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IMPACT ASSESSMENT

Accompanying document to the

Commission Decision on determining transitional Union-wide rules for harmonised free allocation pursuant to Article 10a of Directive 2003/87/EC

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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GLOSSARY

Term	Explanation
Allowance	Allowance to emit one tonne of carbon dioxide equivalent during a specified period, which shall be valid only for the purposes of meeting the requirements of the ETS Directive and which are transferable in accordance with the provisions of the ETS Directive.
Carbon leakage	Carbon leakage is defined as an increase in greenhouse gas emissions in third countries where industry would not be subject to comparable carbon constraints due to a shift in location of production from the EU to that third country as result of the implementation of a climate policy measure.
CITL	The Community Independent Transaction Log (CITL) records the issuance, transfer, cancellation, retirement and banking of allowances that take place in the registry.
Emission factor	Measure of the average emission rate of carbon dioxide equivalent discharged into the atmosphere by a specific fuel or process, expressed as amount of carbon dioxide equivalent per amount of fuel or product.
Emissions cap	Union-wide quantity of allowances issued each year as determined by Articles 9 and 9a of the ETS Directive.
Ex-ante benchmarks	Union-wide ex-ante benchmarks should be used, to the extent feasible, to determine the exact allocation of free allowances to each installation. Their starting point should be the average performance of the 10% most efficient installations in a sector or sub-sector in the Union in the years 2007-2008. They should also take into account the most efficient techniques, substitutes, alternative production processes, high efficiency cogeneration, efficient energy recovery of waste gases, use of biomass and capture and storage of CO_2.

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Introduction and policy context

The EU Emissions Trading Scheme (ETS) is in operation since 2005, and requires installations covered by the ETS Directive to surrender one emission allowance for each tonne of CO_2-equivalent that it emits. The total amount of allowances is limited, which creates a market price for CO_2. As an important part of limiting the costs for installations, while keeping the economic incentives to reduce emissions, the first ETS Directive provided that a large share of the allowances was to be distributed for free. This allocation was done through so-called national allocation plans, which were approved by the Commission.

On 23 April 2009 the climate-energy legislative package containing measures to fight climate change and promote renewable energy was adopted. As part of this package Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community[1] (hereafter called the Directive) provides that full auctioning shall be the rule from 2013 onwards for the power sector. For other sectors a transitional system shall be put in place for which free allocation in 2013 shall be 80% of a relevant benchmark and to be reduced to 30% in 2020. Pursuant to Article 10a (12) of the Directive, sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage shall receive 100% of benchmarked allowances throughout the whole third trading period from 2013 to 2020. The Commission Decision determining a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage[2] was adopted by the Commission on 24 December 2009 and may in this context be regarded as a first step of arriving at harmonised free allocation in the ETS.

As the second step and in accordance with Article 10a of the Directive, the Commission shall adopt Union-wide and fully-harmonised implementing measures for the transitional free allocation of allowances by 31 December 2010, which are the subject of this impact assessment. The measures shall, to the extent feasible, determine so-called ex-ante benchmarks. The ex-ante character implies that allocations must be fixed prior to the start of the third trading period. Furthermore, Article 10a (1) of the Directive stipulates that the rules for transitional free allocation shall take account of the most efficient techniques, substitutes, alternative production processes, high efficiency cogeneration, efficient energy recovery of waste gases, use of biomass and capture and storage of CO_2, where such facilities are available. According to Article 10a (2) of the Directive the starting point for the development of ex-ante benchmarks shall be the average of the 10% most efficient installations of a sector or subsector in the Union in the years 2007-2008. The so derived rules for free allocation concern the free allocation of allowances as of 2013.

According to Article 11 (1) of the Directive, the absolute number of allowances to be allocated per installation will be calculated by the Member States' competent authorities on basis of the rules for the free allocation as they will be set out in the Commission legal act. These so-called national implementation measures constitute the third step of arriving at harmonised free allocation in the ETS. Member States should publish and submit their

1 OJ L 140, 5.6.2009, p. 63-87.
2 OJ L 1, 5.1.2010, p. 10–18.

national implementing measures to the Commission by 30 September 2011. To ensure that the Member States apply the rules correctly, the Commission will check in 2011 their national implementing measures. In this context, the Commission may reject the lists of installations and their allocations as calculated by the Member States if it deems them not in line with the harmonised rules. In addition, the Commission may launch infringement procedures against any Member State deemed in breach of the harmonised rules. To help the Member States in their implementation, the Commission will provide guidance papers along with the detailed rules. In addition, a helpdesk (phone/email) has already been set up.

Under the revised Directive the annual total free allocation to non-electricity generators (industry) is limited to the share of these installations' emissions in 2005 to 2007. The total absolute number of allowances that can be allocated for free to installations in industry sectors will decline in line with the decline of the emissions cap (by 1.74% annually). If adding up all the free allowances as allocated by the Member States would lead to an overshooting of the maximum amount available, a uniform cross-sectoral correction factor will be applied in accordance with Article 10a (5) of the Directive. This factor would reduce the number of free allowances in a uniform manner across all sectors.

As the present Commission proposal has to meet the specific requirements of the Directive's provisions in Article 10a, no diverting policy options could be developed. Therefore, instead of a full impact assessment a proportionate impact assessment has been carried out focussing on methodological choices to be taken to establish transitional Union-wide rules for harmonised free allocation of emission allowances. This proportionate impact analysis explains and justifies methodological choices, and serves the purpose of transparency. Furthermore, it should be stressed that it is not the intention of the present document to duplicate the impact assessment carried out in preparation of the revision of the Directive.[3]

Planned allocation methodology

In order to understand the impact assessment it is necessary to have a general understanding of the planned allocation methodology. In short, the allocation of allowances for an installation will be calculated by multiplying a benchmark value with the historic production data of the installation, for each product falling under the definition of a product benchmark. The historic production data is the only new information obligation. In principle, production data will be needed regardless of the choice of methodological options analysed in the impact assessment.

The number of product benchmarks is expected to be around 50, and they would cover, according to preliminary estimations, around 75% of industrial emissions. The selection of product benchmarks was made in view of having a maximum amount of emissions covered, by a feasible number of product benchmarks. Criteria that were used were emissions, number of installations and homogeneity of products. This selection was done in close cooperation with the concerned industry sectors, and the current list[4] of foreseen product benchmarks is widely accepted by stakeholders.

The large majority of product benchmarks are based on benchmark curves. These benchmark curves contain the ETS installations producing the respective product and show the greenhouse gas intensity of each installation's production process leading to the respective

3 Impact assessment accompanying the proposal for Directive 2009/29/EC; SEC(2008)52.
4 See Annex I.

product, i.e. greenhouse gas emissions in tonnes of CO_2-equivalent per unit of produced product. In cases where only insufficient data for the construction of a benchmark curve was available although the development of a product benchmark appeared appropriate, the product benchmark is based on best available technology (BAT). A so-called CO_2 weighted tonne (CWT) approach is foreseen for the refinery and some of the chemical industries due to the respective industries' highly complex production processes with numerous products and links between individual processes.

If an installation also produces products not covered by a product benchmark, additional allowances will be provided based on heat or fuel use for those products (so-called fallback approaches). For the latter, it will also be possible to get allocation for process emissions (not related to energy use). Process emissions are already included in the product benchmarks, but not in the heat or fuel benchmarks.

There are thus four allocation methods. Product benchmarks, and three fallback approaches: fuel benchmark, heat benchmark, and process emissions (grandfathered). In cases where installations produce both products covered by product benchmarks and products falling under one or several of the fallback approaches, allowances are allocated, pro rata, on the basis of each applicable allocation method.

There may also be a number of additional factors applied to the allocation formula, such as a carbon leakage factor, a linear reduction factor, and the cross-sectoral correction factor. The application of these factors is determined by the Directive, and they are therefore not analysed in this impact assessment.

1.2. Services involved and external expertise

This impact assessment was drafted by DG CLIMA. In preparation of the implementing measure, frequent meetings with Member States' experts took place since February 2009. Furthermore, two inter-service meetings were held to consult the relevant Commission services (including DG COMP, ECFIN, EMPL, ENER, ENTR, ENV, SJ, TAXUD, and SG) on 5 May 2010 and 7 June 2010. In addition, DG ENTR participated in a large number of meetings with stakeholders and with Member States' experts.

In its work on this impact assessment, the Commission drew upon a study commissioned for this purpose and carried out by Entec.[5] The results of this study serve as a basis for this impact assessment.

1.3. Stakeholder consultation

Articles 10a (1) and 10a (2) of the Directive explicitly foresee that the Commission is to consult the relevant stakeholders, including the sectors and subsectors concerned. Over the course of the work on this implementing measure, the Commission has continuously consulted numerous stakeholders, such as industry (including all relevant EU-level sector associations directly affected by the ETS), NGOs, Member States' representatives, European Parliament representatives and academics. Consultations were carried out through the following fora:

5 "Study on impact of implementing measures for harmonised rules for free allocation in the EU ETS", Entec and Cambridge Econometrics, May 2010.

- In 2009 and 2010 the Commission held five large stakeholder meetings (on 30 March 2009, 6 November 2009, 17 March 2010, 20 May 2010, and 1 July 2010) on the subject of benchmarking and allocation rules. The consultations took place in the framework of the Working Group on the review of the EU Emissions Trading Scheme, set up in the context of the European Climate Change Programme (ECCP), which was broadened to include more than 50 industry and NGO stakeholders.

  Each of these large stakeholder meetings involved some 100 participants and gave stakeholders the opportunity to present and discuss their views. The presentations given, lists of participants, and conclusions of the workshops have been published on the Commission's website.[6]

- In addition, DG CLIMA has been in a constant bilateral dialogue with stakeholders since early 2009. When necessary, there were also dialogues with national associations and companies. To date some 100 bilateral meetings with stakeholders were held in order to ensure in-depth consultation of their specific views.

- Furthermore, various stakeholders provided written comments and input.

Overall, among stakeholders there is a high degree of acceptance of the general methodology used in the work on the allocation rules. This includes the application of product based benchmarks where feasible and a hierarchy of so-called fallback approaches for non-benchmarked products.

Furthermore, the general approach of 'one product – one benchmark' is accepted by most stakeholders. This key issue implies that no separate benchmarks are foreseen for production of the same product using different technologies or different fuels. Some industry stakeholders (e.g. sugar sector) and a few Member States with a relatively high share of coal use, however, are in favour of fuel-specific approaches and seek higher levels of free allocation for coal-using installations. As the Directive foresees the benchmarks to be calculated for products rather than for inputs, however, fuel-specific product benchmarks were not considered.

Regarding the period for historic production data, most stakeholders argue that the year 2009 should not be included. Various options for the determination of a period for historic production data, with and without the year 2009, are analysed in this impact assessment (see section 5.1).

While the application of fallback approaches in general is widely accepted, conflicting positions have been expressed concerning their specific design options, such as the reference fuels of the heat and fuel benchmarks, the efficiency value for the heat benchmark or the application of a reduction factor for grandfathered process emissions.

Those sectors most affected by the choice of heat benchmark value, such as the district heating sector and other sectors covered by the ETS due to their fuel combustion activity argue that an efficiency value of 93% is unrealistic and advocate a less ambitious value. Options for the heat benchmark value are analysed in this impact assessment (see section 5.2).

[6] http://ec.europa.eu/environment/climat/emission/benchmarking_en.htm.

As regards the fuel benchmarks, setting the reference at the emission factor of natural gas seems accepted by most stakeholders. Options for the fuel benchmark value are analysed in this impact assessment (see section 5.3).

Given their relatively high share of process emissions subject to grandfathering, the non-ferrous metals and ceramics sectors argue against the application of a grandfathering proportionality factor. Options for this factor are analysed in this impact assessment (see section 5.4).

Regarding the treatment of waste gases the iron and steel industry and parts of the chemicals industry argue for 100% free allowances allocated for waste gases, whether or not flared or used for electricity or heat production. Other stakeholder groups do not support this claim. Options for waste gases are analysed in this impact assessment (see section 5.5).

All stakeholder comments have been considered and assessed in detail.

2. PROBLEM DEFINITION

The analysis of the first phase of the ETS[7] identified a lack of a level playing field for operators in the ETS which resulted in different levels of ambition of the ETS sector in Member States and subsequently different levels of ambition for sectors and different allocation levels for similar installations. As a result, distortions of competition between Member States' trading sectors and also within sectors occurred, entailing a perception of unfairness. As the harmonised approach for the allocation of allowances has been introduced by the Directive, it can be considered as proportionate and in line with the principle of subsidiarity as such harmonised approaches can only be defined at European level. As a consequence, Article 10a of the revised Directive foresees Union-wide rules for harmonised free allocation, which shall be adopted by the Commission.

The Directive contains a number of key parameters which the Commission is to follow in its Decision. This includes the principle of the benchmarks' ex-ante character. In addition, Article 10a (1) of the Directive stipulates that the Commission shall determine, to the extent feasible, Union-wide ex-ante benchmarks so as to ensure that allocation takes place in a manner that provides incentives for reductions in greenhouse gas emissions and energy efficient techniques. Furthermore, the measures shall take account of the most efficient techniques, substitutes, alternative production processes, high efficiency cogeneration, efficient energy recovery of waste gases, use of biomass and capture and storage of CO_2, where such facilities are available. Moreover, no incentives to increase emissions shall be provided. Finally, benchmarks are to be calculated for products rather than for inputs, in order to maximise greenhouse gas emissions reductions and energy efficiency savings throughout each production process of the sector or the subsector concerned.

Article 10a (2) of the Directive stipulates that, in defining the principles for setting ex-ante benchmarks in individual sectors or subsectors, the starting point shall be the average performance of the 10% most efficient installations in a sector or subsector in the Union in the years 2007-2008.

[7] Impact assessment accompanying the proposal for Directive 2009/29/EC; SEC(2008)52.

It should be recalled that Article 10a of the Directive requires the relevant implementing measures to be of Union-wide and fully harmonised character.

In terms of incentive, it is clear that the ETS in itself provides incentives to reduce greenhouse gases, independently of the allocation methods, via the mechanism of the carbon price that is determined through the overall emissions cap and the scarcity created through this limited supply. As a consequence, also the economic, social and environmental impacts are predetermined to some extent. Nevertheless, the allocation of allowances undeniably also has an impact on behaviour of operators, since in case of full allocation or even over-allocation, the pressure to take action and reduce emissions will be rather limited. Inversely, pressure to reduce emissions will be stronger in case a company is faced with the need to buy a significant share of allowances to cover its emissions. The incentive effect is even more evident for new installations, since the allocation methodology could impact on how a new installation is designed.

3. OBJECTIVES

The general objective is to achieve the EU climate objective of limiting global average temperature increase to not more than 2 degrees Celsius above pre-industrial level. Internal EU action against climate change was translated into an internal greenhouse gas reduction target as adopted in the Climate and Energy Package[8] and included in the headline targets of the Europe 2020 Strategy.

The specific objective is to implement the relevant provisions of the Directive 2003/87/EC, which requires the Commission to adopt measures to allow for harmonised free allocation of emission allowances (i.e. benchmarks should be calculated for products rather than inputs, measures should avoid distortions of competition).

The operational objectives include the provision of incentives to maximise greenhouse gas emissions reductions (in particular for newly covered installations), ensuring fairness between covered installations, and the efficient use of public resources. This implies e.g. that there should be no over-allocation for the majority of installations in a given sector.

4. METHODOLOGICAL OPTIONS

The Directive contains a number of clear parameters which the Commission is to follow in its Decision (see problem definition in section 2). Some issues concerning the methodology were identified where the Directive leaves room for methodological choices to be made.

Since the Directive is very clear on the determination of the starting point for setting ex-ante benchmarks[9], the product benchmarks are established through a fact-based data collection leaving no room for discretion. The Directive, however, does not specify the period for

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8 Relevant parts of the package are Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community and Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

9 According to Article 10a (2) of the Directive the starting point for the development of ex-ante benchmarks shall be the average of the 10% most efficient installations of a sector or subsector in the Union in the years 2007-2008.

historic production data, which forms an important part in determining the level of free allocation per installation[10]. Moreover, the Directive does not set out the specific design of any alternative allocation methods in case product benchmarks are not feasible, which is expected to concern a significant share of overall emissions eligible for free allocation. Furthermore, the Directive leaves room for choices to be made with regard to the taking account of waste gases.

As a consequence, these key issues are presented in the following sections. Subsequently, the baseline will be defined against which the methodological options under consideration will be compared.

4.1. Key issues and options

4.1.1. Key issue: Period for historic production data

Defining a period for historic production data is necessary for calculating the amount of free allowances per installation. Applying production data with relatively high levels of production will lead to relatively higher levels of allocation, and vice versa. This period should be representative of industry cycles as far as possible and should cover a relevant period where good quality data is available. Issues that may be taken into account in determining the period include the economic downturn and special circumstances, such as temporary closure of installations due to force majeure. This leaves room for a number of options:

(a) 2005-2009 (median)

The historic production level is expressed as median of the years 2005, 2006, 2007, 2008 and 2009, which is the middle value out of the five production figures for each installation.

(b) 2007-2008 (average)

Production data is averaged across 2007 and 2008. This period is consistent with the period for the development of ex-ante benchmarks[11]. The year 2008 might include some effects of the economic crisis.

(c) 2005-2008 (average)

Production data is averaged across 2005, 2006, 2007 and 2008. This is a relatively long period, which covers a mixture of pre-crisis and crisis data.

(d) 2005-2008 (average minus minimum performing year)

Production data is averaged across 2005, 2006, 2007 and 2008 but the minimum performing year, for the respective installation, is taken out of the average. This is as option (c), except with the exclusion of the year of lowest activity in calculating the average.

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[10] The individual level of free allocation per installation is determined, in principle, by multiplying the respective benchmark values by that installation's historic production data.

[11] According to Article 10a (2) of the Directive the starting point for the development of ex-ante benchmarks shall be the average of the 10% most efficient installations of a sector or subsector in the Union in the years 2007-2008.

(e) 2005-2009 (average minus minimum performing year)

Production data is averaged across 2005, 2006, 2007, 2008 and 2009, but the minimum performing year, for the respective installation, is taken out of the average. This is as option (d), except that it includes the most recent year, which for many installations was a year of low production levels.

A lack of relevant data, due to the fact that operators were until now not required to report production data, prevents all options from being assessed at detailed level (i.e. at installation level). However, a sector-level analysis is possible. A potential option of taking the average of the years 2005-2007 would for most sectors lead to very similar results in terms of total free allocation as option (d) and is therefore not considered as separate option. Due to the fact that 2010 production data is not yet available, it was not feasible to specifically analyse any relevant impacts and to include this year in the options (a) and (e).

4.1.2. Key issue: Heat benchmark value

Where the development of a product benchmark is not feasible, a hierarchy of fallback approaches is applicable. The first of the fallback approaches is the heat benchmark. It is applicable for combustion processes where a measurable heat carrier is used in a production process. A heat carrier could be steam, hot water, hot oil etc. In this way the heat energy is analogous to a product.

The heat benchmark is defined as CO_2 emissions per unit of heat production (t CO_2/ TJ heat). The amount of heat produced is dependent, inter alia, on the efficiency of the heat production system (e.g. a boiler) and the emission factor of the fuel used. The methodological option chosen should reflect a similar level of stringency as the general approach provided for by the Directive, i.e. the average of the 10% most efficient installations. A number of options for determining the value of the heat benchmark may be considered.

(a) 60.3 t CO_2/ TJ

This approach represents the most energy efficient technology available (natural gas and efficiency of 93%). It would also represent a somewhat lower efficiency combined with a fuel mix of natural gas and a share of biomass (e.g. efficiency of 90% and biomass share of 3.3%), or a lower efficiency combined with the emission factor of natural gas and a certain share of heat produced in installations using CHP (e.g. boiler efficiency of 90% and CHP share in heat production of about 9%).

(b) 62.3 t CO_2/ TJ

This approach represents widely used energy efficient technology (natural gas and efficiency of 90%). Although not considered best available technology, an efficiency value of 90% would be consistent with Commission Decision 2007/74/EC establishing harmonised efficiency reference values for separate production of electricity and heat in the application of Directive 2004/8/EC on the promotion of cogeneration.[12]

[12] OJ L 32, 6.2.2007, p. 183-188.

(c) 0 t CO_2/ TJ

Numerous installations can in principle generate heat using biomass as a fuel. The Directive stipulates in Annex IV that the emission factor for biomass shall be zero. In case these installations do not use fossil fuels for start-up and shut-down only (e.g. using fossil fuel for peak load), they are included in the EU ETS[13]. The most efficient of those installations would have specific greenhouse gas emissions close to 0 t CO_2 / TJ heat. Therefore, it may be argued that the use of biomass is the most greenhouse gas efficient means of generating heat and that a heat benchmark value should be 0 t CO_2 / TJ heat.

(d) 75.2 t CO_2/ TJ

A heat benchmark value could in theory be developed using the average fuel mix and the average heat generating system efficiency of all ETS installations. The value 75.2 t CO_2/ TJ was estimated with the help of a fuel use curve, emission factors of different fuels and assumed average boiler efficiencies of 70% for solid fuels, 80% for liquid and gas.

(e) 6.4 t CO_2/ TJ

A heat benchmark value could be calculated using the average of ETS installations with the 10% most greenhouse gas efficient heat production. The value 6.4 t CO_2/ TJ was estimated with the help of a fuel use curve, emission factors of different fuels and assumed above average boiler efficiencies of 80% for primary solid biomass and waste gases, i.e. the fuels consumed by these installations.

(f) 56.1 t CO_2/ TJ

This approach represents widely used energy efficient technology (natural gas and efficiency of 90%), but reduced by 10% taking into account an expected increase in the use of biomass/renewable energy and improved efficiency in heat production and heat use until 2020[14]. An efficiency value of 90% would be consistent with Commission Decision 2007/74/EC establishing harmonised efficiency reference values for separate production of electricity and heat in the application of Directive 2004/8/EC on the promotion of cogeneration.[15]

Option (d) is – other than the options (a), (b), (c), (e) and (f) – based on average performance and is therefore not consistent with the general benchmark setting principles. Option (d) is, however, included to compare the impact of more consistent options against actual performance.

A heat benchmark based on coal would set the benchmark at the level of poor greenhouse gas performance, which would lead to significant over-allocation for the large majority of concerned installations and would therefore lead to an inefficient use of public resources and

13 See Guidance on Interpretation of Annex I of the EU ETS Directive (18 March 2010).

14 The climate and energy package of 2008 foresees that the EU's use of renewable energy shall increase to 20% and that energy efficiency shall improve by 20% compared to 1990 levels. Therefore, a 10% reduction in the benchmark, combining these two elements, was considered appropriate.

15 OJ L 32, 6.2.2007, p. 183-188.

reduce incentives for reductions in greenhouse gas emissions. Furthermore, such a high heat benchmark would increase the likelihood of the application of the cross-sectoral correction factor, and therefore lead to less allocation to installations covered by product benchmarks. Therefore, such an option is not considered.

4.1.3. Key issue: Fuel benchmark value

The second of the fallback approaches is the fuel benchmark. It is applicable for combustion processes where there is no intermediary heat carrier and where the combustion and heat consuming processes are combined (e.g. gas turbines, furnaces and direct fired dryers). In this way the energy content of the fuel input is regarded as the benchmarked product. The reason why a heat benchmark is used where there is a measurable heat carrier is that the allocation would not only take into account the fuel use but also the efficiency of the boiler.

The fuel benchmark is defined as CO_2 emissions per unit of fuel consumption (t CO_2/ TJ fuel). A number of options for determining the value of the fuel benchmark may be considered.

(a) 56.1 t CO_2/ TJ

A fuel benchmark based on natural gas would represent the most commonly used fuel.

(b) 0 t CO_2/ TJ

Numerous installations can in principle combust biomass fuel. As the Directive stipulates in Annex IV that the emission factor for biomass shall be zero, biomass would be the most greenhouse gas efficient fuel. In case these installations do not use fossil fuels for start-up and shut-down only (e.g. using fossil fuel for peak load), they are included in the EU ETS. Using the average of ETS installations with the 10% most greenhouse gas efficient fuel mix would lead to a low value, close to 0 t CO_2/ TJ.

(c) 58.5 t CO_2/ TJ

A fuel benchmark value could be developed using the average fuel mix of all ETS installations. The value 58.5 t CO_2/ TJ was estimated with the help of a fuel use curve and emission factors of different fuels.

(d) 50.5 t CO_2/ TJ

A fuel benchmark based on natural gas, reduced by 10% taking into account an expected increase in the use of biomass/renewable energy and improved efficiency in fuel combustion and fuel use until 2020 would represent the most commonly used fuel in combination with foreseen energy efficiency improvements in the EU[16].

Although option (c) is based on average performance and is therefore not consistent with the principle to provide an incentive for reductions in greenhouse gas emissions that underlies the development of product benchmarks for other activities, this option is included to compare the impact of more consistent options against actual performance. Options (a), (b) and (d) reflect,

16 The climate and energy package of 2008 foresees that the EU's use of renewable energy shall increase to 20% and that energy efficiency shall improve by 20% compared to 1990 levels.

to varying levels of stringency, the Directive's incentives for greenhouse gas efficient activities.

A fuel benchmark based on coal would set the benchmark at the level of poor greenhouse gas performance, which would lead to significant over-allocation for the large majority of concerned installations and would therefore lead to inefficient use of public resources and reduce incentives for reductions in greenhouse gas emissions. Furthermore, such a high fuel benchmark would increase the likelihood of the application of the cross-sectoral correction factor, and therefore lead to less allocation to installations covered by product benchmarks. Therefore, such an option is not considered.

4.1.4. Key issue: Grandfathering proportionality factor

Grandfathering (allocation based on historic emissions) has been an important allocation approach for the two first trading periods. However, this allocation method does not reward early movers, and instead rewards high emitting installations. Therefore, this method should only be used in case no other allocation method is feasible. This is the case for process emissions linked to installations covered by the heat and fuel benchmarks.

In this context, it can be argued that the four different allocation methods (product benchmarks, heat benchmark, fuel benchmark, grandfathering for process emissions) should result in a comparable allocation rate in terms of free allocation per amount of historical emissions. Full grandfathering (i.e. based on 100% of historic emissions) of allowances, which is foreseen for process emissions that are not covered by product benchmarks, does not reflect a similar level of stringency as the general approach provided for by the Directive, i.e. the average of the 10% most efficient installations. It should be noted that all installations subject to this form of allocation also will have allocation from heat or fuel benchmark.

Since most process emissions are to some extent avoidable, a reduction factor for grandfathered process emissions may be envisaged to ensure that allocation of process emissions based on grandfathering amounts to less than 100% of the historical emissions to level out the difference in allocation rate compared to installations covered by product, heat or fuel benchmarks which would on average not receive 100% of historical emissions.

As for stationary installations the Directive neither foresees grandfathering as an allocation method, nor a grandfathering proportionality factor or any value, there is room for a number of options:

(a) No grandfathering proportionality factor

No grandfathering proportionality factor is applied.

(b) Based on installation's reduction potential

A grandfathering proportionality factor is based on an assessment of the individual installation's greenhouse gas reduction potential.

(c) Based on installation's reduction potential (sector-specific)

A grandfathering proportionality factor is based on a sector-wide assessment of the greenhouse gas reduction potential of all installations in that sector.

(d) Harmonised factor of 11.31% for all sectors

A harmonised grandfathering proportionality factor could be applied to all sectors. The factor used in this impact assessment is based on Article 9 of the Directive and constitutes a reduction of 11.31%.[17]

An analysis of option (b) requires a detailed assessment of the greenhouse gas reduction potential of each individual installation. Also option (c) would in principle require such information. Moreover, the required data for heat production, fuel consumption, process emissions, and the specific reduction potentials related to each process step are not sufficiently available at this point in time. Therefore, an assessment of the options (b) and (c) is not feasible within the scope of this impact assessment.

As a result, the options (a) and (d) are further analysed in this impact assessment.

4.1.5. Key issue: Waste gases

In some installations carbon-containing waste gases are generated as a direct result of the industrial production process and can to some extent be regarded as unavoidable[18]. They need to be burnt due to their toxic content (e.g. carbon monoxide), but also have an intrinsic value as a fuel to be used for in-house or outsourced production of heat and/or electricity. Since waste gases from the industrial production process can be used to generate heat or electricity, in the same or in a different installation, a coherent methodology for the benchmark setting needs to be decided.

This first implies assigning the emissions from waste gases to the industrial production process and the heat and/or electricity producing processes to be able to create a benchmark curve. Secondly, after the benchmark value has been determined, the rules for calculating allocation per installation need to be determined.

One key issue is that the Directive foresees no free allocation for electricity production, except for electricity produced from waste gases. However, while the Directive stipulates that undue distortions of competition on the market for electricity should be avoided, it does not specify the extent to which electricity produced from waste gases should be allocated free allowances.

A number of options are conceivable:

(a) Full allocation to the waste gas producer

For the development of the respective product benchmark the waste gas producer is assigned emissions for 100% of the carbon content of the waste gases regardless if and how the waste gas is used. Allocation to the waste gas producer is granted based on this product benchmark and the allocation includes emissions from flared waste gases.

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[17] The starting point for the calculation of the grandfathering proportionality factor is 2010 as mid-point of the period 2008-2012. For 2013 the reduction would be 5.22% below the starting value and for 2020 it would be 17.40% leading to an average of 11.31% below the 2010 level.

[18] In most cases, these waste gases can be avoided or reduced in their amount by application of alternative production technologies.

The waste gas user is assigned no allowances for waste gases burned.

(b) Allocation to both the user and producer of waste gas (with deduction for electricity production with natural gas as reference fuel)

For the development of the respective product benchmark the waste gas producer is assigned emissions for 100% of the carbon content of the waste gas minus the carbon content of the substituted fuel (which would otherwise be combusted by the waste gas user to produce the same amount of heat or electricity).

For this deduction, natural gas is used as reference fuel, since natural gas and waste gas are often exchangeable in the combustion process (and to ensure consistency with the allocation to the waste gas user based on the heat benchmark, see following paragraph). The waste gas producer is then allocated allowances based on the product benchmark developed applying this approach; however no free allocation is granted for emissions related to flaring of waste gas as this does not constitute an energy recovery.

The waste gas user is allocated allowances for waste gases used for heat production based on the heat benchmark, in the same way as any heat production.

(c) Allocation to both the user and producer of waste gas (with deduction for electricity production with coal as reference fuel)

This option behaves as option (b), except that coal is used as substituted fuel, since coal constitutes at times the marginal price setting fuel for electricity generation influencing the inherent carbon price of electricity from which all electricity production benefits, including electricity production from waste gases.

Potential options foreseeing a deduction of the carbon content of the substituted fuel but allocating these deduced allowances not only to heat producers but also to electricity producers lead to similar results in terms of total free allocation as option (a) and are therefore not considered as separate options.

4.2. Baseline

As in all impact assessments there is a need to specify the baseline against which the methodological options are compared. In light of the obligation to adopt Union-wide and fully harmonised measures for free allocation laid down in Article 10a of the Directive, taking no further action is not a valid option and therefore a 'business as usual' scenario cannot be used as baseline for this impact assessment.

In order to compare the impacts of the different options under each key issue, the other parts of the methodology need to be kept stable. Therefore, the approach used in this impact assessment is to select one of the options under each key issue as a reference. These preselected options combined form a reference scenario, which is used for the impact analysis. The impacts of the other options under each key issue will then be assessed in relative terms compared to the reference scenario.

The selection of options is based on an a priori screening of relevant provisions in the Directive, taking into account a mix of stakeholder views. Since the sole purpose of selecting an option as a reference is to have a reference point for comparing the different options, this approach does not constitute any indication of preference. The reference scenario used consists of the following options:

– Period for historic production data option (b): 2007-2008 (average)

– Heat benchmark value option (a): 60.3 t CO_2/ TJ

– Fuel benchmark value option (a): 56.1 t CO_2/ TJ

– Grandfathering proportionality factor option (a): No grandfathering proportionality factor

– Waste gases option (a): Full allocation to the waste gas producer

The impacts of the reference scenario and of the alternative options will be shown as estimates evaluated against the current regulatory position, i.e. the second trading period under the ETS. The following variables and assumptions were used:

1. In accordance with the latest projections as set out in the Commission Communication on Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage[19], an allowance price of €16 is assumed for the calculation of impacts. Given this allowance price was projected for 2020 and considering the current allowance price, this figure is assumed for the entire third trading period. However, it should be underlined that installations may be able to reduce emissions at a lower cost by engaging in abatement. **As a result, this assessment estimates the theoretical maximum operating costs, at an allowance price of €16**. It should be noted that the allowance price and the economic impacts are characterised by a linear relationship.

2. The emissions inventory used consists of emissions registered in the CITL in the years 2005-2008 and covers all sectors regulated during the second trading period. Installations in Norway are also included in the database. Installations in Malta and Cyprus are not included, since no sector classifications were available. Coverage of installations in Romania and Bulgaria starts in the year 2007, when these Member States acceded to the EU.

3. As the uniform cross-sectoral correction factor pursuant to Article 10a (5) cannot be determined before the actual allocations have been completed, this factor is assumed to be 1[20]. This assumption has a significant impact on the economic impacts, as in case of the application of the uniform cross-sectoral correction factor, the total amount of free allocation is independent of any of the methodological choices analysed in this impact assessment. The proportional differences between the impacts of the methodological choices, however, will remain similar over time. **As a result, this impact assessment provides estimates on the theoretical maximum economic impacts**.

4. The assessment is conducted for the year 2013 only, as although the absolute impacts of the third trading period will vary over time due to the decline of the cap and the

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19 SEC(2010)650, p. 4.

20 This means that the number of allowances to be distributed for free is assumed to stay below the amount available according to Article 10a (5) of the Directive.

reduction of free allocation for sectors and subsectors not deemed to be exposed to a significant risk of carbon leakage, the proportional differences between the impacts of the methodological choices will remain similar over time.

5. 2007 emissions data is used to approximate emissions for the year 2013[21]. Using emissions as a proxy for industrial economic activity, this implies the assumption that the emissions intensity of industrial production in 2013 will remain constant at 2007 levels and not improve over time. **Due to this conservative assumption, the economic impacts presented in this impact assessment may be overstated.**

5. ANALYSIS OF IMPACTS

This section analyses the likely economic, social and environmental impacts of the various options under each key issue. The economic impacts are based on modelling results using E3ME, a computer-based econometric model of Europe's economic and energy systems and the environment. It is similar in structure to the E3MG model at the global level used for the analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage[22] (see Annex II for more detail).

The impacts presented in the following constitute the most significant modelling results. The full results of the modelling can be found in the study carried out in preparation of this impact assessment.

5.1. Key issue: Period for historic production data

Table 1: List of analysed options for the period for historic production data

Methodological option	Reference scenario option
(a) 2005-2009 (median)	
(b) 2007-2008 (average)	✓
(c) 2005-2008 (average)	
(d) 2005-2008 (average minus minimum performing year)	
(e) 2005-2009 (average minus minimum performing year)	

Economic impacts

In general terms, the period for historic production data has an impact on operating costs as the allocation is dependant, inter alia, on installations' production rate during that period. The choice of period will, in principle, reflect the level of production activity at the installation.

By selecting a short period, such as option (b), there is a risk that these will not necessarily be representative activity years. While the impacts of the period chosen are relatively indifferent for installations with stable activity levels, the period may on the whole reflect only a small proportion of industries' economic cycles or be significantly influenced by a period of high or

21 The use of the year 2007 does not prejudge its representativeness for 2013 onwards.
22 http://ec.europa.eu/environment/climat/future_action_com.htm.

low capacity utilisation. An interruption of production at an installation in either of the two years would have a relatively large impact on the average production level. Using option (b) is therefore likely to lead to unrepresentative results. Selecting a longer period instead would, generally speaking, take into account variations in capacity utilisation to a larger extent.

Selecting a period which only covers years of high or above average capacity utilisation (which is likely to be the case in the boom years 2006 and 2007), such as in options (c) and (d), could lead to over-allocation of free allowances, if economic activity during the third trading period does not permanently stay at the level of activity of the period for historic production data. Likewise, selecting a period exclusively subject to a general downturn in economic activity (e.g. 2008-2009) would have the opposite effect, if economic activity during the third trading period exceeds activity during the period for historic production data.

Option (d) is expected to have the highest level of activity among all the options, as it excludes the minimum year but, other than option (e), does not include the year 2009, where overall emissions were significantly lower due to the recession. These two options would also increase the free allocation at a sectoral level, which in turn reduces operating costs for all sectors. Using the median of a relatively long period of years, as in option (a), would yield a more robust level of production activity in terms of outliers and unknown or skewed distributions of the sample. Under this option the level of production activity would not be influenced by any extremes and otherwise lead to overall results close to option (e), but with a higher level of stability for individual installations. For options (a) and (e) it would also, in principle, be possible to include 2010 data in the allocation phase, since this data should be available early 2011, when the Member States will calculate the allocation to each installation. Increasing the length of the period will provide a more stable base for the calculations, although more precise estimates on the expected effects are of course not possible to be determined at the current stage.

By having a mechanism for dropping the lowest activity data for a particular year, such as in options (d) and (e), and effectively doing so by disregarding the lowest and the highest activity data as in option (a), there is a higher chance of not including a year in which an unexpected shutdown has occurred. Such options would reduce the risk of installations having undergone maintenance or complete shutdown during the period for historic production data from suffering a competitive disadvantage in comparison to other installations in the sector that have not undergone maintenance.

At the same time, it should be noted that planned downtime, e.g. due to maintenance, is likely to lead to production being covered by another installation owned by the same company. Therefore, the effects of such situations may even out on company-level and an exclusion of a year with low production may be questioned. It may in fact be argued that in case a year with low production can be excluded, a year with high production should be discarded as well to avoid bias.

Furthermore, the use of such options may not necessarily lead to a representative period for historic production data, if shutdowns typically occur on a given cycle that would reoccur in the third trading period. Consequently, it may be argued that maintenance and shutdowns are phenomena that are likely to reoccur over the course of the 8-year third trading period and therefore should be part of a representative period for historic production data. Otherwise an unduly optimistic impression of production may be given and installations may continue to receive free allowances while having lower or even no emissions during maintenance or shutdowns.

Relative to the reference scenario, the estimated overall amount of free allocation would decrease by 0.8% in case of option (a). Option (c) would imply a 0.2% increase. Under option (d) an increase of 5.1% could be expected and option (e) would lead to an increase of 2.9%. Consequently, option (d) would involve the highest increased risk of the application of the cross-sectoral correction factor. At the same time, it should be noted that these figures are no indicator for the levels of free allocation for individual installations.

In this context, it should be underlined that those options leading to less free allowances being allocated overall, such as options (a), (b) and (c), will entail higher auctioning revenues. This in turn, may have positive economic effects depending on the use of the auctioning revenues by the Member States.

Those Member States, sectors and installations which have experienced a positive economic growth trend in a relevant period will benefit from a period for historic production data that includes more recent years. Inversely, those Member States with a negative economic growth trend in a relevant period will benefit from a period for historic production data that excludes more recent years. For example, the manufacturing sectors in the Member States that experienced the highest growth rates in the EU in the years 2005-2010 are likely to benefit most from a period for historic production data that includes more recent years.

Relative to the reference scenario, only minor differences of the impact on consumer prices (increases of not more than 0.16%), change in consumption (decrease of not more than 0.005%) and the macroeconomic environment (increase in GDP of 0.003% under option (c), decrease in GDP of around 0.001% under options (d) and (e)) could be observed between the options.

In case of the application of the cross-sectoral correction factor, the total amount of free allocation is independent of the choice of period for historic production data. As a result, there would be no difference in the impact of the options on GDP, consumer prices, and household consumption. However, significant differences in free allocation to individual installations can not be excluded, in particular for options (b) and (c), if during the period for historic production data, shutdowns or other unexpected incidents occurred in these installations. The choice of a robust statistical indicator could reduce such impacts.

Compared to the reference scenario, administrative burdens on business and public authorities would increase only slightly for options (c), (d) and (e). The reason is that, although an additional one or two years of production data that would need to be collected under these options, the type of data being reported and assessed is the same. The fact that the median is a statistical indicator that is not influenced by outliers renders option (a) relatively easy to administer for public authorities, as no specific rules for special circumstances or force majeure would need to be developed and applied.

Significant impacts on innovation and research are unlikely. However, in the case of options entailing less free allowances being allocated overall, such as options (a), (b) and (c), the Member States may use the increased revenues from auctioning to spur innovation.

Social impacts

The impacts on the level of employment are in the focus of the analysis of social impacts. While on the one hand climate change mitigation offers many employment opportunities, the transformation to a low carbon economy may on the other hand also imply certain structural changes. However, due to the low (or in case of application of the cross-sectoral correction factor almost not existing) economic impacts, the choice of period for historic production data is not expected to have a discernible impact on the level of employment and labour market situation in general.

Environmental impacts

The choice of period for historic production data is not expected to have an influence on fuel choice or air quality.

5.2. Key issue: Heat benchmark value

Table 2: List of analysed options for heat benchmark value

Methodological option	**Reference scenario option**
(a) 60.3 t CO_2/ TJ – natural gas, 93% efficiency	✓
(b) 62.3 t CO_2/ TJ – natural gas, 90% efficiency	
(c) 0 t CO_2/ TJ – biomass	
(d) 75.2 t CO_2/ TJ – average fuel mix, average efficiency	
(e) 6.4 t CO_2/ TJ – average 10% most GHG-efficient heat	
(f) 56.1 t CO_2/ TJ – natural gas, 90% efficiency, 10% reduction	

The degree to which a sector is affected by the heat benchmark choice is influenced by a number of factors, namely the proportion of emissions covered by the heat benchmark, the fuel mix of the sector, and the efficiency of the heat production. The share of emissions covered by this allocation method is estimated at around 20% of total emissions eligible for free allocation. This benchmark value is in particular relevant for the heat production sector (including sectors covered by the ETS due to their fuel combustion activity, such as the food sector), and the pulp and paper and the chemicals sector.

Economic impacts

Options (a), (b), (d) and (f) are estimated to have a mostly similar impact on operating costs, whereas options (c) and (e) are estimated to increase allowance costs significantly for those sectors where the heat benchmark is applied. The sectors most affected by options (c) and (e) include manufacture of food products, beverages and tobacco (cost increase of up to €155m), and the pulp and paper sector (cost increase of up to €109m). Relative to the reference scenario, most sectors would be largely unaffected by a 3 percentage point reduction in the efficiency factor under option (b) with only a 0% to 3% change of the increase in operating cost under the reference scenario).

It is evident that option (c), on the other hand, would for most sectors likely lead to the highest operating costs of all options relative to the reference scenario, as no installation would get any allowances for heat produced. In contrast, under the less ambitious option (d) installations would be allocated relatively more free allowances and consequently all sectors are expected to have lower operating costs relative to the reference scenario (decrease of

€38m for manufacture of food products, beverages and tobacco, and of €27m for the pulp and paper sector).

Option (e) would yield similar results as option (c), with most sectors subject to significantly lower allocation levels compared to the reference scenario. Under option (f) manufacture of food products, beverages and tobacco would experience an increase in operating costs of €11m. The pulp and paper sector would experience an increase of €8m.

The economic impact of any benchmarking approach may be expected to be more pronounced in Member States relying to a large extent on the use of greenhouse gas intensive fuels and production processes. A quantification of these effects per Member State is not possible at this point in time due to the unavailability of relevant Member State specific data. However, given that the Commission is to adopt Union-wide and fully-harmonised implementing measures for the transitional free allocation of allowances, the relative differences in economic impacts between Member States would remain the same regardless of the choice of heat benchmark value, unless efforts would be made to modernise technology and energy infrastructure and to increase the share of renewable energy.

In this context, it should be recalled that, as set out in Article 10 (2) and explained in recital 17 of the amending Directive, 10% of the total quantity of allowances to be auctioned are distributed to support the efforts of those Member States with relatively lower income per capita and higher growth prospects. A further 2% are distributed amongst Member States, the greenhouse gas emissions of which were, in 2005, at least 20% below their emissions in the base year applicable to them under the Kyoto Protocol. The additional auctioning revenues accrued may be used by the respective Member States to modernise industry and energy systems, improve energy infrastructure, support the use of renewable energy and reduce any social impact on vulnerable citizens.

The magnitude of change in international competitiveness and external trade for each sector depends on a variety of factors specific to that sector, as each sector faces different direct cost increases. Under option (c), for instance, the manufactured fuels sector faces a relatively large cost increase compared to the reference scenario. Other factors include the level of indirect cost increases faced and the ability of producers to pass costs on to other sectors, as well as the degree of international competition.

Options (b) and (d) would lead to lower costs compared to the reference scenario, while options (c) and (e) would lead to higher industry costs. Option (f) would lead to somewhat higher cost than the reference scenario. When costs are lower, trade in all sectors is evidently higher than in the reference scenario. The opposite is true when costs are higher than the reference scenario, as in all sectors some costs are passed on, leading to an overall loss of international competitiveness.

Under options (c) and (e), sectors which are expected to experience significant losses in net exports relative to the reference scenario do so mainly due to pass-through of cost increases for the heat production sector and include energy intensive processes not covered by product benchmarks, such as parts of the pulp and paper sector, as well as the manufacture of starches and starch products, the manufacture of sugar, and the production of ethyl alcohol from fermented materials.

With a view to the competition on the internal market, the more stringent benchmarks are expected to increase the competitive advantage of efficient installations and those which use fuels with low greenhouse gas intensity. However, regardless of the heat benchmark value chosen, the relative differences in average emission factors between installations will remain the same and there will be an internal competitive advantage for those installations with the lowest average emission factor.

It should be underlined that the more ambitious the heat benchmark value, the less free allowances would be allocated overall, which would entail higher auctioning revenues. This in turn, may have positive economic effects depending on the use of the auctioning revenues by the Member States.

Under the most stringent heat benchmark options (c) and (e), consumer prices are, relative to the reference scenario, expected to slightly increase for most product groups (in the order of magnitude of maximum 0.005% to 0.03% for most sectors). As option (d) leads to lower industry costs, consumer prices would be slightly lower than under the reference scenario (consumer price decreases of 0.001% to 0.003%). The changes resulting from option (b) would be in the range of maximum 0.001% in all sectors.

The impacts on consumption can be described as very limited. Due to lower consumer prices under options (b) and (d) across all consumer sectors, consumption across all households would slightly increase compared to the reference scenario (by up to 0.004%). Under options (c) and (e) consumption would slightly decrease compared to the reference scenario (by up to 0.01%), due to higher consumer prices.

The choice of the heat benchmark value is not estimated to have a significant impact on GDP (up to 0.006% decrease under options (c) and (e) and up to 0.002% increase under option (d), compared to the reference scenario), investment, and administrative burdens for businesses or public authorities.

In case of the application of the cross-sectoral correction factor, the total amount of free allocation is independent of the choice of heat benchmark value. The risk of the application of the cross-sectoral correction factor would increase with options (b) and (d) and reduce with options (c) (e) and (f). In case the cross-sectoral correction factor applies, there would likely be no difference in the impacts of the options on GDP, consumer prices and consumption. Sectors not covered by the heat benchmark would benefit from options (c) and (e) as these options grant no or little free allocation to the sectors relevant for the heat benchmark.

The choice of the heat benchmark value may have an impact on innovation and research. The more ambitious the heat benchmark value is, the more likely this would lead to greater scrutiny over new investment and the operating life of existing equipment, which in turn may effect the direction of innovation and research. In addition, a more ambitious heat benchmark would lead to higher auctioning revenues, which the Member States may use to spur innovation. The most stringent heat benchmark values (options (c) and (e)) may produce the most significant effects, although they would also lead to high costs for the concerned sectors.

Social impacts

The choice of the heat benchmark value is not estimated to have a significant impact on the level of employment and labour markets. However, in the sectors mostly economically affected by options (c) and (e) some impacts on employment and labour markets can be expected. In case of the application of the cross-sectoral correction factor, such negative impacts would be at least partly compensated by positive impacts on all other sectors. No significant impacts on the level of employment and labour markets are expected under any of the other options.

Environmental impacts

The extent to which air quality will be affected will be influenced by the extent to which switching to natural gas or biomass occurs. Any switching to natural gas from oil or coal will result in reductions in emissions of most air pollutants. Options (c) and (e) would provide an additional incentive to this end. The impacts of switching to biomass from fossil fuels will be dependent upon the type of biomass used and is likely to lead to a reduction in SO_x and possibly NO_x. Impacts on emissions of particulate matter may increase.

5.3. Key issue: Fuel benchmark value

Table 3: List of analysed options for fuel benchmark value

Methodological option	**Reference scenario option**
(a) 56.1 t CO_2/ TJ – natural gas	✓
(b) 0 t CO_2/ TJ – biomass	
(c) 58.5 t CO_2/ TJ – average fuel mix of ETS installations	
(d) 50.5 t CO_2/ TJ – natural gas, 10% reduction	

The share of emissions covered by this allocation method is estimated at around 5% of total emissions under the ETS. This benchmark is particularly relevant for the sectors of oil and gas, food, non-ferrous metals, ceramics, aluminium, and glass.

Economic impacts

If option (b) is pursued, increases in operating costs would be significant relative to the reference scenario, which contains option (a), in those sectors where the fuel benchmark accounts for significant proportions of emissions, such as the oil and gas sector with an increase of €277m and the manufacture of food products, beverages and tobacco with an increase of €149m. Option (c) is expected to produce operating costs of the same magnitude as option (a), while option (d) produces somewhat higher operating costs relative to the reference scenario (€28m for the oil and gas sector, and €15m for the manufacture of food products, beverages and tobacco).

Under option (b) the manufactured fuels sector would experience significant deterioration in net exports of around €293m compared to the reference scenario due to costs being passed through by the oil and gas sector, which would experience a reduction in net exports of some €368m. Option (c) would deliver an insignificant increase in net exports (not more than €0.3m per sector) relative to the reference scenario. Under option (d) the decrease of net exports would amount to €29m for the manufactured fuels sector and to €37m for the oil and gas sector.

The economic impact of any benchmarking approach may be expected to be more profound in Member States relying to a large extent on the use of greenhouse gas intensive fuels and production processes. A quantification of these effects per Member State is not possible at this point in time due to the unavailability of relevant Member State specific data. However, given that the Commission is to adopt Union-wide and fully-harmonised implementing measures for the transitional free allocation of allowances, the relative differences in economic impacts between Member States would remain the same regardless of the choice of fuel benchmark value, unless efforts would be made to modernise technology and energy infrastructure and to increase the share of renewable energy.

As already recalled in the previous section on the heat benchmark, 10% of the total quantity of allowances to be auctioned are distributed to support the efforts of those Member States with relatively lower income per capita and higher growth prospects. A further 2% are distributed amongst Member States, the greenhouse gas emissions of which were, in 2005, at least 20% below their emissions in the base year applicable to them under the Kyoto Protocol. The additional auctioning revenues accrued may thus be used by the respective Member States to modernise industry and energy systems, improve energy infrastructure, support the use of renewable energy and reduce any social impact on vulnerable citizens.

With a view to the competition on the internal market, the more stringent benchmarks are expected to increase the competitive advantage of efficient installations and those which use fuels with low greenhouse gas intensity. However, regardless of the fuel benchmark value chosen, the relative differences in average emission factors between installations will remain the same and there will be an internal competitive advantage for those installations with the lowest average emission factor.

It should be underlined that the more ambitious the fuel benchmark value, the less free allowances would be allocated overall, which would entail higher auctioning revenues. This in turn, may have positive economic effects depending on the use of the auctioning revenues by the Member States.

A fuel benchmark value based on option (b) would imply small consumer price increases in comparison to the reference scenario with sectors like liquid fuels (0.4%) and food and drink (0.02%) affected the most. Compared to the reference scenario, option (c) would lead to slight decreases in consumer prices for all categories while option (d) would lead to slight increases (both in the order of magnitude of 0.0005%).

Compared to the reference scenario, a small decrease in household consumption of 0.01% should be expected if option (b) were to be followed. Options (c) and (d) would lead to a similar level in household consumption as the reference scenario.

Option (b) would likely lead to a small reduction in GDP of 0.015% compared to the reference scenario. A marginal relative increase of 0.0005% with respect to the reference scenario could be expected if option (c) were to be selected.

In case of the application of the cross-sectoral correction factor, the total amount of free allocation is independent of the choice of fuel benchmark value. As a result, there would be no difference in the impacts of the options on GDP, and other macroeconomic factors.

The options considered should not trigger any additional administrative burden for business or public authorities.

All options may lead to increased research and innovation in the field of biomass use. Option (b) may provide the potentially greatest incentive in this respect. In addition, the more ambitious the fuel benchmark is, the higher the auctioning revenues will be, which the Member States may use to spur innovation.

Social impacts

The determination of fuel benchmark value should not have a discernible impact on the level of employment and labour market situation in general. However, in the sectors mostly economically affected by option (b) some impacts on employment and labour markets can be expected. In case of the application of the cross-sectoral correction factor, such negative impacts would be at least partly compensated by positive impacts on all other sectors. No significant impacts on the level of employment and labour markets are expected under any of the other options.

Environmental impacts

The extent to which air quality will be affected is influenced by the extent to which switching to natural gas or biomass occurs. Any switching to natural gas will lead to reduced emissions of most air pollutants. As regards switching to biomass, the impacts will depend upon the type of biomass used, with reductions likely for SO_x and possible for NO_x.

5.4. Key issue: Grandfathering proportionality factor

Table 4: List of analysed options for grandfathering proportionality factor

Methodological option	**Reference scenario option**
(a) No grandfathering proportionality factor	✓
(d) Harmonised factor of 11.31% for all sectors	

The share of emissions covered by this allocation method is estimated at less than 1% of total emissions under the ETS. The sectors with the highest share of emissions expected to be covered by this allocation method are the non-ferrous metals sector and the ceramics sector.

Economic impacts

Compared to the reference scenario including option (a), under option (d) each sector covered by grandfathering allocation would experience a small increase in operating costs, since the quantity of allowances allocated for free is slightly reduced. The operating cost increase would amount to around 0.025% for the non-ferrous metals sector and to around 0.01% for the ceramics sector. These impacts would be relatively larger, if a more stringent grandfathering proportionality factor were applied than the one analysed in this assessment. In particular for installations with relatively high levels of process emissions the impacts could be larger.

Due to the marginal increase in operating costs under option (d), the resulting effects on trade and investment flows, consumer prices, consumption, GDP, and competition on the internal market would also be insignificant compared to the reference scenario.

There would be no significant additional administrative burden for public authorities and businesses due to the choice of grandfathering proportionality factor.

Although the financial incentive to reduce emissions would be the same under both options (a) and (d), the use of a grandfathering proportionality factor may further encourage operators to examine ways in which process emissions can be reduced. Therefore, option (d) may have a positive effect on innovation and research.

Social impacts

The choice of grandfathering proportionality factor options is not estimated to have a significant impact on the level of employment and labour market situation.

Environmental impacts

The grandfathering proportionality factor choice does not impact on fuel choices, which is why no knock-on impacts on air quality are expected. However, option (d) may lead to improvements in process efficiency, which in turn may result in a reduction in emissions of air pollutants. Furthermore, a grandfathering proportionality factor may encourage the use of greenhouse gas efficient raw material, which may also lead to a reduction in emissions.

5.5. Key issue: Waste gases

Table 5: List of analysed options for waste gases

Methodological option	**Reference scenario option**
(a) Full allocation to the waste gas producer	✓
(b) Allocation to both the user and producer of waste gas (with deduction for electricity production with natural gas as reference fuel)	
(c) Allocation to both the user and producer of waste gas (with deduction for electricity production with coal as reference fuel)	

Economic impacts

Compared to the reference scenario, the iron and steel sector would experience an increase in allowance costs of around €320m (which corresponds to around 11% of the allowances allocated to the iron and steel sector industry in 2009) in case of option (b) and of around €500m (17% of the allowances allocated) in case of option (c). This corresponds to a much smaller relative increase in total operating costs (around 0.3% increase in operating costs in option (b) and around 0.5% in option (c)). However, these costs are entirely or partly compensated by the higher value of the electricity produced from waste gas, due to the inherent carbon price of electricity of around €340m. In total, options (a) and (b) lead to net profits of €340m resp. €20m, whereas in case of option (c), net carbon costs of around € 180m can be expected.

Relative to the reference scenario, the basic metals sector would experience a reduction in net exports of €44m or €74m under options (b) and (c) respectively. Compared to the sector's EU export figures of €40bn in 2008, these losses would amount to export losses of 0.11% or 0.19% respectively. Relative to the reference scenario, there would also be small reductions in net exports for the manufacturing of metal goods and motor vehicles sectors in the order of magnitude of €6m under option (b) and €10m under option (c).

The options under consideration would not involve significantly different consequences for the electricity generation sector or the steam and hot water supply sector. Any costs incumbent on the electricity generation sector would most likely be passed through in increased prices onto electricity users. The iron and steel industry would be most affected by the choice of the waste gas methodology. However, the effects on intra-EU competition would be limited.

Relative to the reference scenario, the differences in consumer prices (slight increase of maximum 0.003% under option (c)) and household consumption (slight decrease of maximum 0.0006% under option (c)) can be regarded as marginal across all options.

In terms of macroeconomic impacts, the effects of the choice of waste gases option can be regarded as insignificant given a decrease of 0.001% and 0.002% under options (b) and (c), respectively.

None of the options is estimated to have a significant impact on administrative burdens for businesses or public authorities.

These described impacts are based on the assumption that the uniform cross-sectoral correction factor does not apply. However, given the high absolute amount of CO_2 emissions in question, option (a) increases significantly the probability of application of this factor. In this case, the economic advantages for the iron and steel and parts of the chemicals industry would be offset by increased operating costs due to a reduction of about 2-3% in free allocation for all other installations[23]. The total additional operating costs for these installations can be estimated at €320m per year for option (a). This distributional effect might in particular lead to negative impacts on SMEs as mainly 38 large integrated steel plants would benefit from option (a) whereas SMEs are relevant for sectors such as ceramics, metal processing, glass or gypsum.

In case of the application of the cross-sectoral correction factor, the total amount of free allocation is independent of the choice of waste gases. As a result, there would be no difference in the impacts of the options on GDP.

Compared with option (a), any of the considered alternatives is likely to be more effective in terms of creating incentives for innovation and research that could lead to reduction in the production and/or CO_2 intensity of waste gases.

Social impacts

The choice of waste gases allocation methodology should not have a discernible impact on the level of employment and labour market situation in general. For the steel production sector, losses in exports of 0.11% to 0.19% could lead to negative impacts on employment of a similar magnitude. However, in case of the application of the cross-sectoral correction factor, this would be more than compensated by creation of additional jobs in other sectors as SMEs are more labour intensive than these large enterprises[24].

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[23] According to an analysis prepared for the German Federal Environment Agency, no deduction for waste gas use would lead to around 20 million allowances higher allocation annually in the EU as a whole. This corresponds to around 2-3% of the total free allowances available to all industrial installations.

[24] This assumption is based on Eurostat figures on the average labour productivity of SMEs and large enterprises of €35,900 and €63,300 respectively per person employed.

Environmental impacts

In general, the choice of the allocation method for waste gases would not have any major impact on overall fuel mix or air quality.

6. COMPARING THE OPTIONS AND CONCLUSIONS

This section will compare the options under each issue that were analysed in the previous section. Furthermore, the options will be evaluated against the background of the objectives of Article 10a (1) of the Directive, which include the provision of incentives to reduce greenhouse gas emissions (in particular for newly covered installations). Additional criteria to be taken into account are ensuring fairness between covered installations, and the efficient use of public resources (see objectives in section 3).

6.1. Key issue: Period for historic production data

Table 6: Comparison of impacts from the choice of period for historic production data

Methodological option	Impacts	Remarks	Objectives				
			Achieve the EU climate objective	Implement the relevant provisions	Provide incentives to maximise reductions in emissions	Ensure fairness between installations	Ensure efficient use of public resources
(a) 2005-2009 (median)	Not influenced by extremes, takes into account special circumstances of individual installations	Long period taking into account variations in capacity utilisation, easy to administer for public authorities	+	≈	+	+	+
(b) 2007-2008 (average)	Large risk of negative impact at installation level in case of production interruptions during the period	Short period likely to lead to unrepresentative results	+	≈	-	-	+

(c) 2005-2008 (average)	Risk of negative impact at installation level in case of production interruptions during the period; large variation in operating cost changes	Increases the difference in outcome between those that had smooth production and those that had breakdowns	+	≈	-	-	+
(d) 2005-2008 (average minus minimum performing year)	Leads to highest levels of production activity; increased risk of application of cross-sectoral correction factor; decreases operating cost compared to option (b)	Includes years with generally above average capacity utilisation, likely not representative for the future trading period	-	≈	-	≈	-
(e) 2005-2009 (average minus minimum performing year)	Leads to medium levels of production activity, potential negative impacts at installation level in case of production interruptions during the period; decreases operating cost compared to option (b)	Mix of years with generally high capacity utilisation and year 2009	-	≈	≈	≈	-

Assessment: + positive, - negative, ≈ neutral/marginal

As a result of establishing an emissions trading scheme, there is an inherent inducement to lower CO_2 emissions and the choice of the period for historic production data for free allocation of allowances in itself will not necessarily create additional specific incentives or disincentives for ETS operators to move to alternative, more efficient technologies and fuels. The overall amount of free allowances to be allocated to eligible installations only depends on the choice of the period if the cross-sectoral correction factor does not apply. Therefore, the main differences lie in the distribution of free allowances across sectors and installations and in the overall economic effectiveness and efficiency of the distribution.

In overall terms of free allocation, options (a), (b), and (c) would result in a similar level, while option (e) would raise the overall level of free allocation. Option (d) would lead to the highest overall level of free allocation. Therefore, options (a), (b) and (c) come closer to reaching the operational objective of the efficient use of public resources. Option (d) also implies the highest risk of the application of the cross-sectoral correction factor. At the same time, these overall levels are no indicator for the levels of free allocation for individual installations.

On individual installation level, installations with relatively high levels of production will benefit from relatively higher levels of allocation. If the period for historic production data is not representative, this will put other installations at a relative disadvantage. Hence, the objectives of maximising reductions in greenhouse gas emissions and ensuring fairness between covered installations should be evaluated from the perspective of ensuring most comprehensive and even application of free allocation rules to installations.

In that respect, the longer the period for historic production data, the better projection is offered for the industrial economic activity for 2013 onwards and therefore, options (b), (c) and (d) can not be regarded as most appropriate. Furthermore, special circumstances of individual installations should be taken into account. Therefore, option (a) might be considered most suitable from the economic efficiency and effectiveness point of view. An inclusion of the year 2010 in options (a) and (e) would, once such data is available, be coherent with offering the best possible projection for industrial economic activity for 2013 onwards using the most recent available production data.

6.2. Key issue: Heat benchmark value

Table 7: Comparison of impacts from the choice of heat benchmark option

Methodological option	Impacts	Remarks	Objectives				
			Achieve the EU climate objective	Implement the relevant provisions	Provide incentives to maximise reductions in emissions	Ensure fairness between installations	Ensure efficient use of public resources
(a) 60.3 t CO_2/ TJ	Modest cost impact for majority of installations	Represents the most energy efficient technology available	+	≈	≈	+	+
(b) 62.3 t CO_2/ TJ	Modest cost impact for majority of installations, slight decrease compared to option (a); risk of over-allocation increases over time	Close to average fuel and efficiency of gas using installations	≈	≈	≈	≈	≈

(c) 0 t CO_2/ TJ	Highest operating costs for installations covered by the allocation method, large increase compared to option (a), up to €155m for the most affected sector; positive effects on innovation and research	Represents the most greenhouse gas efficient heat production	+	≈	+	-	+
(d) 75.2 t CO_2/ TJ	Least increase in operating costs for installations covered by the allocation method, small decrease compared to option (a); leads to over-allocation for a large number of installations; increased risk of application of cross-sectoral correction factor	Represents average performance and is therefore not consistent with the general benchmark setting principles	-	≈	-	-	-
(e) 6.4 t CO_2/ TJ	High operating costs for installations covered by the allocation method; positive effects on innovation and research	Represents the average of ETS installations with the 10% most greenhouse gas efficient heat production	+	+	+	-	+
(f) 56.1 t CO_2/ TJ	Modest cost impact, but slightly higher impact than option (a); positive effects on innovation and research	Takes into account expected increased use of biomass/renewable energy and expected improved production and use of heat	+	+	+	+	+

Assessment: + positive, - negative, ≈ neutral/marginal

For the sectors to which the heat benchmark would be applied, the objective of maximising the reduction in greenhouse gas emissions is understandably best fulfilled with the lowest values of the heat benchmark, i.e. options (c) and (e). These also best meet the objective of the efficient use of public resources. At the same time, those options would imply least cost effective choices for the industries affected.

On the other side of the spectrum option (d) would be largely accommodating to the current patterns of heat generation but would not put the necessary downward pressure on emissions reduction in this field. In addition, this option is based on average performance and does not reflect the level of ambition of product benchmarks as prescribed by Article 10a of the Directive (average performance of 10% most efficient installations). Therefore, it does not meet the objective of ensuring fairness between covered installations. Options (a) and (f) (and to a lesser extent option (b)) which aim to reconcile the objectives of reductions in greenhouse gas emissions and cost effectiveness may be regarded as middle ground in this respect. Except for option (d), all other options encourage heat producers to use alternative technologies and fuels, with option (c) providing particular incentives to rely on biomass use (benchmark value set at 0 t CO_2/ TJ).

6.3. Key issue: Fuel benchmark value

Table 8: Comparison of impacts from the choice of fuel benchmark option

Methodological option	**Impacts**	**Remarks**	**Objectives**				
			Achieve the EU climate objective	Implement the relevant provisions	Provide incentives to maximise reductions in emissions	Ensure fairness between installations	Ensure efficient use of public resources
(a) 56.1 t CO_2/ TJ	Modest cost impact for majority of installations	Represents the most commonly used fuel	+	≈	≈	≈	+
(b) 0 t CO_2/ TJ	Highest operating costs for installations covered by the allocation method, large increases compared to option (a) - up to €277m for most affected sector; positive effect on research and innovation	Represents the most greenhouse gas efficient fuel	+	≈	+	-	+

(c) 58.5 t CO_2/ TJ	Least increase in operating costs for installations covered by the allocation method, but generally small difference to option (a); risk of over-allocation	Represents average performance and is therefore not consistent with the general benchmark setting principles	-	≈	≈	-	-
(d) 50.5 t CO_2/ TJ	Modest cost impact, but slightly higher impact than options (a) and (c); positive effects on innovation and research	Takes into account expected increased use of biomass /renewable energy and improved efficiency in fuel combustion and fuel use	+	+	+	≈	+

Assessment: + positive, - negative, ≈ neutral/marginal

The objective of reduction of greenhouse gas emissions in the sectors expected to be covered by the fuel benchmark would be best met with the lowest values of the fuel benchmark (option (b)). It would also best meet the objective of the efficient use of public resources. That option would at the same time entail most significant cost increases for the industries affected.

Option (c) reflecting the current mix of fuel use by ETS installations would be least intrusive and least costly but it would not be sufficient to trigger necessary emissions reductions. In addition, this option is based on average performance and therefore does not reflect the level of ambition of product benchmarks as prescribed by Article 10a of the Directive (average performance of 10% most efficient installations). Therefore, it would not meet the objective of ensuring fairness between covered installations. Options (a) and (d) represent mid-range solutions in this respect. Except for option (c), all other options effectively put emphasis on the use of alternative technologies and fuels, with option (b) providing particular incentives to rely on biomass use (benchmark value set at 0 t CO_2/ TJ).

6.4. Key issue: Grandfathering proportionality factor

Table 9: Comparison of impacts from the choice of grandfathering proportionality factor

Methodological option	Impacts	Remarks	Objectives				
			Achieve the EU climate objective	Implement the relevant provisions	Provide incentives to maximise reductions in emissions	Ensure fairness between installations	Ensure efficient use of public resources
(a) No grandfathering proportionality factor	Larger positive impact on operating cost for installations with high process emissions	Results in the most generous allocation method	-	-	-	-	-
(d) Harmonised factor of 11.31% for all sectors	Compared to option (a) marginally higher level of operating costs for affected sectors; more significant costs for some individual installations; potential positive effect on innovation and research, potential for reduction in emissions	Depending on factor used, may lead to similar level of stringency compared to other allocation methods	+	≈	+	+	+

Assessment: + positive, - negative, ≈ neutral/marginal

With no reduction factor applied to free allocation under the grandfathering method the installations with process emissions would receive 100% of their historic emissions and therefore not experience the same level of stringency as other operators subject to product, heat or fuel benchmarks. Therefore, this option would not meet the objective of ensuring fairness between covered installations. The potential for reducing greenhouse gas emissions would not be used in that area, not meeting the objective of maximising the greenhouse gas emission reductions. The objective of efficient use of public resources would not be met either. On the other hand, an introduction of a harmonised factor for all sectors could imply higher operating costs for the affected sectors. It would also be more likely to encourage greater use of more efficient, alternative technologies and fuels.

6.5. Key issue: Waste gases

Table 10: Comparison of impacts from the choice of waste gases option

Methodological option	Impacts	Remarks	Objectives				
			Achieve the EU climate objective	Implement the relevant provisions	Provide incentives to maximise reductions in emissions	Ensure fairness between installations	Ensure efficient use of public resources
(a) Full allocation to the waste gas producer	Relatively small increase in operating costs for iron & steel sector and parts of chemicals industry; higher risk of application of cross-sectoral correction factor for all other installations	Full free allocation for electricity production, which no other sector receives; degree of flaring disregarded; potential increase in operating costs for all other installations and in particular SMEs, in case cross-sectoral correction factor is triggered	-	-	-	-	-

(b) Allocation to both the user and producer of waste gas (with deduction for electricity production with natural gas as reference fuel)	Compared to option (a), increase in operating costs for iron and steel sector (around 0.3%), in the form of increase of allowance cost of around €320m, which entirely is compensated by the inherent carbon price of electricity; slight decrease (0.11%) in exports for iron & steel sector and parts of chemicals industry	Takes into account the general methodology on allocation for electricity production; no increased risk of application of cross-sectoral correction factor	+	+	+	+	+
(c) Allocation to both the user and producer of waste gas (with deduction for electricity production with coal as reference fuel)	Compared to option (a), increase in operating costs for iron and steel sector (around 0.5%) in the form of an increase of allowance cost of around €500m, which is partly compensated by the inherent carbon price of electricity; decrease (0.19%) in exports for iron & steel sector and parts of chemicals industry	Takes into account the general methodology on allocation for electricity production; no increased risk of application of cross-sectoral correction factor	+	+	+	+	+

Assessment: + positive, - negative, ≈ neutral/marginal

Option (a) provides the lowest cost for the iron & steel sector and parts of the chemicals industry. However, it does not meet the objective of providing maximum incentives for the reduction in greenhouse gas emissions. According to this method, waste gas users are not eligible for free allocation for heat production. This could create perverse incentives to increase greenhouse gas emissions in case of newly covered installations (only being granted free allocation if they use any other fuel but not if they would use any available waste gases for heat production).

Furthermore, option (a) increases significantly the probability of the application of the cross-sectoral correction factor, which would lead to lower allocation for all other installations. In addition, option (a) provides full free allocation for electricity production, which no other sector receives (although even in options (b) and (c) a large part of the emissions from electricity production is covered by free allocation), and disregards the degree of flaring. Therefore, it does not meet the objectives of implementing the relevant provisions of the Directive, i.e. avoiding distortions of competition, and of ensuring fairness between covered installations. The objective of efficient use of public resources is also not met. Options (b) and (c) slightly increase the cost and export losses for the sectors concerned, better meet the objectives of avoiding distortions of competition and ensuring fairness between covered installations and imply no increased risk of the application of the cross-sectoral correction factor.

7. MONITORING AND EVALUATION

Most of the monitoring and reporting requirements relating to benchmarking and the implementation of the third trading period have already been determined in the impact assessment preparing the revision of the Directive[25]. Therefore, the indicators presented in this section relate to the methodological choices' specific role in meeting the objectives set out.

To determine if the methodological choices led to a harmonised application of the rules for free allocation of emission allowances, conformity checks of the Member States' national implementing measures pursuant to Article 11 (1) of the Directive may be carried out. In addition, case studies may investigate the application of the allocation methodology using a sample of installations.

In addition, to determine whether the methodological choices will have lead to over- or under-allocation, a possible first indicator may be the comparison of installations' allocation levels with their actual emissions.

Furthermore, to analyse if the allocation methodology will have created incentives for investments in greenhouse gas efficient technologies, CITL emissions may be used in conjunction with Eurostat production statistics to calculate the average efficiency of a relevant sector during the years in the third trading period and in the years before. Also, volumes of trade with emission allowances and their movements between sectors may be examined to identify which sectors are more actively engaging with the trading system.

In order to analyse whether the methodological choice of the heat benchmark value will have encouraged investments in energy efficiency, an assessment focussing on where the approach was applied would be necessary.

With a view to the methodological choice of waste gases, an assessment focussing on installations buying or selling waste gases would be necessary to evaluate how the methodology has been applied across the Union. Statistics on the changes in volumes of waste gases transferred over time may indicate the impact of the methodological choice on operators' preferences for combustion of waste gases.

[25] Impact assessment accompanying the proposal for Directive 2009/29/EC; SEC(2008)52.

Annex I: Preliminary list of product benchmarks

(State of play: 14/06/2010)

Product benchmark	Emissions (estimated)	Number of installations (estimated)
B.1: Refineries BM	152 Mt	106
C.1: Coke	23 Mt	42
E.1: Sintered ore	28 Mt	31
E.2: Hot metal	Σ: 183 Mt	38
E.3: EAF carbon steel		146
E.4: EAF high alloy steel		88
F.1: Liquid cast iron	2 Mt	30
G.2: Pre-bake anode	1 Mt	17
G.3: Aluminium		30
J.1: Cement clinker	158 Mt	268
K.1: Lime	Σ: 29 Mt	
K.2: Dolime		
K.3: Sintered dolime	1 Mt	6 (18 kilns)
L.1: Float glass	Σ: 19 Mt	About 50
L.2: Bottles and jars of colourless glass		
L.3: Bottles and jars of coloured glass		
L.4: Continuous filament glass fibre		>15
M.3: Facing bricks	Σ: 23 Mt	
M.4: Pavers		?
M.5: Roof tiles		?
M.6: Spray dried powder	3 Mt	
M.7: Dry-pressed wall and floor tiles		
N.1: Mineral wool	3 Mt	73 (?)
O.1: Plaster	1 Mt	21
O.3: Plasterboard	1 Mt	55
O.5. Dried secondary gypsum	<1 Mt	9

Product benchmark	**Emissions (estimated)**	**Number of installations (estimated)**
P.1: Bleached kraft pulp	Σ: 40 Mt	90
P.2: Bleached sulphite pulp		23
P.3: Recovered paper		8
P.4: TMP and mechanical pulp		69
Q.1: Newsprint		47
Q.2: Uncoated fine paper		151
Q.3: Coated fine paper		111
Q.4: Tissue		168
Q.6: Testliner and fluting		178
Q.7: Uncoated carton board		44
Q.8: Roated carton board		61
R.1: Carbon black	3 Mt	18
S.1: Nitric acid	41 Mt	113
T.1: Adipic acid	13 Mt	5
V.1: Ammonia	30 Mt	57
W.1: High value chemicals (steam cracking)	35 Mt	59
W.2: Aromatics incl. cumene	3 Mt	26
W.5: Vinyl chloride monomer		24
W.6: Ethylbenzene/ styrene	4 Mt	18
W.7: Ethylene oxide/ ethylene glycols	3 Mt	16
W.8: Phenol/ acetone	3 Mt	13
W.10: S-PVC	1 Mt	24
W.11: E-PVC	1 Mt	14
X.1: Hydrogen	Σ: 13 Mt	
X.2: Syngas		
Y.1: Soda ash	10 Mt	17

Annex II: E3ME model

The structure of E3ME[26] is based on the system of national accounts, as defined by the European System of Accounts[27], with further linkages to energy demand and environmental emissions. The labour market is also covered in detail, with estimated sets of equations for labour demand, supply, wages and working hours. In total there are 33 sets of econometrically estimated equations, also including the components of GDP (consumption, investment, international trade), prices, energy demand and materials demand. Each equation set is disaggregated by country and by sector. E3ME's historical database covers the period 1970-2008 and the model projects forward annually to 2050. The main data sources are Eurostat, DG ECFIN's AMECO database and the IEA, supplemented by the OECD's STAN database and other sources where appropriate. Gaps in the data are estimated using customised software algorithms.

The main dimensions of the model are: 29 countries (the EU-27 member states plus Norway and Switzerland), 42 economic sectors (including disaggregation of the energy sectors and 16 service sectors), 43 categories of household expenditure, 19 different users of 12 different fuel types, 14 types of air-borne emissions (where data are available) including the six greenhouse gases monitored under the Kyoto protocol, and 13 types of households. The econometric specification of E3ME gives the model an empirical grounding and means it is not reliant on the assumptions common to Computable General Equilibrium models, such as perfect competition or rational expectations.

26 See www.e3me.com.
27 http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/en/esa95en.htm.

Annex III: Implementation of Impact Assessment Board's recommendations

Recommendation	Implementation
Fuller analysis of distributional impacts	
The report should contain a fuller, more detailed analysis of distributional impacts by option, indicating where the largest rises or falls in 'cost of carbon emissions' or numbers of free allowances would occur. This should be presented in as much detail as possible, taking into account the need to protect commercially sensitive data, and an additional annex may be necessary.	The most significant impacts for each key issue are presented in this proportionate impact assessment and the full modelling results can be found in the Entec study. This has been clarified in the report (see section 5).
The distributional analysis should address impacts by broadly grouped industry sectors and by Member State, and might also cover regions and more specific categories of installations.	Information on the impacts by Member States has been included for each key issue (see sections 5.1 to 5.5). Impacts in most affected sectors are presented for the issue where options might lead to significantly different effects across sectors (see sections 5.2 to 5.5). The full modelling results can be found in the Entec study.
It should be indicated if consumer price increases are expected to exceed substantially the average value (low, 0.16%) for any particular product types.	The maximum increase in consumer prices of 0.16% relates to the period of historic production data only and constitutes the modelling result of the economic model used for this impact analysis. The impacts on consumer prices under the other key issues are even less significant. It should also be noted that, in fact, industry stakeholders generally claim that economic reality makes it difficult to pass on any cost at all.
To put the analysis of change by sector into context, the report could usefully include text or graphs on long-term production trends for key sectors to show how closely the second trading period approximates an economic cycle.	A quantification of the degree to which a certain period for historic production data resembles an economic cycle appears difficult. In general, however, the longer such a period, the better projection is offered for the industrial economic activity for 2013 onwards (see section 6.1).

Recommendation	Implementation
Better explain and justify the analytical conclusions	
The report should express its analytical findings more clearly. Most importantly, it should better justify the selection of reference scenario options, indicating whether a common logic was used (such as expectation of mid-ranked impacts or an apparent fit with broad objectives).	Information on the selection of reference scenario options has been added (see section 4.2).
The report should explicitly discuss how well the options meet the objectives (once these have been more precisely expressed).	This has been made more explicit in section 6.
It should specify how options addressing the three key fallback issues compare to product benchmark options in terms of stringency, given the desirability of consistent incentives.	This has been added in section 6. It is also presented in section 4.
The report should also compare impacts more clearly, giving consistent comparisons against the reference option and presenting absolute impact estimates for at least one key variable per key issue. This might be achieved by supplying tables in an annex that shows the estimated impact on key variables for each option (e.g. percentage change relative to previous period in: free allowances, net exports, consumer prices, GDP; and absolute GDP change).	This has been clarified in section 6. Comparisons are also presented in section 5. The full modelling results can be found in the Entec study
Better explain the context	
The report should clarify what decisions have been made already about how the '10% most efficient installations' will be calculated, and whether any outlying high performers in special circumstances might be excluded.	The technical underpinning for the product benchmarks is outside the scope of this impact assessment, which has been flagged in the report (see section 4). Regarding 'outliers', as the Directive does not recognise any such concept, no installations have been excluded from any of the benchmark curves to date.
The link between these rules and the implementing measure relating to carbon leakage provisions should be made clear.	The present exercise has been placed in the context of the previous carbon leakage assessment and the future calculation of free allowances by the Member States (see section 1.1).

Recommendation	Implementation
The report should briefly indicate how the rules would be applied if an installation produces both products covered by benchmark rules and other outputs covered by one or more of the fallback rules.	The report has been supplemented with additional clarifications to address this issue (see section 1.1).
The report should mention how the rules will deal with refineries and any other installations to be treated as special cases.	Information has been included on the specific product benchmark methodology foreseen for the refinery and petrochemical industries (see section 1.1). It should be underlined that at the time of writing no special rules are foreseen in the context of the options analysed in the impact assessment.
The specific and operational objectives should be expressed more precisely to cover at minimum the stipulations in the Directive.	The specific and operational objectives have been clarified (see section 3).
Justify plans for implementation	
The report should indicate what plans are in place to ensure that Member States apply the allocation rules correctly and what the rationale is for these. For clarity, it could also briefly indicate how compliance by individual installations with the trading system rules will be ensured.	This has been indicated in section 1.1.
The report should clearly state what new information obligations would arise from these rules, and if these would be comparable for all options.	This has been indicated in section 1.1.
Clarify how stakeholders were consulted and what they said	
The report should provide more details upfront about how stakeholders were consulted and how a representative spread of views was ensured.	More details on the form and scope of the stakeholder consultation have been provided (see section 1.3).
It should be made clear whether any groups of stakeholders have strong views about any key issue or option.	Information on stakeholders' views has been added for each key issue (see section 1.3).

Recommendation	Implementation
Procedure and presentation	
An annex should be supplied that summarises the E3ME model used, and its relation to other modelling exercises such as the one on moving to a 30% reduction. This annex should outline core assumptions, the processes used to build and test the model, and if possible should indicate how far results are sensitive to changes in key parameters such as the carbon price.	Detailed information on the setup of the economic model used to estimate the impacts has been included (see section 5 and Annex II). The relationship between the allowance price and the economic impacts has been pointed out (see section 4.2).
To make the report more understandable for non-experts, it should provide a clearer explanation of how the system would work in practice, for example in the context and implementation sections.	Elaborations on the free allocation of allowances as of 2013 and on the functioning of the ETS in general have been added (see section 1.1). In addition, the glossary has been extended.