of basic iron and steel; 19.20 Manufacture of refined petroleum products and 17.12 Manufacture of paper and paperboard

There is a general observation that the lower carbon price provides for a more balanced and focused carbon leakage list giving additional free allocation to sectors exposed to higher extent to cost increases due to ETS and to those with high trade. The more specific question on whether the sectors concerned merit being on or off the carbon leakage list goes beyond the scope of this impact assessment. Such analyses could be subject to further reflections as part of applications for disaggregated or qualitative assessments, submitted by the EU sector associations if this situation would occur.

The various options for the elements (auctioning factor, emission factor, carbon price, trade intensity) composing the option packages have been subject to detailed analysis in a dedicated study by expert consultants complemented with significant work within the Commission. The proposed values for each of the elements are results of calculations using best available data. The transparent structure and composition of the packages takes into account considerations from experts, industry and civil society alike. There are no concerns for unequal treatment of sectors through the proposed options. As the Directive allows for addition of sectors on the list, but not for their removal, a non-inclusion of sector can be very easily remediated if the sector fulfils the Directive criteria. Any potential negative impact of the methodological choices on a concrete sector can thus be mitigated.

In sum, the table below shows the impact of all options to the 10 sectors concerned:

Table 14 Sectors concerned by the choice of option package. Ticked sectors are on the list.

Sectors/Packages	**Baseline Updated** *53% AF, 423 g/kWh, 30 €/tCO₂*	**Marginal EF** *53% AF, 690 g/kWh, 30 €/tCO₂*	**Projections A** *Sectoral AFs, 423 g/kWh, 16.5 €/tCO₂*	**Projections B** *53% AF, 423 g/kWh, 16.5 €/tCO₂*	**New ref. A** *Sectoral AFs, 423 g/kWh, 10 €/tCO₂*	**New ref. B** *53%AF, 423 g/kWh, 10 €/tCO₂*
10.62 Manufacture of starches	✓	✓				
17.12 Manufacture of paper and paperboard	✓	✓	✓	✓		
19.20 Manufacture of refined petroleum products	✓	✓	✓	✓		
23.11 Manufacture of flat glass	✓	✓				
23.13 Manufacture of hollow glass	✓	✓				
23.51 Manufacture of cement	✓	✓				
23.52 Manufacture of lime and plaster;	✓	✓				
24.10 Manufacture of basic iron and steel;	✓	✓	✓	✓		
24.42 Aluminium production	✓	✓	✓	✓		
24.43 Lead, zinc and tin production	✓	✓				

The content and thresholds of the Directive criteria are set by the legislators and are not subject to discussion or change with the present impact assessment. It is inevitable as with any threshold that there will be sectors right below or right above it. The Directive provides a way

to address the specific situation of these borderline cases via disaggregated or qualitative assessments.

10. MONITORING AND EVALUATION

The European and international research community undertakes regular empirical studies on carbon leakage which are carefully screened and also supported (e.g. by making EUTL data accessible in certain formats) by the Commission. In a more simple way, to assess whether carbon leakage was prevented via free allocation and whether the sectors on the carbon leakage list were correctly identified, the ratio between sector's emissions and free allocation can be compared.

Some evaluation looking at the past phases of ETS was already carried out, concluding that free allocation has prevented carbon leakage: the sector-specific factsheets found no evidence of carbon leakage in the period 2005-2012.[88] Based on the approach of this study, similar ones can be carried for the period 2013-2020. Moreover, dedicated studies to assess the effectiveness of the free allocation system, which includes the assessment of the existence of and risk of carbon leakage, are foreseen for 2015 and onwards.

The purpose of these studies is to ensure more detailed evaluations can be carried out if needed, aiming to isolate the impact of pricing carbon from other factors, such as general economic climate, labour costs etc.

The Directive foresees a new list to be determined every 5 years, so upon the end of validity of the present list in 2019, a new one will have to be determined. The form and existence of protection against the potential risk of carbon leakage after 2020 is to be decided in the framework for climate and energy policy for 2030 and is not subject to the current impact assessment.

[88] Available at: http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf

ANNEXES

Annex I: Stakeholder consultation analysis

The stakeholder consultation was conducted for 12 weeks from 6 June to 30 August via questionnaire using the Interactive Policy Making tool.[89] The questionnaire consisted of 14 multiple choice questions with possibility to motivate answers. The answers will be analysed according to respondent profile and to topic below. Also, multiple stakeholders from various backgrounds[90] have expressed the view that a pure statistical analysis of the replies is not meaningful and therefore a qualitative analysis of the responses will be made below.

1. Respondents' profile

The stakeholder consultation gathered a total of 468 responses. Multiple replies from the same respondent were treated as a single reply. Thus, 405 replies are taken into account.

The prevailing majority of replies came from businesses (58%) or trade associations representing businesses (34%), including a wide variety of industries and companies covered by the EU ETS. Therefore, it could be argued that over 90% of the respondents have an interest in laxer interpretation of the ETS Directive criteria leading to a broader coverage of the carbon leakage list and higher amount of free allocation.

Given the setup of ETS where allowances which are not given for free are auctioned, it could be argued that Member States also have some interests in the determination of the new carbon leakage list and therefore their replies from government and regulatory authorities will be analysed separately.

Lastly, replies from academic and research institutions, NGOs and citizens will be analysed in a third section.

Table 1: Stakeholder consultation responses[91]

	Number	% of total
Business	237	58%
Trade association representing business	137	34%
Government/regulatory authority	8	2%
Academic/ research institution	4	1%
NGO	15	4%
Citizen	4	1%
Other	0	0%
Total business related	374	92%
Total non-business	31	8%

[89] Several replies received after the date of closure on the functional mailbox were also taken into account.
[90] For instance, chemical industry, IFIEC, WWF.
[91] Some answers seemed incorrectly classified as 'Other' or 'NGOs' and were re-classified as 'business' or 'trade association' accordingly to the nature of the respondent. The multiple identical replies submitted by the same respondents were disregarded and one reply was taken into account. Out of the 4 replies as 'citizens', 2 can be attributed to business as well, since the respondents are employees in companies which have also submitted replies.

2. Business and trade representations of business interests

A very wide range of sectors responded to the public consultation: there were submissions from individual companies and European and national sector associations from the vast majority of energy intensive sectors, as well as manufacturing and food sectors.

There seem to be some misunderstandings of the ETS system among some stakeholders: some respondents from industrial sectors claim they fall under the scope of ETS but do not receive free allocation which does not correspond to the reality where all industrial production falling under ETS receives free allocation of 80% of the basic allocation in 2013 decreasing to 30% in 2020 and if a sector is on the carbon leakage list, then they receive 100% of this basic amount.

a. Competitiveness and carbon leakage

On the evolution of the risk of carbon leakage, the majority (90%) of industrial stakeholders representing wide variety of sectors see a significant or slight increase. The main reasons for the perceived increase of the risk of carbon leakage are the international context (lack of binding international agreement on climate matching EU policy, lower energy prices in other parts of the world, global competition and growth of emerging economies compared to shrinking EU ones) and the domestic context (EU rules on free allocation, indirect costs due to high electricity prices and not sufficiently compensated, lack of predictability on the carbon market and new entrant allocation rules). 7% of the industrial respondents see the risk of carbon leakage remaining the same due to the decrease of carbon prices together with product prices and the international context remaining the same as in 2009. There is also a minority view (1%) seeing the risk decreasing slightly or substantially, mainly due to the low carbon prices and generous free allocation.

Almost 100% of industrial stakeholders find free allocation and the carbon leakage list adequate and very adequate instrument to address such potential risk. This can be interpreted as high general acceptance of the system among industrial stakeholders.

Although the necessity and the beneficial effects of free allocation are not disputed, wide range of industrial stakeholders make several comments: the benchmark values for some products are perceived as too strict; natural and geographical conditions are not taken into account and activity levels should be based on actual production.

Concerning the length of the carbon leakage list, 60% of the industrial respondents find the list is of adequate length, 24% have no opinion on the length of the list. There are numerous views that the length of the carbon leakage list is an irrelevant indicator because as long as the list reflects the Directive criteria, its length cannot be judged. There are also comments that the Directive criteria are to the benefit of sectors with high trade, regardless of their emissions and that the list should be as accurate as possible due to its impact on other EU legislative acts. There are also some industrial stakeholders (3% mainly from the non-ferrous metals industry) who perceive the list as too long. About 10% of industrial stakeholders perceive the list as too short, with main comments that the Directive criteria do not account for national specificities and detailed qualitative assessments may be needed to account for all the value chain of sectors.

These replies show that industrial stakeholders have high degree of acceptance of the current free allocation system, awareness that the determination of the new carbon leakage list is a technical exercise applying the Directive criteria and mixed perception of the current state of the risk of carbon leakage.

b. Trade intensity and international climate policies

Concerning the ambition of domestic climate policies around the globe and their evolution since 2009, the majority of industrial respondents (69%) perceive an increase, 10% perceive no change and 17% see a decrease. Increase of ambition is perceived as slight due to lack of international binding agreement, but nevertheless there is recognition of growing interest and commitment to climate policies and doing more than business as usual.

Concerning comparability of the climate policies of concrete countries to the EU ETS, 21% of industrial respondents see the Australian system as at least partially comparable, 70% see it as non-comparable and 9% have no opinion. One comment from respondents which do not see the Australian scheme as comparable is that since the analysis is backward-oriented, the policy in place in 2008-2010 should be taken into account, not the current policy. Also, industrial respondents find the Australian system more generous in terms of benchmark values and emission factor used. As for Switzerland, the answers are more mixed: 38% see it as fully or partially comparable, 49% as not comparable and 12% have no opinion).

Concerning other countries (China, South Korea, New Zealand, USA, Brazil and Russian federation), the majority of industrial stakeholders perceive their climate policies as not comparable to the EU ETS. There is some positive nuance regarding the Californian scheme, and the Chinese schemes, but they cannot be deemed comparable as long as they remain regional.

c. Level of analysis of data

Concerning the level of data analysis, the majority of industrial stakeholders prefers analysis at NACE-4 (58%) level, but there are also quite some views (34%) supporting analysis at NACE-3 level. 7% have no opinion mainly with the argument that different levels may be appropriate for different sectors.

A much wider variety of sectors prefer NACE-4 as level of analysis with the argument that it most accurately represents sectors and includes the whole value chain. Some stakeholders also believe that NACE-4 should be the starting point of analysis and further disaggregation should be possible.

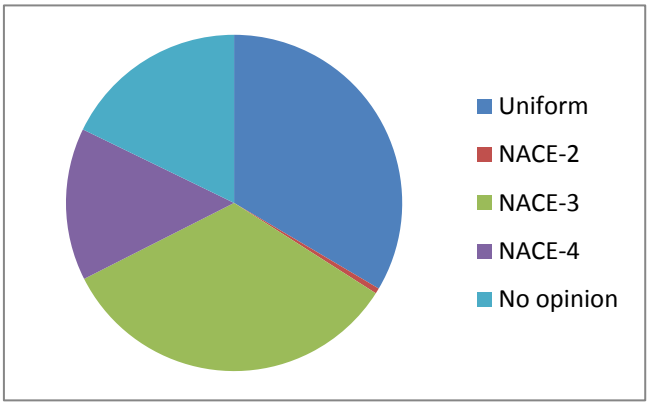
The preference for NACE-3 level is expressed by a very big number of individual companies and national trade associations mainly in the ceramic sector, and few in the chemicals sector. The main argument is that NACE-3 should be the starting point of analysis according to their interpretation of the Directive, and also because it is the suitable level of assessment given the heterogeneity of the.

Some respondents find the NACE statistical classification not suitable for defining sectors because it does not reflect the specific features of small sectors.

d. Auctioning factor

Views of industrial stakeholders are quite spread on the type of auctioning factor – 32% prefer a uniform factor for all sectors, 32% prefer a NACE-3 level auctioning factor, and 14% prefer a NACE-4 level, and 17% have no opinion.

Figure 3: Auctioning factor views



The same argument, accuracy, is used by stakeholders in favour of both a uniform and a NACE-4 sectoral factor. Another view is that the auctioning factor should match the level of analysis and should be a choice based on the best available data and maximum accuracy. Also, some stakeholders mention it should take into account the cross-sectoral correction factor. There are also views that the factor should remain the same as in 2009 or be even higher. It is noteworthy that the uniform factor is supported by a wider range of industrial stakeholders from more industries, while the NACE-3 one is preferred mainly by ceramics industry.

e. Carbon price

On the carbon price, the vast majority of stakeholders (93%) believe the 30€ is adequate, while 2% believe it is not. The argument of the supporters of the 30€ price lies in the reference of the ETS Directive, while the ones who find this value inadequate justify it with volatility of actual market carbon price and its current values and projections. Some stakeholders express a view that a higher price of 60 to 90€ should be considered to ensure the EU is "*resistant to carbon leakage"* until the time horizons of new investments (2020-2040).

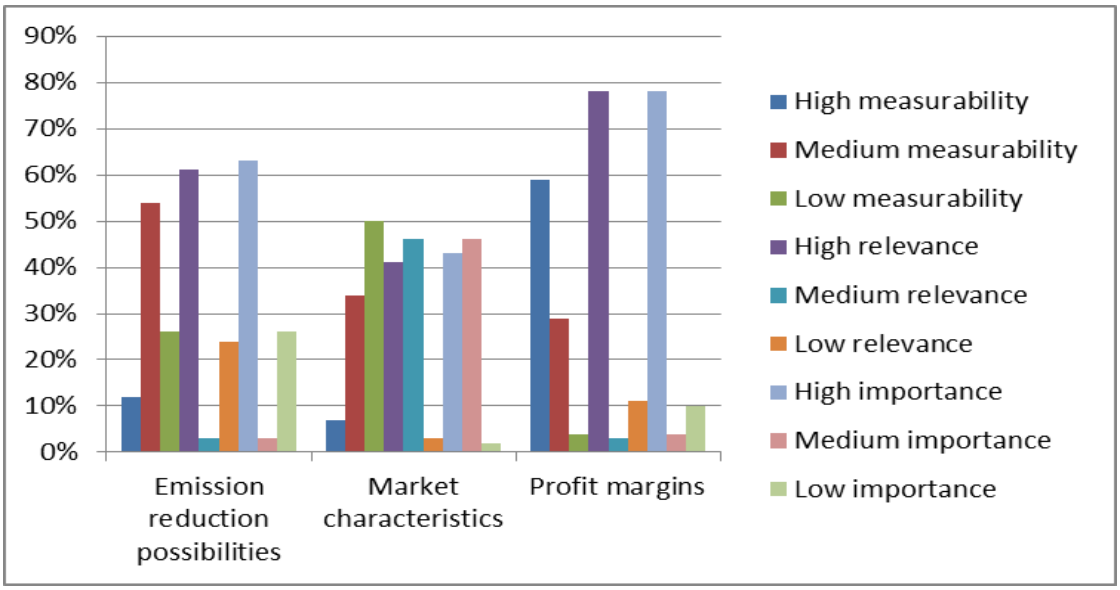
It is important to keep in mid the reasoning behind this answer: a higher carbon price would lead to higher costs calculated according to the Directive criteria and thus more sectors could end up on the carbon leakage list.

f. Emission factor for electricity

As for the carbon price, the answer of most respondents on the emission factor for electricity seems to be driven by maximising strategies – 73% show preference for the highest option (the marginal electricity generation in the current system). 11% prefer the average emission intensity of the fossil fuel mix and 8% the average emission intensity of the total electricity generation mix. A comment made by some stakeholders is that the marginal factor would be too complex to calculate correctly, albeit its theoretical relevance, so an average one is preferable. It is also noteworthy that the average emission factor is supported by companies from various industrial sectors. The fossil fuel mix approach is mainly preferred by oil and refinery industries.

g. Qualitative criteria

Figure 4: Industrial stakeholders views on qualitative criteria



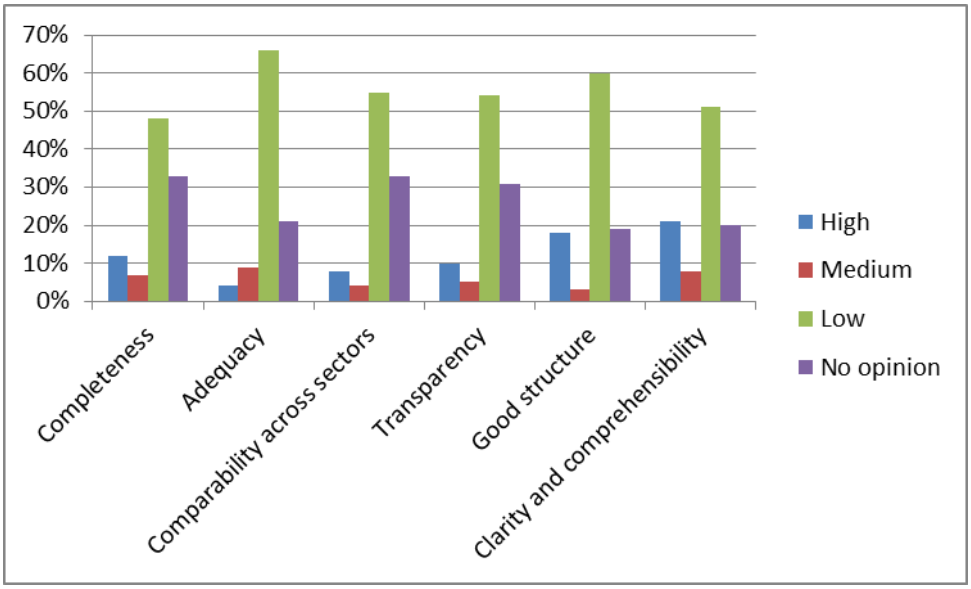
The numbers indicate that profit margins are seen as the indicator with the highest measurability, relevance and importance.[92] Market characteristics emerge as an indicator with low measurability, medium relevance and importance. Emission reduction possibilities are perceived as an indicator with medium measurability, and high relevance and importance.

A comment made by some sectors, mainly expressing no opinion, is that the criteria cannot be ranked and they need to be seen in conjunction. One common view is that carbon costs are unavoidable. Another frequent comment is that carbon leakage is actually investment leakage and whether is happens is determined by the profits as compared to the costs. One more recurrent observation is that future profit margins could not be adequately measures based on current ones and this would require modelling. Also, industry stakeholders comment that possibility to reduce emissions should be seen in conjunction with economic feasibility.

On the proposed framework for qualitative assessment, the graph below indicates the views of industrial stakeholders.

[92] Summary results of the views on the qualitative criteria are presented below. High is understood as scoring 4 and 5, low as scoring 1 and 2 and medium as scoring 3. The missing percentages are 'no opinion' answers.

Figure 5: Industrial stakeholders views on qualitative framework



A qualitative analysis of comments shows that quite a number of industrial stakeholders support in principle the introduction of a structured and harmonised framework, as long as all indicators in such framework are taken into account and all steps of the step-wise approach are followed. There are views that following only one step of the step-wise approach is not in line with the ETS Directive. Some stakeholders suggest extending the qualitative assessment to more sectors than those without data and borderline cases. A frequently expressed view is that impacts on the whole supply chain need to be considered, as well as cases of globally traded goods where the price is determined worldwide. Another opinion is that cross-border flows of EU border countries with non-EU ones need to be taken into account. Another frequent, although vague, comment is that assessment of possibility to reduce emissions may be incompatible with the level-playing field of the sector. Some stakeholders support a very detailed level of analysis; even suggest using individual company data to assess the inclusion of individual companies on the carbon leakage list.

3. Government and regulatory authorities

Only a few Member States responded officially to the stakeholder consultation – United Kingdom, Belgium, Portugal, Slovakia, Estonia and some regional authorities from Spain.

a. Competitiveness and carbon leakage

Several national authorities (Slovakia, Belgium, Estonia) perceive that the risk of carbon leakage has decreased since 2009. UK emphasises that *'The risk of carbon leakage depends on a number of factors including the carbon intensity of production, carbon price, degree of international competition and cost pass through rates'* and if looking at the decreasing carbon price, it seems this risk is reduced, but there is no information on the other parameters. On the other hand, some Spanish regional authorities[93] perceive an increase of the risk of carbon leakage for low value-added products due to competition from non-regulated markets and also a general worsening of the competitive position of industry due to the economic crisis.

All but one[94] governments and national authorities perceive free allocation as adequate measure to address the risk of carbon leakage. However, UK draws the attention to the considerable over-allocation in the system due to a number of factors: carry-over of over-

[93] Comunidad de Madrid, Junta Comunidades Castilla-La Mancha and Gobierno de Cantabria
[94] Junta Comunidades Castilla-La Mancha

allocation in phase two, economic downturn and low ambition of the 2020 emission reduction targets.

On the length of the carbon leakage list, the majority of national authorities perceive the length of the carbon leakage list as adequate, making the comment that it is just technical application of the Directive criteria and cannot be judged. UK perceives it as too long and references several studies with the same view.[95] The Government of Cantabria expresses the view that the list is too short without further justification.

These replies show that Member States have a perception of the system similar to the one of industrial stakeholders: very high degree of acceptance of the current free allocation system, awareness that the determination of the new carbon leakage list is a technical exercise applying the Directive criteria and mixed view of the current state of the risk of carbon leakage.

b. Trade intensity and international policies

Concerning the ambition of domestic climate policies around the globe and their evolution since 2009, all except Junta Comunidades Castilla-La Mancha perceive some increase. A comment made is that although the progress was less than expected, some countries have made considerable steps on domestic level.

Concerning comparability of the ETS schemes of concrete countries to the EU ETS, the majority of national and regional authorities perceive Australia and Switzerland as at least partially comparable to the EU ETS, or have no opinion due to discussions at Council level. South Korea, New Zealand and USA are seen by partially comparable by some respondents.

c. Level of analysis of data

Concerning the level of data analysis, the majority of responding Member States (UK, Portugal, Belgium and and Gobierno de Cantabria) advocate analysis starting at NACE-4 level, while the rest have no opinion or prefer NACE-3 level. The argument for NACE-4 is best targeted analysis and best available data.

d. Auctioning factor

Uniform auctioning factor is preferred by Portugal and Estonia, NACE-4 one by Belgium, UK and a regional authority with the argument that such level is consistent with the level of analysis of sectors and it is leading to the most realistic auctioning factors. A regional authority supports NACE-3 auctioning factor coherent with the level of analysis. Slovakia supports auctioning factor at NACE-2 level.

e. Carbon price

The majority of Member States believe 30€ is not an adequate price for the assessment for the new carbon leakage list and argue for an assessment based on a price closer to reality: best available evidence of what the carbon price is likely to be over the period of list validity.

[95] Carbon leakage methodology study literature review;
Climate Strategies (UK) Reports (2007 – 2009) on: Tackling Leakage in a world of unequal carbon prices http://climatestrategies.org/our-reports/category/32.html,;
Hourcade et al (2007) Differentiation and Dynamics of EU ETS Industrial Competitiveness Impacts, *Climate Strategies* (http://www.climatestrategies.org/research/our-reports/category/6/37.html);
Öko-Institut (Germany), Fraunhofer ISI, DIW *(September 2008)* Impacts of the EU Emissions Trading Scheme on the industrial competitiveness in Germany http://www.umweltdaten.de/publikationen/fpdf-l/3625.pdf
Carbon leakage and the future of the EU ETS market - CE Delft
http://www.cedelft.eu/art/uploads/CE_Delft_7917_Carbon_leakage_future_EU_ETS_market_Final.pdf

Therefore, 30€ cannot be the likely price unless structural reforms are implemented before 2020. The price value should consider market forecasts over time, impact of Phase II surplus and current growth projections.

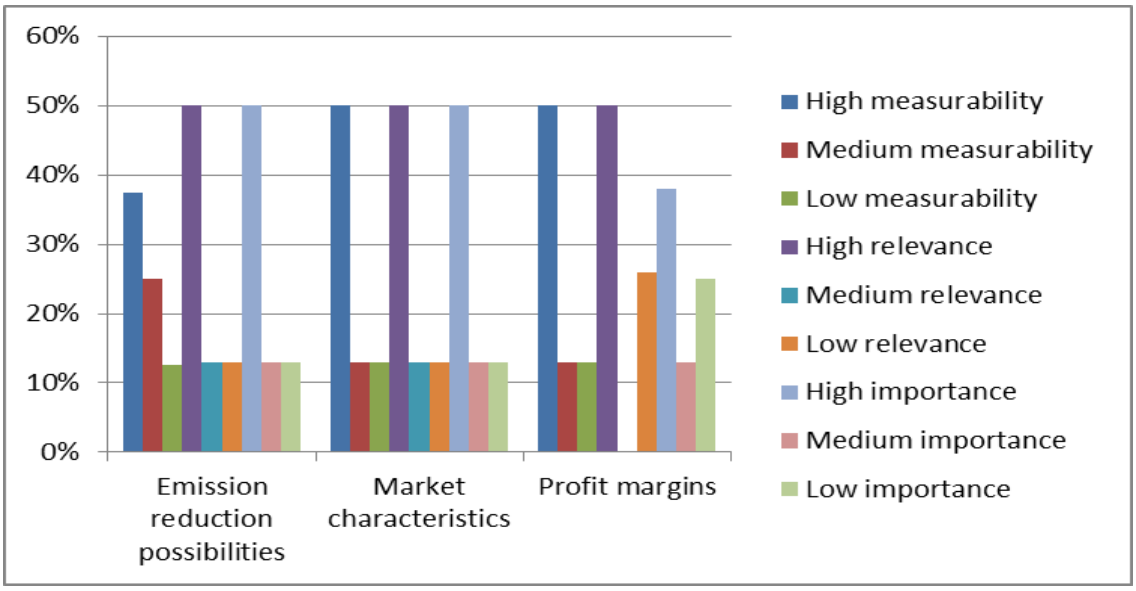
Estonia and two Spanish regional authorities believe 30€ is an adequate price.

f. Emission factor for electricity

The majority of responding national governments support the average emission intensity of the whole electricity generation mix. The argument is made that this approach is most appropriate in light of the practical difficulties around estimating a marginal factor and it takes account of all forms of electricity generation in the mix, including renewables and low carbon technologies. The average emission intensity of the fossil fuel mix is supported by one regional authority, and one government has no opinion.

g. Qualitative criteria

Figure 6: Member State views on qualitative criteria

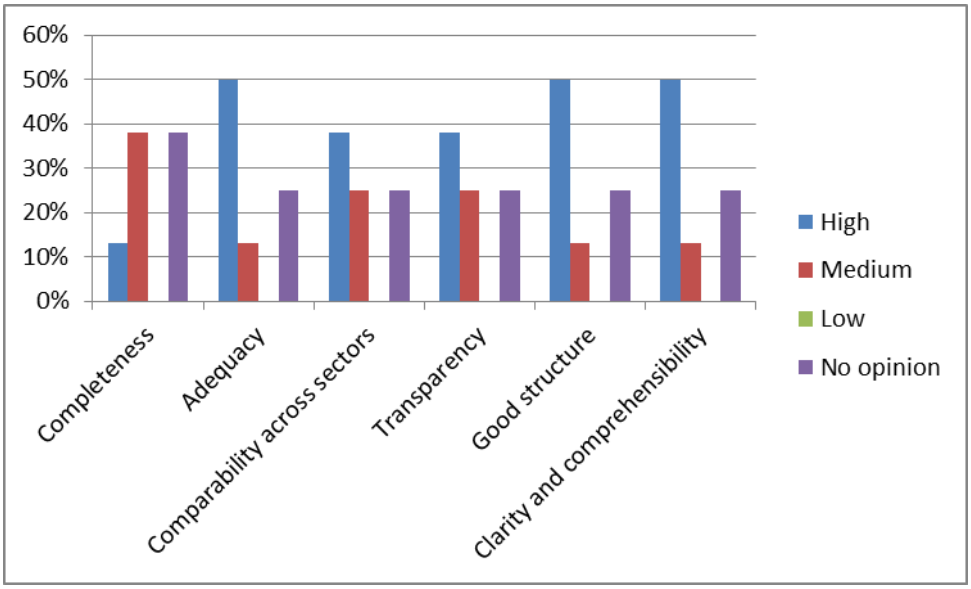


Due to small number of respondents, the statistical analysis of the answers needs to be taken with caution. The numbers indicate that all three criteria are seen as equally relevant. Emission reduction potential is seen as slightly less measurable, while profit margins are seen as slightly less important that the other two.

A comment is made that decisions on indicators of carbon leakage need to be based on firm evidence and these indicators would not provide a sufficient level of detail to enable a qualitative assessment of carbon leakage risk. Also, the relevance and importance of the indicator would also depend largely on the approach used to measure it.

On the proposed framework for qualitative assessment, the graph below indicates the views of Member States. Due to small number of respondents, the statistical analysis of the answers needs to be taken with caution.

Figure 7 Member State views on qualitative framework



The framework for qualitative assessment is in general seen as adequate, well-structured, transparent and clear. There is less positive view to its completeness. A comment made by regional authorities is that the three steps should be seen simultaneously. Belgium and UK support the principle of a qualitative element of the assessment and support the European Commission in making the qualitative assessment more harmonised, structured, robust and transparent. To aid transparency and foster a greater understanding of the qualitative assessment, UK requests that the European Commission publish a preferred approach for the qualitative assessment for stakeholder consideration and comment, including methodologies and data requirements for each indicator; and reports detailing the evidence to support the outcome of any qualitative assessments with commercially confidential information redacted if necessary.

As for other indicators to be considered, UK suggests consideration of demand growth for products at the sector/ sub-sector level as an insight into whether the impact of carbon price might be due to a general market trend of the product rather than carbon leakage risk. The UK also suggests sectoral infrastructure investment horizons as an indication of the risk of a sector moving production, investment and/ or physically. A regional authority suggests special attention to EU border areas, cumulative impact of EU and national measures, analysis of structure of GVA to reflect labour costs, financial performance of the sector, cost structure. A comment is also made on regulatory predictability of qualitative assessments.

4. Academic and research organisations, NGOs and citizens (civil society)

a. Competitiveness and carbon leakage

On the evolution of the risk of carbon leakage, the majority (70%) of civil society respondents see a significant or slight decrease. The main reasons for the perceived decrease of the risk of carbon leakage are the generous free allocation, the surplus of allowances in the system and the low carbon price. An argument made is that the risk of carbon leakage has been exaggerated in the past, leading to over-allocation and reducing incentives for cost-effective emission cuts by large emitters and several industries have profited from unjustified free allocation. Studies are quoted that there have not been job losses due to carbon leakage and that ETS has been to the benefit of industries. The 30% seeing an increase of the risk come from industry-affiliated think tanks.

57% of civil society respondents find free allocation and the carbon leakage list adequate and very adequate instrument to address such potential risk. There is a general comment that free allocation needs to be applied more restrictively. Another view is that for some sectors border measures could be considered instead. 44% of the respondents see free allocation as quite or very inadequate with the main comment that it is too generous, redistributing potential government revenues to industry and thus constituting a hidden subsidy which is not subject to the usual control.

Concerning the length of the carbon leakage list, 70% of the civil society respondents find the list too long. The main arguments are that the criteria unnecessarily overestimate the risk of carbon leakage, the trade criterion alone is irrelevant and the phase II surplus of allowances are not taken into account. Many civil society stakeholders refer to the need for revision of the list to reflect reality better. 13% of the respondents, mainly ones with industrial affiliation, find the list of adequate length while another 13% find it too short.

These replies show a mixed picture: on the one hand free allocation has high degree of acceptance, but it is considered too generous and the risk of carbon leakage is found exaggerated and thus the list is considered too long.

b. Trade intensity

Concerning the ambition of domestic climate policies around the globe and their evolution since 2009, 87% of civil society respondents perceive some increase. Comments made are that after Copenhagen multiple countries are taking up various climate policies and some of them are comparable to the EU, so the EU is no longer the only player in climate action, and in some cases the level of ambition is even higher than the EU.

Concerning comparability of the ETS schemes of concrete countries to the EU ETS, 65% of civil society respondents perceive Australia and Switzerland as at least partially comparable to the EU ETS. 47% consider China at least partially comparable to the EU, 52% consider South Korea as comparable and 43% consider New Zealand as partially comparable. Other countries are not considered as having comparable climate policies.

In sum, civil society respondents have a positive perception of climate policies around the globe.

c. Level of analysis of data

Concerning the level of data analysis, 44% of the civil society respondents advocate analysis starting at NACE-4 level, while the rest have no opinion and 8% prefer NACE-3 level. The argument for NACE-4 is that it offers maximum differentiation between sectors and avoids inadvertently subsidizing some businesses within the sectors.

d. Auctioning factor

Uniform auctioning factor is preferred 35% of the civil society respondents, 13% prefer a NACE-4 one and the majority of 52% has no opinion. This shows the lack of strong views on this technical element.

e. Carbon price

The majority of civil society respondents believe 30€ is not an adequate price for the assessment for the new carbon leakage list with the argument that it is too high compared to reality and that it artificially inflates the costs of sectors including them unduly in the carbon leakage list and thus foregoing revenues from governments in times of crisis. The price value should be the result of more accurate modelling and consider market forecasts over time, impact of Phase II surplus and current growth projections.

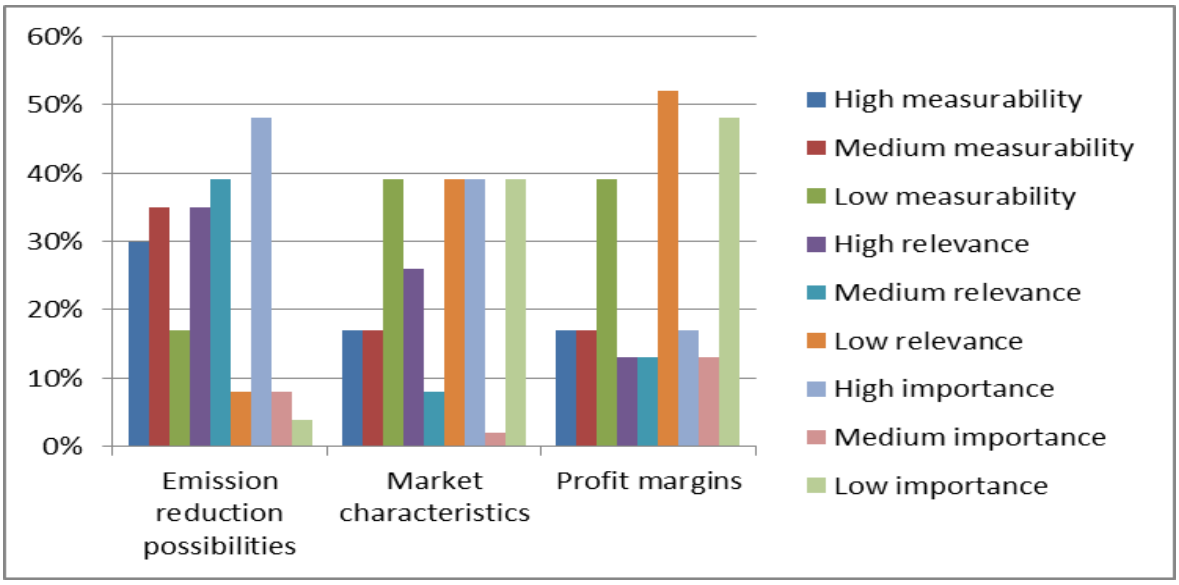
30% of the civil society respondents mainly with industry affiliation consider the 30€ price adequate.

f. Emission factor for electricity

The majority of civil society respondents support the average emission intensity of the whole electricity generation mix. The argument is made that this approach can be most soundly calculated and reflects the realistic electricity generation including renewables without leading to overestimation of the indirect costs. The average emission intensity of the fossil fuel mix as well as the marginal emission intensity of the fossil fuel mix are supported by 8% each.

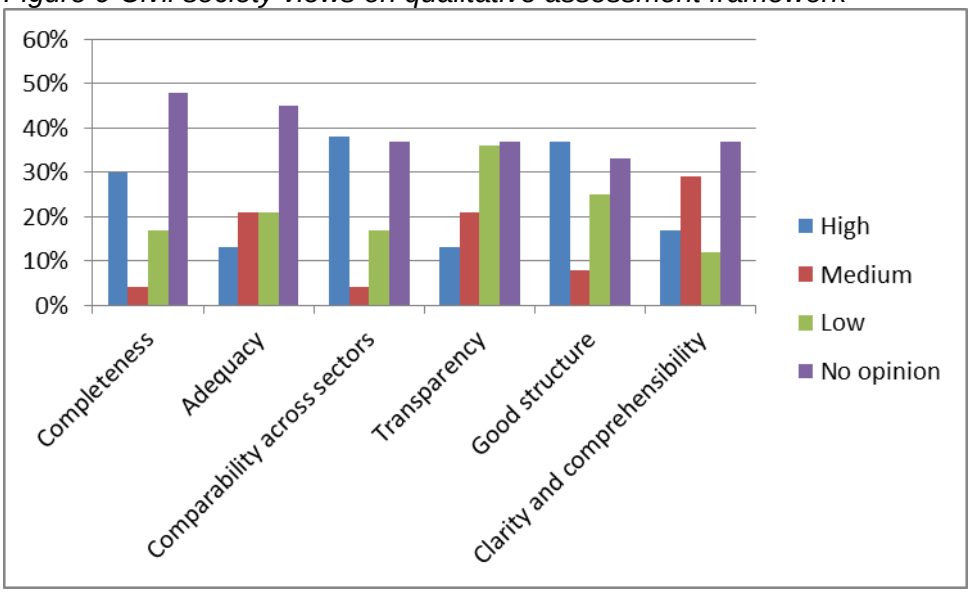
g. Qualitative criteria

Figure 8 Civil society views on qualitative criteria



Due to medium number of civil society respondents, the statistical analysis of the answers needs to be taken with caution. The numbers indicate that the emission reduction potential is seen as an indicator with medium to high measurability, while market characteristics and profit margins are seen as having low measurability. Emission reduction potential is seen as the most relevant indicator, while profit margins and market characteristics are pronouncedly deemed of low relevance. Again, emission reduction potential is deemed highly important, closely followed by market characteristics, while profit margins have clearly low importance.

Figure 9 Civil society views on qualitative assessment framework



The civil society respondents do not express strong views on the qualitative assessment framework as visible from the graph. One comment also illustrated by the low perceived transparency is that holds that the qualitative factors laid down in the ETS directive (Article 10a, paragraph 17) cannot be determined sufficiently transparently to justify the decision to include a sector in the carbon leakage list. Also, there are requests to publish qualitative assessments in full.

5. Conclusions

For the analysis of the stakeholder consultation, 405 replies are taken into account.[96] The table below illustrates the participation of stakeholders by group.

Table 2: Summary of stakeholder consultation responses

	Number	% of total
Total business related	374	92%
Government/regulatory authority	8	2%
Civil society	23	6%
Total non-business	31	8%

Given the prevailing participation of business oriented stakeholders, it could be argued that over 90% of the respondents have an interest in an interpretation of the ETS Directive criteria leading to a broader coverage of the carbon leakage list and higher amount of free allocation. A very wide range of industrial sectors represented by national and European sector associations, but also a high number of individual companies responded to the public consultation.

On the evolution of the risk of carbon leakage, the majority (90%) of industrial stakeholders see a significant or slight increase, while the majority of Member States and civil society respondents see slight or significant decrease. The arguments for the perceived increase are related to the international context (lack of binding international agreement on climate matching EU policy, lower energy prices in other parts of the world, global competition and growth of emerging economies compared to shrinking EU ones) and the domestic context

[96] The stakeholder consultation gathered a total of 468 responses. Multiple replies from the same respondent were treated as a single reply.

(EU rules on free allocation, indirect costs due to high electricity prices and not sufficiently compensated, lack of predictability on the carbon market and new entrant allocation rules). On the other hand, the arguments for a perceived decrease are the generous free allocation, the surplus of allowances in the system and the low carbon price. An argument made is that the risk of carbon leakage has been exaggerated in the past, leading to over-allocation and reducing incentives for cost-effective emission cuts by large emitters and several industries have profited from unjustified free allocation. There is also a view that this risk depends on a number of factors, including the carbon intensity of production, carbon price, degree of international competition and cost pass through rates and the decreasing carbon price indicates reduction of the risk, but there is no information on the other parameters.

Concerning free allocation, both industrial stakeholders and Member States show high degree of acceptance and find it an adequate method to address the potential risk of carbon leakage. Industry makes some comments on the adequacy: on the benchmark values for some products which are perceived as too strict; natural and geographical conditions are not taken into account and activity levels should be based on actual production. Civil society is most critical towards the adequacy of free allocation with the main argument that it needs to be applied more restrictively because as it stands now it is too generous, redistributing potential government revenues to industry and thus constituting a hidden subsidy.

On the length of the carbon leakage list, 60% of the industrial respondents find the list of adequate length. One quarter as well as the majority of Member States find the length of the list an irrelevant indicator since its determination is a technical exercise reflecting the Directive criteria, therefore its length cannot be judged. The majority of civil society respondents, on the other hand, find the list too long with the argument that the criteria unnecessarily overestimate the risk of carbon leakage, the trade criterion alone is irrelevant and the phase II surplus of allowances are not taken into account and therefore argue strongly for revision of the list to reflect reality better.

Concerning the ambition of domestic climate policies around the globe and their evolution since 2009, the majority of all respondents (industry, Member States and civil society) respondents perceive some increase. Industry and Member States are a bit more critical recognising the efforts but focusing on the lack of international climate agreement, while civil society is more positive looking at the domestic climate policies achievements since 2009. As for the comparability of climate policies, industry sees no comparable policy to the EU ETS worldwide, while Member States and civil society see some comparable elements in several countries' policies.

On the level of analysis, industry expresses its views most actively and there seems to be a preference for analysis at NACE-4 level shared by broader range of stakeholders, also supported by some Member States and a share of the civil society respondents. The main arguments supporting this choice are that NACE-4 is best targeted analysis and best available data and it was used in 2009. Some stakeholders, notably the ceramic industry and some chemical companies, prefer analysis at NACE-3 level.

On the auctioning factor, civil society does not have strong views, while industrial stakeholders are split between uniform factor for all sectors (32%), NACE-3 level factor (32%), and NACE-4 level (14%). NACE-4 is the most supported choice for Member States, but also the other options find some support. Notable is the lack of opinion in about half of the civil society respondents and about one fifth of industrial stakeholders with the frequent comments that the auctioning factor should correspond to the level of analysis.

On the carbon price, the vast majority of industrial stakeholders believe the 30€ is adequate, with the argument of the reference of the ETS Directive. Some industrial stakeholders express a view that a price above 30€ should be considered to ensure the EU is "*resistant to carbon*

leakage" until the time horizons of new investments (2020-2040). The majority of Member States and civil society, on the other hand, find the 30€ inadequate, with the argument that it is too high compared to reality, that it artificially inflates the costs of sectors including them unduly in the carbon leakage list and thus foregoing revenues from governments in times of crisis. They argue that the price value should be the result of more accurate modelling and consider market forecasts over time, impact of Phase II surplus and current growth projections. It is important to keep in mid the reasoning behind this answer: a higher carbon price would lead to higher costs calculated according to the Directive criteria and thus more industrial sectors could end up on the carbon leakage list.

As for the carbon price, the answer of most industrial respondents on the emission factor for electricity seems to be driven by maximising strategies and about three quarters show preference for the highest option (the marginal electricity generation in the current system). A comment made by some industrial stakeholders is that the marginal factor would be too complex to calculate correctly, albeit its theoretical relevance, so an average one is preferable which is supported by companies from various industrial sectors. Member States and civil society also prefer the average factor of the total fuel mix with the argument this the most accurate number taking into account all forms of electricity generation, including renewables and low carbon technologies.

Concerning the ETS Directive criteria for qualitative assessment, industrial stakeholders see profit margins as most measurable, relevant and important; market characteristics emerge as an indicator with low measurability, medium relevance and importance while emission reduction possibilities are perceived as an indicator with medium measurability and high relevance and importance. Member States on the other hand see all three criteria as equally relevant; emission reduction potential is seen as slightly less measurable, while profit margins are seen as slightly less important. Civil society has a different view: emission reduction potential is seen as most measurable, relevant and important, while market characteristics and profit margins are seen as less measurable, relevant and important. Such views may be logical, given that industry focuses on profits and market conditions for investments, while civil society is primarily looking at environmental integrity and emission reductions. Member States have a balanced view recognising the importance of all three criteria. There are comments made from all sides concerning the vagueness of the criteria.

As for the framework for qualitative assessment, industrial stakeholders show a more critical stance, Member States see it in general as adequate and useful and civil society has no particular opinion, albeit the general positive views. According to the comments made, a number of industrial stakeholders support in principle the introduction of a structured and harmonised framework, as long as all indicators in such framework are taken into account and all steps of the step-wise approach are followed. This view is also shared by Member States which in general support the European Commission in making the qualitative assessment more harmonised, structured, robust and transparent. Civil society and some Member States urge the publication of all qualitative assessments in their entirety to ensure transparency of the process.

Annex II: Share of ETS costs, surplus of allowances and additional allocation from carbon leakage list as share of turnover in major energy intensive industries

1. Share of ETS costs in major energy intensive industries

Various studies corroborate the conclusion that ETS costs constitute a very minor part of the costs even of energy intensive industries.

For instance, recent assessment of the overall cumulative cost of environmental regulation to the European steel industry conducted by the Centre for European Policy Studies shows that so far these costs have been marginal if compared to the overall costs, and are not the driver affecting the industry's performance. In the particular case of the ETS, so far it has been an overall benefit, rather than a cost for many operators. Only in the case of some operators producing via the EAF route, the ETS direct cost can be estimated to represent around 0.5 % of the price of product.[97]

Preliminary results from a similar exercise for the aluminium industry clearly convey the same message: the ETS cost is not a key driver affecting the industry if the whole value chain is considered. For some operators producing primary aluminium, the ETS indirect cost may represent up to a third of the cost differential with the least cost producers, but even so the benefits for producing in Europe clearly compensate this.

It is noteworthy that the cumulative cost assessments only assess the costs of EU regulation, but completely ignore the regulation costs in the other parts of the world. The prices quoted are ex-factory costs. The transport costs to access the EU-market are from 20 EUR/ton upwards, clearly far more than the ETS costs.

These findings have been confirmed also in "Carbon Leakage Evidence Project: Factsheets for selected sectors, Ecorys, 23 September 2013"[98]. The study produced set of factsheets for a selection of sectors. The factsheets present historical data and assess the degree to which carbon leakage may have occurred in the sector. They were assembled using publicly available data, draft versions were commented by European industry representatives.

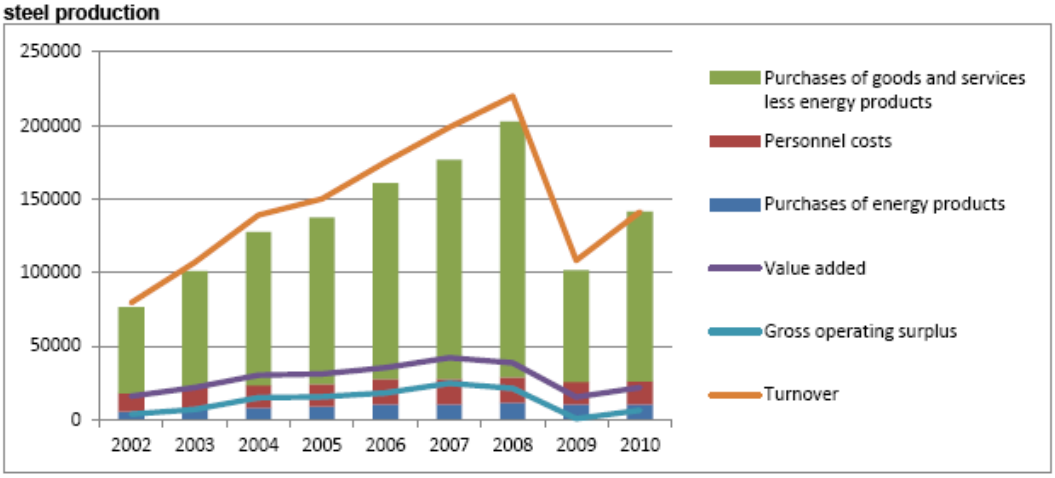
For instance, the cost structure for iron and steel as depicted by the graph below shows that energy costs in total, including fuel and not only limited to ETS are limited compared to purchases of goods and services and personnel costs.

[97] See http://ec.europa.eu/enterprise/sectors/metals-minerals/files/steel-cum-cost-imp_en.pdf

[98] "Carbon Leakage Evidence Project: Factsheets for selected sectors, Ecorys, 23 September 2013" available at http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf.

Figure 10: Cost structure of iron and steel industry[99]

Figure 2.9 Development of costs, gross operating surplus, value added, and turnover in EU-27 iron and steel production

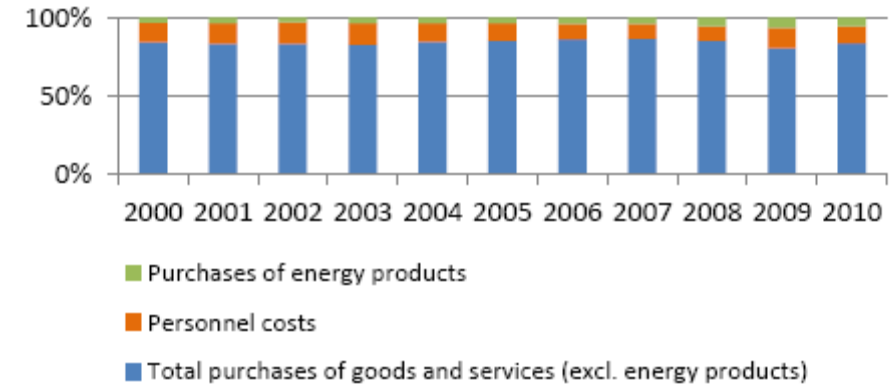


Source: Eurostat SBS.[12]

The same situation is also valid even for a greater extent for the chemical industry, as visible from the graph below.

Figure 11 Cost structure of chemical industry[100]

Figure 3.10 Cost structure for the chemical industry EU-25

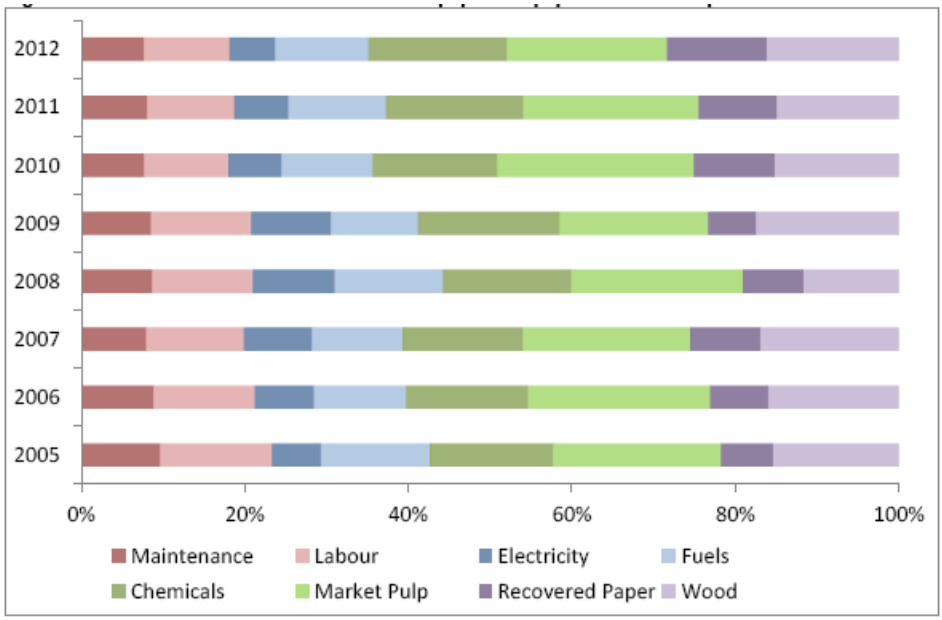


Source: Eurostat (2013) Sector definition: Data represents NACE 20.13, 20.14 and 20.16

Similar is also the situation for the pulp and paper sector as illustrated by the graph below

[99] Carbon leakage evidence study, p.25
[100] Carbon leakage evidence study, p.47

Figure 12: Cost structure pulp and paper industry



Source: CEPI & RISI (2013)

Very similar is the picture for the glass industry and clay building material industries: for glass, total energy costs are less than 10% of total costs for ETS installations, and even less for the whole sector[101], while for clay the share is around 10% EU wide, but there are some variations across Member States.[102]

For lime production, fuel costs are more significant representing 40% of total costs, but it is not possible to establish which part is attributable only to ETS costs.[103] For cement production, the situation is similar with fuel representing 33% of total costs, but again ETS costs cannot be isolated.[104]

For non-ferrous metals, energy costs seem to play a very large role for the production of primary aluminium, and they are also significant for other non-ferrous metals sectors. The isolated cost of the ETS is not possible to establish.

Figure 13 Cost structure for non-ferrous metals[105]

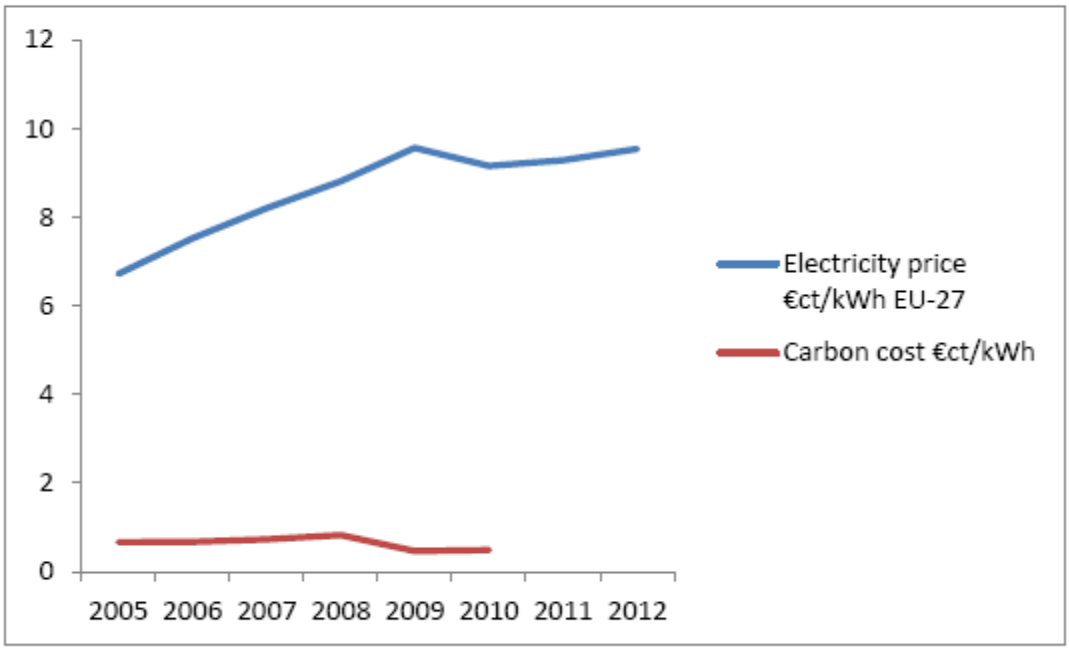
	Cost category			
	Energy Costs (%)	Labour Costs (%)	Other Costs (%)	Capital Costs (%)
Aluminium Primary	68.6	19.6	11.8	
Aluminium Secondary	22	78		
Copper	25-34	23-36	15-21	20-27
Zinc	36	24	27	13
Lead	18	27	41	14
Nickel	19	30	7	44

Source: Ecorys (2011)

[101] Carbon leakage evidence study, p.57
[102] Carbon leakage evidence study p. 140
[103] Carbon leakage evidence study, p.75
[104] Carbon leakage evidence study, p. 124
[105] Carbon leakage evidence study p.91

In sum, the study illustrates that total energy costs are of some importance in the cost structure of energy intensive industries. However, there is no information of the isolated ETS costs, but the graph below gives an idea of the order of magnitude of carbon costs as compared to electricity prices.

Electricity prices for industrial consumers in the EU-27, excluding taxes; compared to carbon cost for electricity production



Source: Eurostat Energy Statistics, EEX, EEA, IEA.[2]

Also, given the considerable surplus of free allowances from the period 2008-2012 and the continued free allocation for the period 2013-2020, the cost impact of ETS on energy intensive industries cannot be deemed as important so far.

This view is also shared by some civil society stakeholders which draw the attention to the comparative size of other costs (labour, raw materials) compared to carbon costs.

2. Surplus of allowances from phase 2

The sectors listed below have accumulated considerable surplus of free allowances. In the ETS, each installation has to surrender a number of allowances corresponding to its emissions. The allowances allocated for free, but exceeding the emission levels are in surplus. This accumulation is due to several factors: economic crisis, improvement in energy efficiency and implies an over-allocation of the EU ETS installations, which de facto alleviates the carbon costs of the sectors in question since they can use these allowances for compliance also in the period 2013-2020.

For iron and steel sector, there is a certain degree of uncertainty as to the exact magnitude of surpluses due to the effect of waste gases, expressed with the range of value below.

NACE code	Sector	Phase 2 surplus (mio. EUAs)	Phase 2 surplus as % of Phase 2 emissions	Current value of Phase 2 surplus[106] (mio. €)
24.10	Manufacture of basic iron and steel and of ferro-alloys	~ 210-390	~ 30%-55%	~ 1775-1953
23.51	Manufacture of cement	236.9	36%	1184.4
19.20	Manufacture of refined petroleum products	64.9	9%	324.4
20.14	Manufacture of other organic basic chemicals	74.1	22%	370.5
20.15	Manufacture of fertilisers and nitrogen compounds	11.0	22%	55.4
23.52	Manufacture of lime and plaster	48.4	36%	241.8
17.12	Manufacture of paper and paperboard	48.6	36%	243.1
20.13	Manufacture of other inorganic basic chemicals	8.0	27%	39.9
24.42	Aluminium production	6.5	30%	32.7
23.13	Manufacture of hollow glass	8.7	16%	43.6
10.81	Manufacture of sugar	10.6	24%	53.1
20.11	Manufacture of industrial gases	0.7	10%	3.3
23.32	Manufacture of bricks, tiles and construction products, in baked clay	37.4	98%	187.2
19.10	Manufacture of coke oven products	0.7	2%	3.4
23.11	Manufacture of flat glass	10.0	29%	49.8
23.31	Manufacture of ceramic tiles and flags	3.7	57%	18.7
20.16	Manufacture of plastics in primary forms	3.71	20%	18.6
17.11	Manufacture of pulp	8.96	55%	44.8
10.62	Manufacture of starches and starch products	5.46	28%	27.3
24.51	Casting of iron	1.97	32%	9.8
23.99	Manufacture of other non-metallic mineral products n.e.c.	3.71	39%	18.5
16.21	Manufacture of veneer sheets and wood-based panels	9.60	84%	48.0

The figures and conclusions are confirmed by the calculations in the Carbon leakage evidence study.

[106] Calculated with a carbon price of 5 EUR

Annex III: Technical details of calculations

1. Time scope

First element is to determine the **time scope**. The principle of using best available data and the requirement of the Directive to use '*three most recent years for which data are available'* led to a choice of an average value for the period 2009-2011. The main reason dictating this choice was the availability of the GVA data – at the time of calculations (Q4 of 2013) the latest available Eurostat GVA data was for 2011. Direct emissions and trade data were available up to 2012, but for the sake of internal coherence of the exercise, they have not been taken into account. Considering data from different years in the calculations for one criterion would lead to internal discrepancies: comparing emissions generated by production for one period (eg. 2010-2012) to the gross value added generated by production in another period (eg. 2009-2011). Taking data for less than three years is not preferred either, because it may distort the picture and reduce the accuracy of the exercise, especially in times of economic volatility. Once the time scope of the cost criterion is decided, it is highly recommended to maintain the same scope also for the trade criterion. Otherwise, the situation of a sector will not be assessed objectively: costs from one period will be combined with trade from another period, not necessarily painting an accurate picture of reality.

2. Direct emissions data

As in 2009, to obtain **direct emissions data**, verified emissions per installation were taken from the EUTL for the period 2009-2011. The newly available data from the NIMs helped fill in gaps where EUTL data was missing for this period, mainly because of scope extension of the ETS from Phase 2 to Phase 3. Then, a concordance between the EUTL identifier and the NACE code of the installation was developed using the NIMs data where Member States had to report verified data, including NACE codes per installation.

3. Auctioning factor

For the calculation of the **auctioning factor** the verified emissions taken from the EUTL (and complemented by NIMs data to reflect the effect of ETS scope extension form Phase 2 to Phase 3) have been compared to the amount of basic allocation (the amount installations would receive if not on the carbon leakage list). The effect of the cross-sectoral correction factor has been taken into account.

The specific cases when there is a difference between the scope of reported emissions and the scope of allocations have also been taken into account. These cases are:

Certain waste gases from coke and steel production[107] are partly transferred to electricity and heat producers. The emissions related to the production of waste gases are reflected in the allocation of the industrial installations (coke ovens, blast furnaces, etc.), whereas the corresponding emissions are reported where they occur, i.e. by the installation receiving and burning the waste gases (in many cases CHPs)[108]. In order to estimate the actual shortage of allowances related to the relevant industrial activities (coke oven and steel production), the estimated amount of emissions transferred in the form of waste gases from industrial installations to power and heat producers have been added to the emissions reported by the steel and coke producing installations. As the exact amount of emissions transferred in the form of waste gases from industrial installations to electricity and heat producers is not known, ranges are provided for both coke and steel production.

[107] Waste gases are formed also in the chemical industry. For more information please refer to Guidance Document n°8 on the harmonized free allocation methodology for the EU-ETS post 2012

[108] In Phase 3. In Phase 2 reporting rules in certain Member States have been different, which complicates further the calculations.

Some industrial installations also produce electricity. The emissions from electricity production have to be reported by these installations, but electricity production is not eligible for free allocation, and therefore this activity is not reflected in their allocation. In order to estimate the actual shortage of allowances related to the eligible industrial activities, the estimated amount of emissions relating to electricity production have been deducted from the emissions reported by the industrial installations producing also electricity.

In the case of heat transfers, the installations receiving and using the heat are eligible for the corresponding allocation, whereas emissions have to be reported where they occur, i.e. by the heat producer in this case. In order to estimate the actual shortage of allowances related to the eligible industrial activities, the allocation based on the net heat import by industrial sectors has been deducted from the basic allocation.

Finally, the auctioning factor has been determined by the following formula:

$$AF = \frac{Allowances\ to\ purchase}{Direct\ emissions} = 1 - \frac{Basic\ allocation}{Direct\ emissions}$$

Sectoral auctioning factors have been calculated for the 24 biggest emitter sectors subject to assessment. Other sectors are not impacted by the cost criterion calculations at NACE-4 level, as either their cost to GVA ratio remains below 5% even assuming full auctioning, 30 EUR carbon price and 690 gCO2/kWh for the indirect cost calculations, or they are added to the list based on trade intensity above 30% criterion anyway.

The values are the following:

Table 15: Sectoral Auctioning factor values

NACE-4 code and sector name		AF
24.10	Manufacture of basic iron and steel and of ferro-alloys[109]	**34-48%**
23.51	Manufacture of cement	**44%**
19.20	Manufacture of refined petroleum products	**58%**
20.14	Manufacture of other organic basic chemicals	**63%**
20.15	Manufacture of fertilisers and nitrogen compounds	**72%**
06.10	Extraction of crude petroleum	**71%**
23.52	Manufacture of lime and plaster	**50%**
17.12	Manufacture of paper and paperboard	**46%**
20.13	Manufacture of other inorganic basic chemicals	**50%**
24.42	Aluminium production	**50%**
23.13	Manufacture of hollow glass	**59%**
10.81	Manufacture of sugar	**62%**
20.11	Manufacture of industrial gases	**41%**
23.32	Manufacture of bricks, tiles and construction products, in baked clay	**42%**
19.10	Manufacture of coke oven products	**66%**
23.11	Manufacture of flat glass	**55%**
23.31	Manufacture of ceramic tiles and flags	**49%**
09.90	Support activities for other mining and quarrying	**58%**
20.16	Manufacture of plastics in primary forms	**40%**
17.11	Manufacture of pulp	**46%**

[109] Range is provided because the exact amount of emissions transferred in the form of waste gases to electricity and heat producers is not known

NACE-4 code and sector name		AF
10.62	Manufacture of starches and starch products	**51%**
24.51	Casting of iron	**51%**
23.99	Manufacture of other non-metallic mineral products n.e.c.	**53%**
16.21	Manufacture of veneer sheets and wood-based panels	**0%**
	Other sectors	**50%**

4. Indirect emissions

Indirect emissions were obtained via a data collection with Member States, as done in 2009. The template requested information on electricity consumption per NACE code. The coverage of the data collection was significantly improved, amounting to ca. 70% of total indirect emissions covered. The data was thoroughly checked and several rounds of clarifications were taken with Member States, aiming to improve accuracy. The indirect emissions were converted into percentage of indirect costs with the use of the emission factor.

5. GVA

The Structural Business Statistics (SBS) as published by Eurostat is the only available source for **Gross Value Added (GVA)** of industrial sectors at NACE-4 level for all European countries.[110] This data source was also used for the 2009 carbon leakage list. A sensitivity analysis showed that the geographic coverage of GVA data does not need to be adapted to the geographic coverage of the direct emissions, i.e. there is no difference[111] if the direct emissions refer to a certain number of Member States while the GVA is the EU-28 total. This can be expected because the installations generating most GVA are usually in the scope of ETS, so there are emissions reported. On the other hand, for indirect emissions adapting the GVA scope would make more sense: since all installations consume electricity, regardless if they are in the scope of ETS and report direct emissions, it can be expected that they have associated indirect costs. Indeed, sensitivity analysis showed a bigger difference[112] and this justifies adapting the scope of GVA to indirect emissions data coverage.

6. Trade intensity

Concerning **trade intensity,** data on imports, exports and turnover can be obtained from the COMEXT database. In case of data gaps, they can be further filled with the use of SBS database. The same data sources and approach was taken also in 2009.

[110] For some countries and sectors the GVA is available to but not published by Eurostat due to confidentiality concerns (e.g. when the number of firms in the sector is very low or one firm dominating the sectors result).
[111] The differences between 'adapting' the GVA to the number of Member States reporting direct emissions and not adapting it are less than 0.2%.
[112] Difference of the range of 0.5%

Annex IV: Qualitative framework

The qualitative framework has been developed in the project 'Support to the Commission for the determination of the list of sectors and subsectors deemed to be exposed to a significant risk of carbon leakage for the years 2015-2019 (EU Emission Trading System)' by a consortium of Ecofys and Ökö institute. The work was carried in 2011-2012. Below is a short presentation of the harmonised framework.[113]

Based on the qualitative assessments carried in the past for the 2009 list and for annual additions, the consortium developed a list of 9 indicators which can be structured in a three step approach, based on the Directive's three criteria.

Step 1: The extent to which a sector will be exposed to carbon cost

The first part of the qualitative assessment would provide a further interpretation of the quantitative carbon cost ratio. Its aim is to determine the amount of carbon costs the sector actually faces. In the quantitative assessment this has been assessed already on the basis of direct emissions and indirect emissions from electricity consumption. In this step, this assessment is extended and refined by taking into account:

- *Abatement potential and associated costs:* Quantification of "the extent to which it is possible for individual installations in the sector or subsector concerned to reduce emission levels or electricity consumption, including, as appropriate, the increase in production costs that the relevant investment may entail, for instance on the basis of most efficient techniques".
- (*In)direct carbon costs from suppliers:* (In)direct costs from raw materials from supplier sectors (upstream), which are likely to be passed through to the sector being assessed. Also emission related costs from third party heat generation can be regarded in this respect. Indirect costs from electricity consumption are not intended here, as these are already included in the induced carbon cost ratio.

The first indicator may have a reducing effect on the carbon cost exposure. The second indicator may have an increasing effect on the carbon cost exposure.

Sectors that, after taking into account these indicators, still have a sufficiently high carbon cost exposure could proceed to the next step in the assessment, otherwise the carbon cost (relative to gross value added) are deemed as not significant enough for the sector to lead to a significant risk of carbon leakage.

Step 2: The extent to which a sector is able to pass these costs on to its customers

Whether or not a sector is able to pass these carbon costs on in market prices depends on various market characteristics which are assessed in this second step. The relevant market characteristics are:

- *Bargaining power of sector in value chain*: an assessment of the bargaining power of a sector within its value chain by looking at the market concentration and industry structure. This directly influences the ability of a sector to pass through costs.
- *Import intensity*: a metric for the strength of exposure to international markets and world prices, which influences the ability to pass through costs. Import intensity is to be determined by looking at the ratio of imports relative to turnover, and the development of this ratio over time. The import intensity should also be seen in conjunction with the export specialisation position, preferably over time.

[113] A full presentation of the harmonised assessment framework can be found online here http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/carbon_leakage_list_en.pdf

- *Export specialisation position*: a metric for robustness a sectors net export position over time, influencing the ability to pass through costs without risking to loose export markets. Export specialisation position is to be determined by looking at the development of the trade surplus (exports minus imports) of a sector over time and/or ratio of exports relative to turnover over time. The export specialisation position should also be seen in conjunction with the import intensity position over time.
- *Transportability:* Transport costs in relation to product value, as metric for the "local/regional" nature of a sector's market. Alternatively, since transport costs are closely related to the weight of products, transportability can be assessed by looking at the product's weight-to-value ratio as a proxy.
- *Homogeneity of produce:* A metric for degree of price competition, influencing the ability for producers to pass costs through. Homogeneous goods are physically identical, or at least seen as such by the buyer of the goods, and it is therefore difficult for a producer to distinguish themselves. Homogeneous products compete more on price and substitution of homogenous products from one producer by those of another producer is easier than in the case of highly differentiated products.

If the combined picture of these indicators provides an indication that carbon costs are hard to pass through and the sector thus needs to absorb most of it themselves, the sector could proceed to the next step of the assessment. Otherwise there is no need to go to the next step, even if carbon costs (step 1) are relatively high, since the sector can pass through a large part of the costs to its customers and is not – or to a limited extent only - affected by the costs itself.

Step 3: The extent to which the inability to pass on costs is likely to result in carbon leakage

Even if carbon costs faced by the sector are high (step 1) and the ability to pass these costs through is low (step 2), there would be no significant risk of carbon leakage if the sector can either absorb these costs e.g. because of sufficiently high profit margins, or if substitution of the product overall leads to a lower carbon footprint.

- *Cost absorption potential:* an indication of absorption capacity of additional carbon costs for a sector by looking at profit margins. This indicator could be determined by assessing two elements:

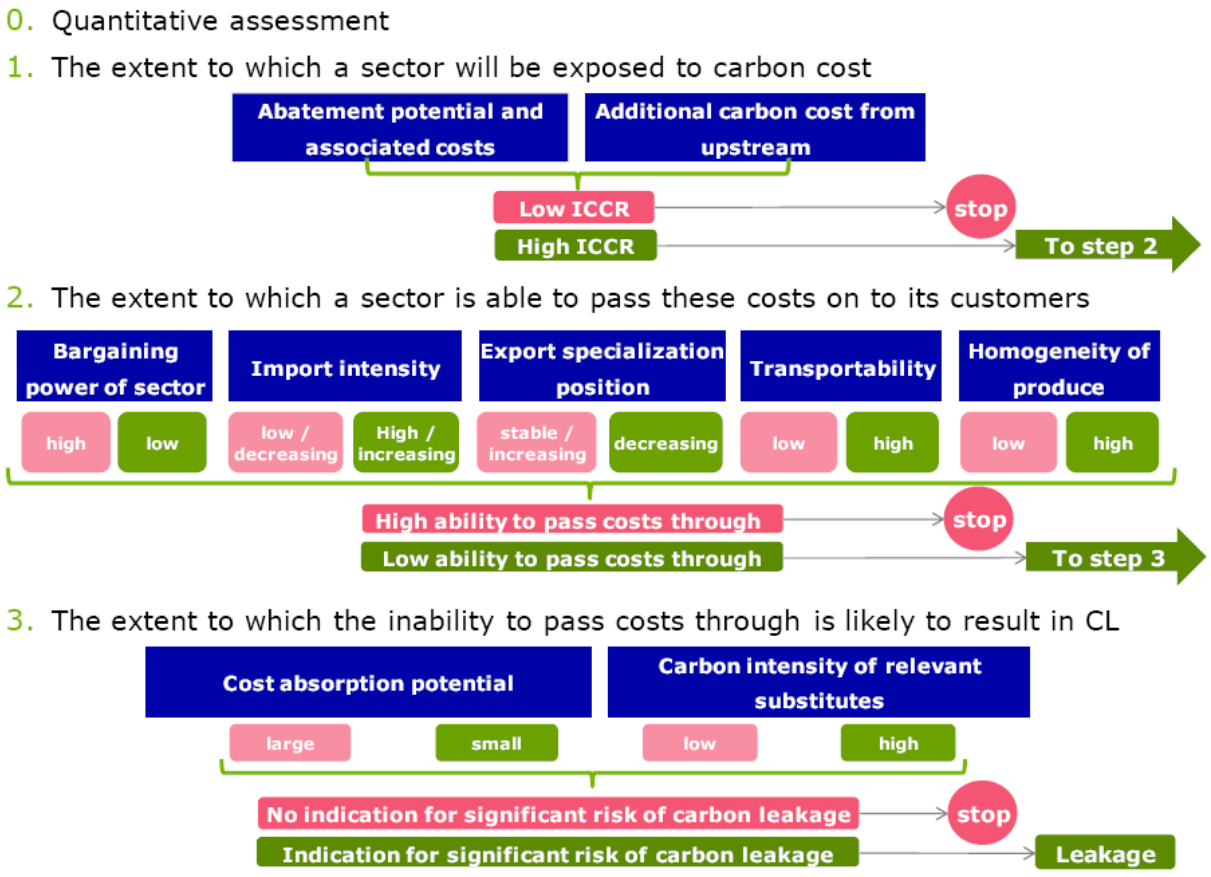
i) *Profit margins:* High profit margins can indicate the ability for a sector to absorb the costs without problems. Low profit margins can indicate lack of such ability (and can also provide an indication for strong competition of the market with low cost pass-through ability).

ii) *The share of additional carbon costs as % of profit margins*. This provides a direct relation between profit margin and the additional carbon costs faced by a sector and indicates the extent of impact and hence the risk of lower future (inward) investments, of relocation or of shutting-down.

- *Carbon intensity of likely substitutes:* This indicator assesses the carbon intensity of tradable substitutes, both from within EU and from non-EU, having the same functionality, which is relevant *if* it has been established that there is indeed a significant substitution risk.

The interrelation between the three assessment steps is depicted schematically in the picture below.

Figure 14: Visual representation of staged qualitative assessment



A summarising overview of each of the indicators under step 1, 2 and 3 is provided in the tables below.

Table 15: Schematic overview of factors determining Step 1: (In)direct carbon costs

Indicator	Indication of low impact on induced carbon cost	Indication of high impact on induced carbon cost
Abatement potential and associated costs	Low	High
Indirect carbon costs from suppliers	High	Low

Table 16: Schematic overview of factors determining Step 2: Ability to pass costs

Indicator	Indication for low ability to pass costs through	Indication for high ability to pass costs through
Bargaining power of sector in value chain	Low	High
Import intensity	High / increasing	Low / decreasing
Export specialisation position	Decreasing	Stable / Increasing
Transportability	High	Low
Homogeneity of produce	High	Low

Table 17: Schematic overview of factors determining Step 3: Extent to which this could lead to carbon leakage

Indicator	Indication for high risk to carbon leakage	Indication for low risk to carbon leakage
Cost absorption potential	Small	Large
Carbon intensity of relevant substitutes	High	Low

Annex V: Direct and Indirect carbon cost and trade intensity per NACE-4 industrial sector with preferred option 'Projections A'

The parameters of the preferred option are:

3	**Projections package A**	**sectoral AFs**	**423 g/kWh**	**16.5 €/tCO_2**	**EU-28 + EEA**	**Framework**

1. Sectors to be added to the list based on the quantitative criteria set out in paragraphs 15 (combined criterion: carbon costs above 5% and trade intensity above 10%) and 16(b) (trade criterion: trade intensity above 30%)

NACE-4	Sector	Direct Costs	Indirect Cost	Total Cost	Trade
19.10	Manufacture of coke oven products	16,1%	0,3%	16,4%	116,3%
20.14	Manufacture of other organic basic chemicals	3,8%	1,1%	4,9%	47,4%

2. Sectors to be added to the list based on the quantitative criteria set out in Article 10(a)15 (combined criterion: carbon costs above 5% and trade intensity above 10%)

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
17.12	Manufacture of paper and paperboard	1,5%	3,6%	5,1%	27,1%
19.20	Manufacture of refined petroleum products	7,0%	0,8%	7,8%	25,3%
20.15	Manufacture of fertilisers and nitrogen compounds	15,5%	1,2%	16,7%	29,5%
24.10	Manufacture of basic iron and steel and of ferro-alloys	6,0%	2,5%	8,6%	25,1%
24.42	Aluminium production	1,6%	3,8%	5,4%	30,7%

3. Sectors to be added to the list based on the quantitative criteria of Article 10(a)16b (trade criterion: trade intensity above 30%)

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
05.10	Mining of hard coal	0,0%	0,7%	0,7%	58,9%
06.10	Extraction of crude petroleum	1,1%	0,2%	1,3%	50,1%
06.20	Extraction of natural gas	0,2%	0,1%	0,3%	41,6%
07.10	Mining of iron ores			0,0%	86,3%
07.29	Mining of other non-ferrous metal ores	0,0%	1,6%	1,6%	82,8%

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
08.91	Mining of chemical and fertiliser minerals	0,1%	1,4%	1,5%	72,0%
08.99	Other mining and quarrying n.e.c.	2,1%	0,9%	3,0%	172,8%
10.20	Processing and preserving of fish, crustaceans and molluscs	0,1%	0,3%	0,4%	44,7%
10.41	Manufacture of oils and fats	0,6%	0,6%	1,2%	39,5%
10.86	Manufacture of homogenised food preparations and dietetic food	0,1%	0,3%	0,3%	34,8%
11.01	Distilling, rectifying and blending of spirits	0,1%	0,1%	0,2%	58,3%
13.10	Preparation and spinning of textile fibres	0,0%	0,9%	0,9%	41,8%
13.20	Weaving of textiles	0,0%	0,5%	0,6%	54,6%
13.91	Manufacture of knitted and crocheted fabrics	0,0%	0,4%	0,4%	60,3%
13.92	Manufacture of made-up textile articles, except apparel	0,0%	0,2%	0,2%	52,8%
13.94	Manufacture of cordage, rope, twine and netting	0,0%	0,5%	0,5%	36,4%
13.95	Manufacture of non-wovens and articles made from non-wovens, except apparel	0,1%	0,9%	1,0%	35,2%
13.96	Manufacture of other technical and industrial textiles	0,0%	0,4%	0,4%	42,1%
13.99	Manufacture of other textiles n.e.c.	0,0%	0,4%	0,4%	37,0%
14.11	Manufacture of leather clothes	0,0%	2,6%	2,6%	71,9%
14.12	Manufacture of workwear	0,0%	0,1%	0,1%	53,1%
14.13	Manufacture of other outerwear	0,0%	0,1%	0,1%	84,8%
14.14	Manufacture of underwear	0,0%	0,1%	0,1%	86,0%
14.19	Manufacture of other wearing apparel and accessories	0,0%	0,1%	0,1%	103,2%
14.20	Manufacture of articles of fur	0,0%	0,3%	0,3%	99,1%
14.31	Manufacture of knitted and crocheted hosiery	0,0%	0,3%	0,3%	44,7%
14.39	Manufacture of other knitted and crocheted apparel	0,0%	0,3%	0,3%	80,6%
15.11	Tanning and dressing of leather;dressing and dyeing of fur	0,0%	0,2%	0,2%	52,4%
15.12	Manufacture of luggage, handbags and the like, saddlery and harness	0,0%	0,1%	0,1%	88,7%

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
15.20	Manufacture of footwear	0,0%	0,1%	0,1%	68,4%
16.29	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	0,0%	0,3%	0,4%	34,3%
17.11	Manufacture of pulp	1,3%	2,9%	4,2%	47,0%
17.24	Manufacture of wallpaper	0,0%	0,4%	0,4%	48,7%
20.12	Manufacture of dyes and pigments	0,4%	0,7%	1,1%	46,9%
20.13	Manufacture of other inorganic basic chemicals	1,2%	2,2%	3,4%	57,9%
20.16	Manufacture of plastics in primary forms	0,2%	1,4%	1,6%	33,8%
20.17	Manufacture of synthetic rubber in primary forms	0,8%	1,1%	1,8%	49,9%
20.20	Manufacture of pesticides and other agrochemical products	0,1%	0,3%	0,4%	46,7%
20.42	Manufacture of perfumes and toilet preparations	0,0%	0,2%	0,2%	53,6%
20.53	Manufacture of essential oils	0,0%	0,1%	0,1%	88,0%
20.59	Manufacture of other chemical products n.e.c.	0,1%	0,3%	0,5%	55,4%
20.60	Manufacture of man-made fibres	0,7%	1,3%	2,0%	43,2%
21.10	Manufacture of basic pharmaceutical products	0,1%	0,6%	0,6%	77,0%
21.20	Manufacture of pharmaceutical preparations	0,0%	0,1%	0,1%	74,1%
22.11	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	0,2%	0,4%	0,6%	40,5%
23.19	Manufacture and processing of other glass, including technical glassware	0,3%	0,6%	0,9%	42,8%
23.20	Manufacture of refractory products	1,4%	0,5%	1,9%	43,2%
23.31	Manufacture of ceramic tiles and flags	1,9%	0,8%	2,6%	33,1%
23.41	Manufacture of ceramic household and ornamental articles	0,3%	0,3%	0,6%	64,8%
23.42	Manufacture of ceramic sanitary fixtures	0,3%	0,6%	0,8%	34,7%
23.43	Manufacture of ceramic insulators and insulating fittings	0,0%	0,8%	0,9%	45,3%
23.44	Manufacture of other technical ceramic products	0,0%	0,4%	0,4%	62,0%
23.49	Manufacture of other ceramic products	0,1%	0,5%	0,7%	41,8%

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
23.91	Production of abrasive products	0,0%	0,2%	0,2%	45,8%
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	0,2%	0,6%	0,7%	48,5%
24.41	Precious metals production	0,0%	0,6%	0,6%	113,6%
24.44	Copper production	0,3%	1,5%	1,8%	35,4%
24.45	Other non-ferrous metal production	0,1%	1,3%	1,4%	79,9%
24.46	Processing of nuclear fuel	0,3%	2,7%	3,0%	34,5%
25.40	Manufacture of weapons and ammunition	0,0%	0,1%	0,2%	79,1%
25.71	Manufacture of cutlery	0,0%	0,2%	0,2%	81,3%
25.73	Manufacture of tools	0,0%	0,2%	0,2%	44,5%
25.94	Manufacture of fasteners and screw machine products	0,0%	0,3%	0,3%	51,0%
25.99	Manufacture of other fabricated metal products n.e.c.	0,0%	0,2%	0,2%	41,7%
26.11	Manufacture of electronic components	0,0%	0,3%	0,4%	82,3%
26.12	Manufacture of loaded electronic boards	0,0%	0,2%	0,2%	37,6%
26.20	Manufacture of computers and peripheral equipment	0,0%	0,2%	0,2%	98,1%
26.30	Manufacture of communication equipment		0,2%	0,2%	92,9%
26.40	Manufacture of consumer electronics	0,0%	0,1%	0,1%	51,8%
26.51	Manufacture of instruments and appliances for measuring, testing and navigation	0,0%	0,1%	0,1%	70,9%
26.52	Manufacture of watches and clocks	0,0%	0,1%	0,1%	122,0%
26.60	Manufacture of irradiation, electromedical and electrotherapeutic equipment	0,0%	0,1%	0,1%	94,0%
26.70	Manufacture of optical instruments and photographic equipment	0,0%	0,1%	0,1%	87,0%
26.80	Manufacture of magnetic and optical media	0,0%	0,3%	0,3%	99,6%
27.11	Manufacture of electric motors, generators and transformers	0,0%	0,1%	0,1%	58,3%
27.12	Manufacture of electricity distribution and control apparatus	0,0%	0,1%	0,1%	46,5%
27.20	Manufacture of batteries and accumulators	0,0%	0,6%	0,6%	57,9%

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
27.31	Manufacture of fibre optic cables	0,0%	0,3%	0,3%	65,2%
27.32	Manufacture of other electronic and electric wires and cables	0,0%	0,4%	0,4%	33,5%
27.33	Manufacture of wiring devices	0,0%	0,1%	0,1%	57,9%
27.40	Manufacture of electric lighting equipment	0,0%	0,2%	0,2%	44,1%
27.51	Manufacture of electric domestic appliances	0,0%	0,2%	0,2%	46,1%
27.90	Manufacture of other electrical equipment	0,0%	0,2%	0,2%	59,4%
28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	0,0%	0,2%	0,2%	52,3%
28.12	Manufacture of fluid power equipment	0,0%	0,1%	0,1%	49,4%
28.13	Manufacture of other pumps and compressors	0,0%	0,1%	0,1%	66,1%
28.14	Manufacture of other taps and valves	0,0%	0,1%	0,1%	55,5%
28.15	Manufacture of bearings, gears, gearing and driving elements	0,0%	0,2%	0,2%	48,1%
28.21	Manufacture of ovens, furnaces and furnace burners	0,0%	0,1%	0,1%	71,4%
28.22	Manufacture of lifting and handling equipment	0,0%	0,1%	0,1%	42,1%
28.23	Manufacture of office machinery and equipment (except computers and peripheral equipment)	0,0%	0,2%	0,2%	113,6%
28.24	Manufacture of power-driven hand tools	0,0%	0,1%	0,1%	75,9%
28.25	Manufacture of non-domestic cooling and ventilation equipment	0,0%	0,1%	0,1%	41,7%
28.29	Manufacture of other general-purpose machinery n.e.c.	0,0%	0,1%	0,1%	60,1%
28.30	Manufacture of agricultural and forestry machinery	0,0%	0,1%	0,1%	33,8%
28.41	Manufacture of metal forming machinery	0,0%	0,1%	0,1%	56,1%
28.49	Manufacture of other machine tools	0,0%	0,1%	0,1%	55,9%
28.91	Manufacture of machinery for metallurgy	0,0%	0,2%	0,2%	49,2%
28.92	Manufacture of machinery for mining, quarrying and construction	0,0%	0,1%	0,1%	75,2%
28.93	Manufacture of machinery for food, beverage and tobacco processing	0,0%	0,1%	0,1%	49,2%
28.95	Manufacture of machinery for paper and paperboard production	0,0%	0,1%	0,1%	58,7%

NACE-4	Sector	Direct Costs	Indirect Costs	Total Costs	Trade
28.96	Manufacture of plastic and rubber machinery	0,0%	0,1%	0,1%	61,7%
28.99	Manufacture of other special-purpose machinery n.e.c.	0,0%	0,1%	0,1%	69,5%
29.10	Manufacture of motor vehicles	0,0%	0,2%	0,2%	32,7%
30.11	Building of ships and floating structures	0,0%	0,2%	0,2%	73,2%
30.12	Building of pleasure and sporting boats	0,0%	0,2%	0,2%	46,9%
30.30	Manufacture of air and spacecraft and related machinery	0,0%	0,1%	0,1%	101,5%
30.91	Manufacture of motorcycles	0,0%	0,3%	0,3%	51,5%
30.92	Manufacture of bicycles and invalid carriages	0,0%	0,1%	0,1%	53,4%
30.99	Manufacture of other transport equipment n.e.c.	0,0%	0,1%	0,1%	40,7%
32.12	Manufacture of jewellery and related articles	0,0%	0,0%	0,0%	129,0%
32.13	Manufacture of imitation jewellery and related articles	0,0%	0,0%	0,0%	85,2%
32.20	Manufacture of musical instruments	0,0%	0,1%	0,1%	83,6%
32.30	Manufacture of sports goods	0,0%	0,2%	0,2%	67,1%
32.40	Manufacture of games and toys	0,0%	0,1%	0,1%	59,1%
32.50	Manufacture of medical and dental instruments and supplies	0,0%	0,1%	0,1%	64,4%
32.91	Manufacture of brooms and brushes	0,0%	0,4%	0,4%	52,9%
32.99	Other manufacturing n.e.c.	0,0%	0,5%	0,5%	68,3%