HARMONISATION OF ALLOCATION METHODOLOGIES

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1 INTRODUCTION

The EU Emissions Trading Scheme (EU ETS) was launched in January 2005. It is the largest cap-and-trade scheme in the world and the core instrument for Kyoto compliance in the EU. This first environmental market established in the EU involves thousands of operators who have obligations for limiting the carbon dioxide emissions from their plants. In an average week more than 10 million allowances are traded, resulting in a market worth several billion Euro already in the first year of operation.

Article 30 of the Directive implementing the EU ETS requires the Commission to review the application of the EU Emissions Trading Scheme and report to the European Parliament and to the Council. The report may be accompanied by proposals for amendments to the scheme.

The European Commission's DG Environment appointed McKinsey & Company and Ecofys to support it in developing the review. Amongst other things, they were asked to develop an understanding of the impact of the scheme on the competitive position of participants and to analyse possibilities for the design of the scheme after the second trading period.

Their work deals with a number of the issues listed in Article 30 as ones that should be addressed in the Commission's report, as well as other relevant issues. Each report discusses approaches taken in the first phase and important lessons learnt. The analyses focus on the post-2012 design. For each design element, future options are investigated. This involves discussion of the advantages and disadvantages of design options, harmonization opportunities, and impact on competitiveness.

The work conducted in the period June 2005–July 2006 consists of a web survey to consult stakeholders on their views on the EU ETS, as well as extensive topical analyses.

This report reflects the views of McKinsey & Company and of Ecofys and does not constitute official views or policy of the European Commission.

Other reports delivered in the scope of this work are available at http://ec.europa.eu/environment/climat/emission/review_EN.htm.

This paper focuses on the harmonisation of allocation methodologies. It begins by setting out the provisions related to allocation methodologies in the EU ETS Directive and the subsequent Commission Guidance documents and defining the different elements of possible allocation methodologies. For those elements that are important candidates for further harmonisation, Section 3 looks at possibilities for further harmonisation to limit undesirable competitiveness effects and strengthen the system's incentives for clean technologies. The pros and cons of harmonising the different elements of the allocation methodologies are set out. Section 4 discusses the implications of possible further harmonisation in terms of system and data requirements and potential impacts.

2 Allocation methodologies

This section looks in general terms at allocation methodologies in the context of the EU ETS. It sets out the provisions in the EU ETS Directive and the Guidance documents, and identifies the different elements of allocation methodologies.

2.1 The Directive and Guidance documents

The Directive leaves the choice of allocation methodologies largely to Member States. A number of articles in the Directive provide the framework in which this choice must take place:

- Article 9 National Allocation Plans
  Member States propose allocated amounts in line with the criteria in Annex III and further guidance developed by the Commission.
- Article 10 Method of allocation
  Allocation should be free of charge for at least 95% of the allowances for Phase I and 90% for Phase II. Article 10 does not restrict the freedom of Member States regarding the allocation method for phase III and beyond, such that e.g. 100 % of the allowances could be auctioned, if so decided.
- Article 11 Allocation and issue of allowances
  Sets out the timing of decisions on allocation and issuance of allowances.

Annex III of the Directive sets out the criteria that the National Allocation Plans must meet. Except for the criteria on public consultation, the installation list, and the maximum use of JI/CDM credits, all criteria are relevant for the allocation methodology. The first Guidance document published by the Commission in January 2004[1] elaborates the level at which each of the criteria is to be applied, distinguishing between the total level (national ETS cap), the activity or sector level[2] and the installation level. It also categorises the criteria into those that are mandatory and those that may be

[1] COM(2003) 830 final, 7-1-2004
[2] The Guidance document further indicates that the explicit determination of sector totals is not mandatory.

applied on a voluntary basis. These categorisations are shown in Table 1.
Again, the criteria represent framework conditions that must be met when applying a chosen allocation methodology, rather than prescribe which methodology should be used.

Further guidance for the design of allocation plans was published in December 2005. In this second Guidance document, the Commission offers a consistent methodology for setting caps and provides a standardised set of tables to make the NAPs more transparent and to facilitate their assessment.[3]

In terms of the overall cap, both the first and the second Guidance document state that the allocation should be 'not more than needed', as determined by the most stringent of the mandatory criteria (1, 2, 3, 4, 5). This amount cannot be increased by application of any of the optional (elements of) criteria (see Table 1 for the distinction between mandatory and optional criteria). The second Guidance document further specifies that "the combination of the respective economic and technological potential to cut emissions sets an upper limit for the cap at national level". It also specifies a methodology for calculating an indicative cap taking that emission reduction potential into account:

Actual emissions * share ETS in total emissions * expected GDP growth * expected CO_2 intensity change

[3] COM(2005) 703 final, 22-12-2005

Table 1 Categorisation of NAP criteria in Annex III of the EU ETS Directive as elaborated in the first Guidance document[4]

	Mandatory (M)/ Optional (O)	Total level	Activity/ Sector	Installation level
(1) Kyoto commitments	(M)/(O)	+		
(2) Assessments of emissions development	(M)	+		
(3) Potential to reduce emissions	(M)/(O)	+	+	
(4) Consistency with other legislation	(M)/(O)	+	+	
(5) Non-discrimination between companies or sectors	(M)	+	+	+
(6) New entrants	(O)			+
(7) Early action	(O)			+
(8) Clean technology	(O)			+
(9) Involvement of the public	(M)			
(10) List of installations	(M)			+
(11) Competition from outside the Union	(O)		+	

With regard to specific allocation methodologies, the Directive and Guidance documents include references to:

- The maximum amount of auctioning to be used;
- The acceptability of both free allowances and auctioning or buying allowances on the market as the way to provide access to the market for new entrants
- The possibility of using benchmarks and best available technology reference documents in the allocation as a possible way to credit early action.
- The review and further development of the ETS specifically mentions auctioning and the development of community-wide benchmarks as a basis for allocation.

[4] Note that after the adoption of the Linking Directive a 12th criterion was added requiring the NAP to state the maximum quantity of JI/CDM credits that may be used by operators in the EU ETS in meeting their targets.

With regard to benchmarking as an allocation methodology, the first Guidance document recommends that installations are grouped by input fuels and that separate input-derived fuel benchmarks should be applied. It also states that the output value to determine the allowances needs to be justified.

2.2 Elements of allocation methodologies

The phrase 'allocation methodology' can refer to various aspects of the process to determine the overall cap, the allocation to sectors (if applicable) and the allocation to individual installations. As such, developing an allocation methodology includes decisions on each of those elements. Here we briefly identify, in general terms, the various elements that can constitute allocation methodologies. In the next section we will describe the possibilities for further harmonisation of the various elements, as far as they are relevant for the different approaches identified in Section 3.

1. Determination of the overall cap
   The overall cap can be determined in different ways. An important distinction is whether the cap is determined by a top-down approach or a bottom-up approach.
   In a purely top-down approach the cap is determined by an emissions target for the economy as a whole, after which the allowed emissions are distributed over sectors that are covered by the cap and those that are not. For Phase II, these emission targets are the national Kyoto targets (corrected for the use of ERU/CERs/AAUs by the government). Post-2012 this may be different, e.g. one EU-wide emission target or sectoral targets (see Section 3.2 for further discussion of harmonisation options in these cases). The distribution of the total amount of emission allowances available for the economy as a whole over participating and non-participating sectors would be based on assumptions regarding a comparable effort of ETS and non-ETS sectors in contributing to meeting that emissions target. This could include for example, assumptions on trends in economic development, standard of living, emission reduction potentials and cost as well as political considerations.
   In a purely bottom-up approach, the expected emissions growth of individual sectors covered by the cap (or even individual installations) is determined, e.g. based on detailed modelling or expert judgements. Such projections are based on assumptions in growth of production (or activity) levels and emission limitation or

reduction efforts. The sector (or installation) level allocations are then summed to establish the total cap. The emission target for the economy as a whole determines the remaining allowed emissions for non-ETS sectors and/or the need for government purchases of AAUs or JI/CDM credits[5].
So far, most often a combination of the top-down approach and the bottom-up approach has been used in an iterative process. In such a combined approach, a 'compliance factor' (or reduction factor) is applied to the bottom-up allocation to fit within the top-down estimate or assumptions on the efforts of ETS-sectors, non-ETS sectors and national JI/CDM purchases are revised to match the top-down and bottom-up approaches. In the future environmental constraints will likely play a bigger role in setting the level of the cap.

2. The general allocation method
   In general, three different methods are distinguished: grandfathering, benchmarking and auctioning.
   Grandfathering and benchmarking provide allowances free of charge, in the case of grandfathering on the basis of historic emissions, in the case of benchmarking on the basis of a performance-based standard combined with a certain production or input indicator. Although both grandfathering and benchmarking could be applied 'statically', i.e. on the basis of the activity level (production, fuel input, or emissions) in the base year period, in most cases assumptions on future growth rates[6] have been used to calculate installation-level allocations in the relevant trading period. Often expected growth rates have been combined with a compliance factor to ensure that the total of allocations fits within the total cap[7]. In case of a more constraining cap, the compliance factor could outweigh the growth factor, i.e. the allocation is below base period emissions. However, in some cases growth rates can still be used to differentiate between sectors if sector trends differ strongly from one another. Auctioning is different, in that operators buy their allowances according to their own estimated need.

[5] Or similar flexibility mechanisms, assuming such mechanisms will exist post-2012.
[6] This can refer to growth rates in emissions, (physical or economical) production or energy consumption. In many cases no transparent definition of the type of growth rates is available (see the Working Group C report from the Lets Update project: http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/).
[7] Note that there is a strong link between the use of growth rates to determine installation-level allocations and the use of growth rates in determining the total cap, implying that bottom-up or a combined approach is used to set the cap.

3. Determination of potential sectoral caps
   In the case where no auctioning is used, allowances can be allocated directly to individual installations or to sectors first, after which the sectoral cap is distributed over installations in that specific sector. In Phase I, also an intermediate form was used, where only a distinction was made between the electricity sector and the category of 'other sectors'.
   Where a two-step allocation process is used, the installation-level allocation is usually determined by multiplying the installations share in historic emissions by the sectoral cap. The sectoral cap can be determined in different ways: top-down or bottom-up, including growth projections or not, assuming further emission reductions or not, etc. The use of sectoral caps allows differentiation of allocation rules between individual sectors. The use of sectoral caps would also facilitate a more harmonised approach to the allocation in specific sectors, e.g. the power sector.
   As the rules determining the allocation in a two-step approach depend strongly on the sector in which an installation is categorised, a clear definition of sectors and sector boundaries is very important. In general, determining sectoral caps adds complexity to the allocation process.

4. Determination of installation-level allocation
   When auctioning is chosen as the general allocation approach, the allocation to individual installations is simply the outcome of the auction. In the case of an allocation free of charge, this can be done directly to individual installations or to sectors first, after which the sectoral cap is distributed over the installations in that specific sector.
   Direct installation-level allocation for incumbents has usually been determined by applying sectoral growth rates to installation-level base period emissions, possibly combined with emission reduction factors, compliance factors, early action factors, etc. Benchmarking is an approach that has so far been used mostly for new entrants, but which could also be used for incumbents.
   A combination of approaches is also possible:
   - Grandfathering corrected by a benchmark-based factor
   - Grandfathering part of the allowances, whilst auctioning the remainder
   - Free allocation on the basis of a benchmark, whilst auctioning the remainder

   In determining the installation-level allocation based on benchmarking, benchmark factors are multiplied by an appropriate pro-

duction or activity level[8]. Many different choices can be made with regard to which factors to benchmark (emissions per unit of activity, energy consumption per unit of activity, capacity utilisation benchmarks, fuel emission factors), how many different benchmarks to distinguish (fuel-specific, technology-specific, product-specific) and the level of the benchmark (average performance, best practice, BAT).

5. Allocation to new entrants
   The allocation to new entrants can be based on auctioning or allocated for free on the basis of a benchmark factor (or a combination of the two). The choice between free allocation and auctioning does not have to be the same for new entrants as it is for incumbents. New entrants (as in new installations, not expansions or retrofits) can include carbon constraints in their investment decisions, in contrast to incumbents. Therefore, auctioning allowances to new entrants while incumbents are allocated free of charge is in line with the non-discrimination criterion and the EC Treaty.
   If allowances are allocated to new entrants free of charge, as was generally done during Phase I, a new entrants reserve (NER) must be established. The size of the NER would usually depend on the growth expectations in the various sectors. It is important to note that this growth can occur in incumbents (through a higher capacity utilisation) as well as in new entrants (either new installations or capacity expansions). It is therefore important to make sure that the expected growth is not double-counted.
   In the case where allocation to new entrants is done for free, the installation-level allocation must be based on benchmarking. Activity levels can not be derived from historic levels, so must be based on operator estimates or on a capacity utilisation factor benchmark.

6. Early action parameters
   An allocation methodology that recognises early action would be considered to result in a fairer distribution of any negative impacts (cost) to participants and also provides a closer link between allocation and the technological potential of activities to reduce emissions. Allocation via grandfathering can reward inaction, but there are ways even with grandfathering that recognise early action.

[8] The production level can be historic, forecasted or a benchmark in itself. A benchmark applied to the actual production is not possible under the current EU ETS Directive, as the allocation has to be made upfront.

In Phase I, the most common way to recognise early action has been to use early base years, but this only rewards recent early action, not early action taken before the selected base years. The use of benchmarking provides a more sophisticated way of recognising early action and of taking into account differences in reduction potential. Auctioning would also not disadvantage early action.

7. Clean technology incentives
   During Phase I, the provision in the Directive to encourage energy efficient technology was used mostly for CHP. This was done mainly through awarding a CHP bonus. Another route was the establishment of an earmarked segment in the new entrant reserve for CHP new entrants. Other ways of awarding clean technologies that have been used, or could be used, include the use of higher than actual emission factors (e.g. gas-based emission factors for biomass co-firing) and the use of benchmarks, especially non-fuel specific benchmarks.

8. Emission reduction potential factors
   In Phase I, a number of Member States applied correction factors to the projected emissions to reflect remaining emission reduction potentials. This was done in very different, and not always transparent, ways. This element is difficult to harmonise as it would require the development of a systematic way to estimate emission reduction potentials, such as an approach based on marginal abatement costs or benchmarking.

3 Possibilities for harmonisation

3.1 Different degrees of harmonisation

During Phase I and Phase II, Member States have used very different approaches to many of the allocation methodology elements discussed in the previous section. This has led in Phase I to (perceived) differences in the ambition levels reflected in the overall national caps, subsequently translated into installation-level allocations. This has affected the overall environmental effectiveness of the scheme as a whole (the amount of emissions reductions achieved) and resulted in (perceived) differences in treatment of similar installations in different Member States. Harmonisation of allocation methodologies across the EU post-2012 should prevent competition distortion effects between Member States and strengthen incentives for investments in clean technology.

Harmonisation can be achieved in different ways and to different degrees. For the first two phases, all elements of the allocation methodology have been or are determined nationally, within the framework conditions set out by the Directive and the Guidance documents and subject to the approval of an allocation plan by the European Commission.

Different degrees of further harmonisation are possible. Three basic levels of harmonisation can be envisaged:

- Setting both the ambition level and the allocation rules at the EU level;
- Setting the ambition level at the Member State level and harmonising allocation rules at the EU level;
- Setting the ambition level at the EU level, but allowing Member States to determine how to allocate to installations.

In the following sections, these three approaches are discussed. Table 2 presents the main advantages and disadvantages of the various harmonisation options. In general, ensuring the environmental outcome of the system at the outset will only be possible if the ambition level is set at the EU level. At the same time, determining the ambi-

tion level at the EU level is also likely to the most effective way to limiting competitive distortions as differences in this level are a major factor in potential distortions.

In the case that the ambition level is set at the Member State level, harmonisation of the allocation rules will focus on more detailed elements of the allocation methodology. The text box below illustrates different degrees of harmonisation using the example of benchmarking. Note that the last step – with the highest degree of harmonisation – is equivalent to setting the ambition at the EU level.

An illustration of different degrees of harmonisation - benchmarking:

- The first step in harmonisation could be that at the EU level it is stipulated that benchmarking must be used to allocate to the power sector, but that the Member States can determine whether or not to use fuel-specific benchmarks, and what the benchmark values are.
- A further step towards harmonisation could require Member States to apply non-fuel-specific benchmarks for the power sector, while Member States determine the benchmark value.
- The next step in this case would be that also the benchmark values are prescribed at the EU level.
- Even more harmonisation would be achieved it is also prescribed at the EU level how to determine the production or activity levels to use in combination with the benchmark, e.g. based on historic data or on output projections.
- The final step to harmonisation, in this specific example, is that the (quantitative) production or activity level (e.g. through a benchmarked capacity utilisation factor) to use in combination with the benchmark, de facto prescribing the installation-level allocation (and through summation also the sector allocation), is set at the EU level.

It must be noted that, as shown in the last step in the text box, the different elements of the allocation methodology are linked, and that therefore, harmonisation of one element may affect other elements. If for example, sectoral caps or installation-level allocations are harmonised, the total national cap will be determined by adding up the sectoral caps[9], rather than being independently determined by Member States.

Note that the above example is typically a 'bottom-up approach', with very detailed, and often technical, design elements to identify, under-

[9] Or breaking down the sectoral cap in case of an EU-wide sectoral cap

stand and agree upon before they can be harmonised. Another option that addresses the main issues of non-harmonisation, but with less need for detail and technical know-how is a more 'top-down approach', focussing on ambition level, either at the level of the economy as a whole, the whole group of ETS participants (the cap) or sectors as a whole. These approaches could allow for a stronger degree of harmonisation with less need for detailed design and agreement.

Post-2012 examples of such an approach are:

- The adoption of EU-wide caps per sector
- The adoption of an EU-wide cap for the whole group of participants
- The adoption of an EU-wide target for the economy as a whole (no individual Member States' targets).

In the following sections, first the above-mentioned top-down approaches to set the ambition at the EU are described (Section 3.2). Section 3.3 discusses options for further harmonisation in case the ambition level is set at the Member State level. Section 3.4 describes what possibilities for further harmonisation exist in case the ambition level is set at the EU level, while Member States decide on the allocation rules. Table 2 presents the main advantages and disadvantages of the various harmonisation options.

3.2 Ambition level and allocation rules set at the EU level

The major distorting factor during Phase I has been the (perceived) differences between Member States in the ambition levels reflected in the overall cap, subsequently translated into installation-level allocations. Early indications are that these differences will still exist to some extent in the second phase.

There are many valid reasons why required emission reduction efforts can differ across Member States. Currently, emission targets differ between Member States, as do economic trends, emission reduction opportunities in ETS and non-ETS sector (and for non-CO_2 gases) as well as the extent of emission reduction efforts already undertaken in the past (either autonomously or policy-induced) and the cost of further emission reduction efforts in ETS sectors.

Many of the above factors (trends, potentials, cost) are, however, not well defined. This uncertainty may provide national governments with an incentive for erring on the side of caution from an economic perspective, i.e. opting for less stringent targets, especially where national operators are exposed to competition with countries where less stringent climate policy measures are in place. In addition, national decision-making is by definition always more susceptible to national pressures because of the accountability in national elections.

The above considerations suggest a harmonisation of the ambition level at the EU level would be an important option to limit economic distortions between Member States. It must be noted, though, that economic distortions may also result to some extent from the reduced flexibility to take into account differences between Member States in this approach. Whether this occurs, depends on the details of the establishment of the ambition level and the subsequent allocation to installations.

In addition, setting the ambition level at the EU level may have implications on the feasibility of economy-wide targets at the Member State level or the approach to determine those targets. In the case where greenhouse gas targets are established at the Member States' level after 2012 as well, using an EU-wide approach for the ETS sectors means that:

- There are no national targets for greenhouse gas reductions, only an EU target; or
- The national targets would be set to cover only the emissions in sectors and sources not covered by the ETS.
- The EU-wide (sectoral) cap needs to redistributed to individual Member States to be covered in the national target;

The latter case reduces the benefits of the EU-wide approach, as it reintroduces complexity and discussions on the need to differentiate between different Member States.

3.2.1 EU-wide cap

Over the longer term, it seems likely that the cap on emissions for the EU ETS (as a derivative of the cap for the economy as a whole) will be determined by environmental constraints. In this context, the cap could be set at the EU level.

In practice, the above could work as follows:

- The environmental constraint is translated to an emission reduction target for the economy as a whole, e.g. -30% in 2020 compared to 1990 levels[10];
- The target for the economy as a whole is translated to a cap for the ETS participants. This can be based on simple metrics, e.g. a constant share of the whole group of ETS participants in total emissions, or on more elaborate considerations based on equality of effort between ETS sectors and non-ETS sectors (e.g. past emission reduction efforts, growth projections, emission reduction opportunities and cost, vulnerability to outside competition);
- The ETS cap is translated to allocations to participants:
  1. Directly to participants
  2. First to sectors then to participants
  3. First to Member States, then to (sectors and) participants

An EU cap works especially well if it is combined with the general allocation method of auctioning to distribute allowances directly to participants. Differences between participants in different Member States are then reflected in the prices participants are willing to bid. With other allocation methods, there still has to be a process of allocating to installations. Dependent on the method chosen, this process could introduce real or perceived economic distortions, for example if grandfathering and a compliance factor were used as discussed below.

Grandfathering could be applied as the general allocation method, either by assuming the same share in emissions under the cap as in the base period or by applying a growth rate[11], possibly combined with an EU-wide compliance factor. The former does not take into account the differences between Member States mentioned before. In addition, it does not take into account differences in trends, technological reduction potentials and cost between different sectors. The latter still requires the use of growth rates with their associated uncertainties.

Benchmarking[12] cannot be applied across the board, as it is unlikely that benchmarks could be developed for all sectors in a meaningful

[10] Consistent with the 2005 Spring Council Conclusions , 22-23 March 2005, European Council, 7619/1/05 REV 1
[11] Many different growth rates could be used, e.g. emissions, energy consumption, output. Output growth rates provide the least perverse incentives.
[12] In this report, benchmarking is defined as an allocation based on an assessment of the relative performance of an installation, i.e. relative in comparison to the performance of comparable peers. A benchmark is the performance measure installations are compared to, e.g. CO_2 emissions per KWh produced in electricity generation.

way. For option 2 listed above, benchmarking could be used for specific sectors, while other allocation methods could be used for sectors not suitable for benchmarking (see below).

The third option, a three-step allocation approach, is potentially complex and has limited added value compared to the option of using an EU discount factor, as described below. Distribution of the EU-wide cap over Member States could be done on the basis of simple metrics, e.g. proportional to the contribution to total EU emissions. However, this again also does not taken into account differences between Member States mentioned before. A distribution of the EU-wide cap over Member States that reasonably reflects important differences in national circumstances would require an elaborate methodology, e.g. based on marginal abatement cost or something similar to the Triptych approach used in the EU burden sharing negotiations.

3.2.2 EU-wide sectoral caps

Distributing the EU-wide cap over sectors (option 2 listed above) results in EU-wide sectoral caps, which would be followed by a distribution of the allowances under that cap according to one generally agreed allocation methodology. The methodology could differ by sector, but within a specific sector the methodology would be the same for participants across the internal market.

The EU-wide cap can be divided into individual sector caps on the basis of simple metrics, e.g. proportional to the sectors' contribution to historic emissions. However, taking into account different trends and emission reduction opportunities and cost in the various sectors would require a more elaborate approach, e.g. based on marginal abatement cost and/or production trends.

Using EU-wide sectoral caps provides the opportunity for taking into account different situations in different sectors. It would, for example, allow the use of auctioning in sectors where there is a risk of undue distributional advantages because of limited vulnerability to outside competition. At the same time other allocation methodologies could be used for other sectors, e.g. where such vulnerability is higher or

There are various ways in which benchmarking can be used in this regard: The benchmark can be used directly to allocate emissions allowances to an installation by multiplying the benchmark with a specified production level (historic, projected or standardised). A benchmark can also be used to distribute the allowances under e.g. a sectoral cap over individual installations, with installations that are closer to the benchmark receiving a larger share of the allowances than when grandfathering is used.

where participating in an EU-wide auction would pose barriers for e.g. smaller players.

An approach using EU-wide sectoral caps would also allow for the harmonised use of benchmarking in those sectors where such benchmarks are possible, whilst using other allocation methods for sectors where the development of meaningful benchmarks is not feasible. In this case, benchmarking could be applied without the need for growth rates. The sectoral cap could be redistributed over the individual installations on the basis of the share in production in a recent year and a benchmark factor[13].

A sectoral approach as discussed here would also simplify the inclusion of other countries outside the EU into the ETS, as this could be done on a sectoral basis rather then for the economy as a whole. This simplifies the assessment of the equivalence of effort of proposed targets for candidate countries with the targets of current participants.

3.2.3 A risk-based combination of approaches

The use of sectoral caps would allow for a mixture of approaches for different sectors in terms of whether the ambition level and allocation rules are determined at the EU level or at Member State level. In this context one could envisage three categories of participants in terms of the risk of competitive distortions:

1. The electricity sector:
   This sector experiences distributional advantages under a carbon constraint and is the least vulnerable to outside competition. Free allocation of allowances is therefore not necessary, and the approach should be harmonised to limit distortions within the electricity sector within the EU.
2. Energy-intensive sectors
   A number of sectors, such as iron & steel, possibly refineries, are the second largest potential sources of competitive effects. These sectors are relatively well-known in terms of emission reduction potentials and cost, benchmarks, etc. Markets for the products are also largely international so allocation on the basis of harmonised benchmarks and compliance factors would be quite practical.
3. The smaller sectors
   Other sectors are much more diverse, much less well-known

[13] Allocation installation = sectoral cap * share in production * benchmark factor.
The benchmark factor = best practice specific CO_2 emissions/actual specific CO_2 emissions.

and are also less likely to be a source of competitive distortion. These sectors are more difficult to harmonise (unless auctioning is used). Leaving the details of the allocation to Member States, within a set of harmonised principles for allocation would limit the effort required for harmonisation without allowing major competitive distortions.

3.3 Ambition level at the Member State level and allocation rules at the EU level

3.3.1 Harmonisation of national cap setting

In the case where the cap is set at the Member State level, the following harmonisation options exist for setting the cap:

- Setting the ambition level to be realised by the Member States or by sectors;
- Setting the expected contribution from the ETS sectors to emission reductions;
- Harmonising growth rates and compliance factors used in setting the cap;
- Prescribing the general methodology to be used (top-down versus bottom-up).

Ambition level

- All set cap X% below BaU emissions

  Caps in Phase I and Phase II were often expressed as a reduction (or increase) compared to the BaU emissions to show the effort required from the participants under the system. However, for a number of countries suspicions exist that BaU scenarios have been inflated so that the cap compared favourably to the BaU emissions. In addition, BaU scenarios in different countries will in themselves already reflect very different levels of effort, as the stringency of policies to reduce emissions already implemented will vary strongly.

  Harmonisation of the ambition level in terms of a percentage under BaU is possible, however, under the current approach to defining and modelling BaU scenarios it suggests a higher degree of harmonisation than is actually achieved in terms of equivalence of effort.[14]

[14] Within the LETS Update project a new approach has been proposed that would address this issue, but this would require significant effort to further develop and implement across Member States (see also under 'Efforts of ETS sectors vs other sectors' and 'Top-down vs bottom-up

- All use benchmarking to set the overall cap
  Benchmarking is often discussed as a distributional tool, i.e. to distribute the available allowances under a cap over individual sectors or installations on the basis of their performance. Benchmarking could, however, also be used to determine the ambition level of the cap. In this case, the cap would be determined by the sum of the projected activity levels multiplied with the benchmark. The benchmark would not necessarily be set at the level of BAT or best practice, as this will not be economically feasible to achieve for all participants, but could e.g. be set at 10% above BAT. This allows for an easy assessment of the required effort for different countries. This harmonisation option would, however, require benchmarks to be available for all covered activities, which seems to be unlikely.
- All face same marginal abatement cost
  The least distortion in competitiveness (on average, assuming comparable vulnerability to competition) would be achieved if the effort required to stay within the cap in each country would result in the same marginal abatement costs. Information about marginal abatement cost associated with a specific cap is currently not available for all countries.

Effort of ETS sectors versus others

An important factor determining competitive distortion between Member States during Phase I was the difference in the expected contribution of ETS and non-ETS sectors to meeting the national emission targets. As also concluded in the LETS Update project[15], however, the relative contribution of the different sectors to the Kyoto targets (or other – post-2012 - emission targets) is difficult to determine:

- Is an equal contribution represented by a constant share of the sectors in total emissions (i.e. emissions increase or decrease at the same rate)?
- Is it represented by each sector developing similarly compared to its BaU emissions (all x% below BaU)?
- Is it represented by emission developments that represent equal marginal abatement cost for the different sectors?
- Or should differences between sectors in exposure to international competition be taken into account as well?

approach' below). For LETS Update reports see: http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/

[15] LETS Update Working Group C report, see: http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/

Harmonisation of the relative contribution of ETS and non-ETS sectors seems hard to achieve. Within the LETS Update project a methodology for assessing the contribution of the different sectors is proposed. It will, however, require significant effort to further develop and implement this approach. It involves a harmonisation of national modelling approaches. Until this has been achieved, it may be more feasible to aim for limiting distortion by increasing the transparency through harmonisation of the information that Member States have to provide on indicators, such as mentioned above.

Growth rates

- All using the same type of growth rates
  Many different growths have been used to set the cap and to allocate to sectors and installations in Phase I and II, e.g. based on expected developments in GDP, sectoral value added or sector or installation-level production, energy consumption or emissions. In many cases it has been unclear exactly which type of growth rates was used. This has made it difficult to assess the underlying trends in the projected growth in emissions and therefore the ambition level of a proposed cap. Prescribing the type of growth rate to use, or at least prescribing the definition of the growth rates used would facilitate the assessment process.
- All using the same level of growth rates
  Where growth rates are used in the allocation, either to set the cap or to determine the distribution of available allowances over sectors or individual installations, over-optimistic growth rates in some Member States can have a distorting effect on competitiveness. One approach to harmonisation would be the obligation to use the same growth rates in all Member States. As the economic development can be very different between different sectors, it would make most sense to do this at a sectoral level, i.e. have the same growth rate for the electricity sector for each country, then another common growth rate for the iron & steel sector. The cap would then be the sum of the projected sectoral emissions, with a compliance factor. This would not recognise real differences in growth rates between countries arising from differences in economic situation or the policy context (either economic policies or environmental policies).
- All using the same rules for determining growth rates
  A more promising approach may be to harmonise the way growth rates are determined, as was suggested in the LETS Update project. An example for this could be to define ranges in which the applied growth rates must fall. The ranges could be based on e.g. each country's previous submission to the Monitoring Mechanism

of the UNFCCC for the National Communication, or on historical growth rates.

It should be noted that future allocation may not be based on the expected growth rates in the different sectors, but more directly derived from environmental constraints. This would lead to a decrease in allowed emissions compared to base period emissions. Growth rates could still be used in parts of the allocation process, e.g. in the determination of the share of allowances to distribute to individual sectors (either under a national cap or an EU-wide cap).

Top-down versus bottom-up approach

Similarly to what was described before for the EU-wide cap, national cap-setting can involve top-down approaches, bottom-up approaches or a combination of the two.

- All use a top-down approach
  A top-down approach starts from the environmental constraint (i.e. the Kyoto target for Phase I and Phase II, emission targets still to be determined for post-2012) to determine allowed emission levels by ETS participants and non-ETS participants. Usually the approach will involve modelling of the expected growth in activity levels and emissions, taking into account current policies and measures. It assesses developments in all sectors in the same macro-economic modelling framework and also shows the development of non-ETS sectors. This allows for a link between the projected emissions in the ETS sectors and the progress towards the emission target. It provides a more consistent and independent projection of emissions than bottom-up approaches depending on industry growth forecasts.
  Not all Member States have used such an approach for Phase I, and certainly for a number of the smaller Member States modelling capacity for this type of analyses may be limited. In addition, modelling approaches can vary substantially between different Member States[16], which in itself can create distortion of competitiveness if the results are used in allocation.
  A harmonised approach in its simplest form could entail the obligation to use a top-down approach. In a more sophisticated approach, requirements for the modelling framework could be specified as well.

[16] See also the analysis carried out into modelling approaches in the context of the LETS Update project: http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/

- All use a bottom-up approach
  In a bottom-up approach, growth projections are determined for individual sectors and/or installations on the basis of industry expectations or expert judgement. This allows for using industry's expertise on technical and economic developments, emission reduction potentials and costs, etc. It may also provide a more up-to-date picture than modelling results for which the analysis may have been carried out a number of years ago. A main problem with industry-provided projections as a basis for allocation is the incentive to inflate the baseline by deliberately overestimating growth rates.
  A harmonised approach in its simplest form could entail the obligation to use a bottom-up approach. In a more sophisticated approach, requirements on possible checks and balances could be specified as well.
- All use a combination of top-down and bottom-up approaches
  A combination of top-down and bottom-up approaches allows for making use of industry expertise, but with the possibility of contrasting this against an independent, systematic and consistent set of projections that can also be linked to the progress towards the Kyoto targets.
  A harmonised approach in its simplest form could entail the obligation to use both type of approaches in the setting of the cap. In a more sophisticated approach, requirements on how to use the different results in the allocation could be specified as well (e.g. allocation is the average of the two approaches).

As indicated before, future allocation may not be based on the expected growth rates in the different sectors, or on sectoral emission reduction potentials and cost, and allowed emissions may actually decrease compared to the base period. Still, growth rates could be used in parts of the allocation process, e.g. in the determination of the relative share of allowances to distribute to individual sectors (either under a national cap or an EU-wide cap). Even if this is not the case, the different expected growth rates in different countries and different sectors are relevant in assessing the level of effort derived from alternative allocation approaches.

3.3.2 General allocation method

In the case where the cap is set at the Member State level, the following harmonisation options exist in relation to the general allocation method:

- All use only grandfathering
  This is more or less the default option, and would require the least effort in terms of harmonisation. This option would allow most of the distortion and perverse incentives that occurred in Phase I and look likely to continue in Phase II. Countries and/or operators that have taken significant early action may be less in favour as they are not rewarded for this and may be required to put in a similar effort for further reductions as laggards. Related elements to harmonise include the harmonisation of base period selection (see Section 3.3.3).
- All use full or a minimum share of auctioning
  Auctioning in general is thought to provide the best incentives for clean investments and limitation of undue distributional advantages. Often it is also thought of as a much simpler allocation methodology than those currently used. However, full auctioning could result in potential high cost for participants. Without compensation of the industries exposed to global competition, this would lead to reduced profitability and may cause production shifts[17]. Therefore the recycling of revenues would be crucial for the implementation of significant auctioning levels. At the same time, however, recycling of revenues creates a new distribution issue similar to the initial allocation issue that the auctioning would be replacing.
  Note that in the case where more countries assumed targets after 2012 the exposure of sectors to competition from outside the EU will be reduced and the issue of recycling may become less important.
  See Section 3.3.3 for a description of auctioning elements that could be subject to harmonisation.
- All use benchmarking for some sectors
  Benchmarking has the advantage that, if the benchmark is chosen appropriately, it can recognise the technological potential for emissions reductions. If the benchmarking system is designed appropriately, benchmarking would also allow for an easier assessment of the (comparability of) the ambition level of the allocation, leading to higher transparency. The design of such a system is however time-consuming and data-intensive and would require industry support and involvement.
  Harmonised benchmarking could be done by harmonising the 'benchmarking rules' and by harmonising the 'benchmarking values' (see Section 3.3.3).

[17] Assuming neither similar climate policy measures nor cross border taxation adjustments are in place.

- All use a combination of benchmarking and auctioning
  An approach that could limit the perverse incentives and undue distributional advantages of full grandfathering and may be more acceptable to industry, is a combination of free allocation on the basis of benchmarking with the possibility of buying additional allowances at an auction. The approach would still require the determination of an appropriate production (or activity) level to determine the part of the allocation provided for free and possibly a recycling of revenues for the auctioned part.

3.3.3 Distribution of allowances over sectors and installations

In relation to the distribution of allowances over sectors and installations, the following harmonisation options exist:

Sectoral elements

- Same sector definitions
  Except for full auctioning, allocation to installations will in most cases involve the use of sectoral elements (assumptions of growth rates and emission reduction potentials and cost, reduction factors, new entrants provisions). Therefore, it is important that installations are consistently categorised in the same sector in different Member States and that switching to another sector does not lead to an advantage over similar installations in other countries. In addition, consistent sector definitions reduce the risk of installations not being included in the ETS because they are located in sectors not mentioned in Annex I of the Directive.

Example of such harmonisation rules are:

- The sector 'lime production' will include all lime kilns that produce lime from limestone with a capacity over 50 tonnes per day, independent of their physical location. This includes kilns in the cement industry, the chemical industry, the pulp and paper industry, the food industry and any other industry.
- The iron & steel sector includes all processes for the production and processing of ferrous metals, including metal ore (including sulphide ore) roasting or sintering installations; installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2.5 tonnes per hour; and additional combustion activities at integrated steelworks including rolling mills, re-heaters, annealing furnaces and pickling.

- All use sectoral caps
  If all Member States were to use sectoral caps any impacts of such sectoral caps would be similar in the different countries. More importantly, though, sectoral caps (using consistent sectoral definitions) would facilitate the harmonisation of sectoral allocation methodologies across Member States.
- The use of EU-wide sectoral caps
  One further step towards harmonisation would be to set one cap per sector for the EU as a whole, and distribute the allowances under that cap according to one generally agreed methodology, as described in Section 3.2.2. This would, to some extent, allow for decoupling the determination of national sectoral allocations from the national political context.

Auctioning

If auctioning were to be used, several options for harmonisation exist that would provide greater certainty for market participants. These are described in more detail in another report from this project[18]. With the cap set at the Member State level, harmonisation could involve:

- The proportion of allowances to be auctioned as a percentage of the cap;
- The sectors which have to make recourse to auctioning, i.e. which receive a reduced amount or no free allowances. Auctioning may be especially appropriate for sectors that are currently experiencing distributional advantages by passing on the value of free allowances to their customers (such as the electricity sector). Sectors that cannot as easily pass on the cost of the allowances to their customers may be less suitable.
- Whether revenues are recycled and how. The revenues of auctioning can benefit the general government budget are can be (partly) recycled back to participants of the EU ETS. A partial (indirect) recycling could e.g. be based on a greening of the tax system (lowering labour tax), which would affect participants as well as other parts of the economy. A more direct recycling approach would distribute the revenues back to the participants only. In this case a distribution key would need to be developed to redistribute the revenues over the individual participants[19];
- The frequency of the auction;

[18] Hofman, Y., *Auctioning of CO_2 Emissions Allowances*, Ecofys, 2006.
[19] Examples are share in emissions, share in production, share in value added, share in employment, benchmarked on energy efficiency or carbon intensity, contribution to certain policy goals (e.g. renewable electricity generation).

- The auction methodology, e.g. English auction[20], Dutch auction[21], sealed bid auction, etc.
- Procedural elements, such as time lag between bid submission and taking ownership, assessment of creditworthiness of bidders, accessibility to participants from different sectors and countries and non-participants, etc.

Benchmarking

- All use benchmarks to determine the installation-level allocation (see Section 3.3.2)
- Use the same benchmark sectors
  Benchmarking is not feasible for all sectors. For a number of large, energy-intensive and relatively homogenous sectors benchmarking is already possible, for a set of others benchmarks could be developed over time.

> An example of this approach may be:
> - At the EU level specifiy that Member States should use benchmarks for sectors such as iron and steel, cement and the power sector
> - At the EU level specify that there should be, e.g.:
>   - Separate benchmarks primary and secondary steel; or
>   - The electricity generation efficiency should be corrected for the amount of extracted heat; or
>   - The benchmark should be corrected for the amount of waste fuels burned in cement kilns that reduce combustion efficiency but reduce waste.
> - Member States choose the level of the benchmark for these sectors.

- Use the same rules for determining the level of benchmarks
  Harmonisation can be carried out on the rules of developing the benchmarks. Such rules could e.g. include which products and technologies to distinguish and what correction factors to apply. It would define whether benchmarks are fuel-specific and/or technology-specific, for how many different products benchmarks should be developed or for which factors they should be corrected.

- Use the same benchmarks

[20] Ascending bids.
[21] Descending clock auction.

In addition to harmonisation of the benchmark rules, also the ambition level of the benchmarks (national average, world average, national best practice, world best practice) or the 'benchmarking values' could be harmonised.

- Using the same source for the production level
  To establish the allocation for installations, the emission benchmark per unit of production needs to be multiplied by an appropriate level of production. This could be a historic level, a projected level or a standardised level. The latter could be based on a standardised capacity utilisation factor.

An example of this approach may be:

- At the EU level specifiy that Member States should use benchmarks for sectors such as iron and steel, cement and the power sector
- At the EU level specify that there should be, e.g.:
  - Separate benchmarks primary and secondary steel; or
  - The electricity generation efficiency should be corrected for the amount of extracted heat; or
  - The benchmark should be corrected for the amount of waste fuels burned in cement kilns that reduce combustion efficiency but reduce waste.
- At the EU level specify that Member States should use e.g.:
  - The benchmark for electricity generation should be based on a gas-fired plant with an efficiency of 56% (without heat extraction); or
  - The benchmark for cement production should be based the world best practice efficiency level of 3.0 GJ/t clinker and the actual clinker content in cement.

This approach need not necessarily be combined with harmonisation of the benchmark value, so two alternative examples are:

- At the EU level specify that Member States should use a benchmark for cement, iron and steel and electricity generation;
- At the EU level specify for how many different products benchmarks should be developed or for which factors they should be corrected;
- Member States use national best practice for cement, iron and steel and power
- At the EU level specify that allocation is to be based on the benchmark and a historic level of production.

Or

- At the EU level specify that Member States should use a benchmark for cement, iron and steel and electricity generation;
- At the EU level specify for how many different products benchmarks should be developed or for which factors they should be corrected;
- At the EU level specify the value of the benchmarks;
- At the EU level specify that emissions are based on a projected level of production.

Other

- Use the same factors for clean technology (CHP)
  A harmonised treatment of CHP would be beneficial for the distortion of competition between CHP operators in different countries and between CHP operators and other heat and power producers. It would also provide a better incentive for clean technologies and improve transparency.
  Options for harmonisation include using the same definition for CHP and (if relevant) high quality CHP, using the same thresholds to distinguish high quality CHP and using the same type of incentive (bonus, earmarked segment in the new entrant reserve).
- Base period selection
  In Phase I, differences existed in which base periods were selected, how many base years were included in the base period, how the relevant emissions were calculated (e.g. average of the two highest years out of three) and the provisions to deal with missing base period data (what to do if only two years are available, instead of the required three). Although the effect of harmonising base period s on the level of allocation and distortion would be relatively limited compared to other candidates for harmonisation, it would significantly increase simplicity and transparency of the NAP.

3.4 Ambition level at the EU level and allocation rules at the Member State level

The ambition level could be set at the EU level, as discussed in Section 3.2. This has the advantage that the environmental effectiveness of the scheme is set at the start. In theory, allowing allocation rules at sector and installation level to be determined by the Member State, gives the option to include considerations of the national circumstances. However, there seem be limited options for determining allocation rules at the Member State level in case the ambition level is set at the EU level, unless the EU-wide (sectoral) cap is first translated into Member State caps. If this is not done, any choice made at the Member State level will affect the overall cap. The only other option is that a Member State would sum the installation-level allocation of its ETS participants and redistribute them over sectors and installations according to national interests and preferences. This would not affect the overall environmental outcome of the system, but would again allow to some extent real or perceived distortion of the market.

Options for the further harmonisation of the allocation to new entrants are the subject of a separate report under this project[22].

Table 2 shows the advantages and disadvantages of the different harmonisation options regarding allocation methodologies.

[22] Gilbert, A, and D. Phylipsen, *New entrants, closure and transfer rules in the EU ETS*, Ecofys, 2006.

Table 2 The advantages and disadvantages of different harmonising options related to the allocation methodology

Approach/rule	Harmonised approach	
	For	Against
Fully national approach (current approach)	Full flexibility to take into account national circumstances	No further harmonisation Potential distortion of competitiveness Unclear and potentially perverse incentives for clean technologies for the system as a whole because of differences between Member States Intransparent allocation possibly leading to over-allocation, low emission reductions and low carbon prices Intransparent market leading to price volatility
Approach to harmonisation		
Fully EU approach - both ambition level and allocation rules set at EU level	Environmental effectiveness defined up front Maximum harmonisation High transparency of allocation process	No possibility to take into account national circumstances.
Allocation rules at EU level, ambition level at national level	Harmonisation on main rules Some room for taking into account national circumstances Possibly less distortion than national approach because of fewer differences between MS	Environmental effectiveness depends on choices at national level Reduced room for taking into account national circumstances Less transparent than full EU approach

Approach/rule	Harmonised approach	
	For	Against
Ambition level at EU level, allocation rules at national level	Environmental effectiveness defined up front Some room for taking into account national circumstances	Very limited options unless EU-wide cap is translated to MS cap or emissions are redistributed among MS participants. Some room still for distortions because of Member State choices
General allocation approach (the allocation rules)		
All full grandfathering	Simple Low effort required for harmonisation	Less beneficial to early movers
All same proportion of auctioning	Limits distorting effects of different shares of auctioning (importance depends on revenues recycling approach)	No disadvantages of the harmonisation General disadvantage of any auctioning: May require recycling of revenues (depending on amount) to increase acceptability, leading to a new distributional issue
Same sectors for auctioning	Limits distorting effects of using auctioning for a sector in one country and not in the other Allows for applying auctioning to most appropriate sectors only, improving acceptability	See above
Same approach for recycling of revenues	Limits distorting effects of different revenue recycling approaches	Possibly difficult given the different taxation systems in different countries General disadvantage of recycling (also without harmonisation): May lead to difficulties in (judging) compliance

Approach/rule	Harmonised approach	
	For	Against
		with state aid rules
All use benchmarking	Takes into account early action, independent of when action was taken Distributes cost of emission reductions on the basis of remaining potential Allows for easier judgement of ambition level of allocation	Complex system with need for agreement on methodology and high data requirements Long lead time to develop benchmarks
All use combination of auctioning and benchmarking	Strengthens incentives for clean technology compared to full grandfathering	Relatively complex system Still needs a decision on which production level to use
Approach to setting the cap if done at Member State level		
Same distribution burden ETS sectors/ non-ETS sectors	Eliminates important cause of potential distortion	Very difficult to define and compare Links to many local social and socio-economic issues, therefore political acceptability may be low
All top-down approach	Less distortion than different national approaches Simpler and more transparent approach Less room for gaming by industry	Less room for incorporating industry expertise and expectations Differences in modelling approaches between MS leave room for distortion. May not be feasible in all MS because of lack of sufficient modelling capacity
All bottom-up approach	Less distortion than different national approaches May better reflect need for allowances	Large room for gaming by industry Difficult to judge by government and EC Difficult in MS with high number of installations

Approach/rule	Harmonised approach	
	For	Against
	as more up to date and based on industry expertise No need for modelling capacity	
All combination of top-down and bottom-up approach	Less distortion than different national approaches Allows for using industry expertise while limiting gaming by contrasting industry expectations with modelling results	May not be feasible in all MS because of lack of sufficient modelling capacity Difficult in MS with high number of installations
Use same growth rates for sectors (compliance factor determined at the national level)	Simple to apply and provides more clarity to the allocation No possibility to inflate baselines For sectors with international markets in particular, would limit better competitive distortions	For some sectors, actual developments may differ substantially between different MS, e.g. because of economic situation. For these sectors, it could imply a greater level of effort in some MS
Use same rules for determining growth rates (compliance factor determined at the national level)…	Limited room for inflating baselines Better potential for reflecting real differences between national circumstances whilst limiting competitive distortions More clarity on assumed growth rates than is the case now.	More complex than applying the same growth rates Still some room for countries to inflate baselines .
Same percentage under BaU	Less distortion than with different percentages under (or above) BaU	BaU scenarios represent very different levels of effort, i.e. amount and stringency of policies

Comment [A1]: Harmonisation would be on the sector growth rate – the compliance factor would be determined by the MS otherwise this would be the same as a sectoral cap

Approach/rule	Harmonised approach	
	For	Against
		already implemented.
Use benchmarking to set the cap	Allows for easier assessment and comparison of ambition level/required effort[23] Reflects early action and remaining emission reduction potential	Benchmarks are not available for all activities covered by the ETS. See also above under 'All use benchmarking'
Base cap on marginal abatement cost	Least distortion of competitiveness (on average)	Data not available for all countries Still differences in marginal abatement cost between different sectors, so still distortion at a sectoral level
Distribution of allowances to sectors and installations		
All use sectoral caps	Allows for easier harmonisation of allocation methodologies in specific sectors General advantage (also without harmonisation): Allows for shielding specific sectors from effects of the allocation methodology in other sectors	No disadvantages of the harmonisation Increases complexity of the allocation process Requires development and application of consistent sectoral definitions
Use one EU-wide sectoral cap	Minimises distortion within a sector Allows for easier harmonisation of allocation methodologies in specific	Reduces Member States' flexibility to take into account national circumstances Link with national targets is weaker, which may

[23] Note that the benchmarks will need to be designed carefully for longer-term cap setting as over time more abatement technologies are expected to become available and they need to be reflected in the benchmarks.

Approach/rule	Harmonised approach	
	For	Against
	sectors	lead to a higher overall sectoral cap
Consistent sector definitions	Less possibility for gaming by choosing different sector with more favourable growth rate, therefore less distortion Lower risk of installations being left out of ETS because of different sector categorisation	Less flexibility Work required to develop consistent definitions
Use same benchmarking rules	Less distortion than with non-benchmark based approach or national benchmark approaches	Still distortion caused by different ambition levels reflected in the benchmark values
Use same benchmarking values	Maximum comparability of allocation between countries Allows for easier judgement of ambition level of allocation	Less room for taking into account national or sectoral circumstances and preferences
Same approach CHP	Less distortion between different CHP operators in different countries Comparable incentive for CHP relative to other heat and power producers in different countries Increased transparency, reducing risk of over-allocation	Less flexibility to take into account national circumstances
Same base periods	Less distortion than national approach	Only relevant in case grandfathering will be used Relatively small impact compared to other candidates for harmonisation

3.5 Conclusions

In addition to the options for harmonising new entrant rules discussed in a separate paper, the most promising options for the harmonisation of allocation methodologies in terms of improvement of incentives and transparency, limitation of distortions and practical feasibility include:

Ambition level:
- EU-wide cap;
- EU-wide sectoral caps;

Allocation rules:
- Similar sector definitions;
- Combination of top-down and bottom-up approach to determine the cap;
- Use of similar definition and rules to determine growth rates;
- Combination of benchmarking and auctioning;
- Use the same sectors for benchmarking and/or auctioning;
- Use same benchmarking rules and/or values;
- Same approach to CHP;
- Identical base period.

4 Requirements for further harmonisation

Here we will discuss the requirements for a successful implementation of the various harmonisation approaches selected in Section 3.5, focussing predominantly on practical feasibility. Each section first discusses what elements can be harmonised, then sets out the steps needed to achieve the harmonisation and describes the data availability for these steps.

4.1 Use single EU-wide cap

What to harmonise

The EU-wide cap harmonises the ambition level among installations in different Member States and guarantees upfront the environmental outcome of the system.

Steps to be taken

The following steps must be taken to implement the approach:

- Agree on the ambition level of the overall environmental constraint, translated into an economy-wide emission constraint. A first step in this is provided by the Spring 2005 Council Conclusions;
- Agree on whether post-2012 targets for the economy as a whole will be translated to the Member State level.
- If so, decide whether Member State targets will cover all sectors and sources or only those not covered by the EU ETS;
- Decide on the contribution of ETS participants and other sectors and sources to the overall emission constraint;
- Decide on what the general allocation methodology will be (auctioning, grandfathering, benchmarking, combination);
- Decide on whether allocation will be done in a one-step, 2-step or 3-step process. In case the cap will be translated into EU-wide sectoral caps in a 2-step process, Section 4.2 describes the steps required for this step.
- Decide on the degree to which the more detailed allocation rules need to be harmonised (see Section 3 for general discussions on harmonisation options, and Sections 4.6 to 4.11 for

more detail on steps to be taken for achieving further harmonisation);

Data availability

To gain agreement on the overall ambition level, information on the environmental effects of climate change and the acceptability of changes is crucial. This information is sufficiently available and discussions on this topic have been held widely within the EU (see e.g. discussions on maximum temperature increase in many EU submissions to the UNFCCC and in other EU documents, e.g. the 2005 Spring Council Conclusions).

The environmental constraint needs to be contrasted against information about technical feasibility of emission reductions, the associated costs within the EU and the availability and costs of reductions via the Kyoto project mechanisms. Here it is important that this is done within a common framework rather than with different models and assumption in different Member States. Work on this has been in the past in the project 'Economic Evaluation of Sectoral Emission Reduction Objectives for Climate Change'[24] (2001, 15 EU Member States). An update of this study, SERPEC, will start soon[25] and will expand the work to 27 Member States. Results should be available in September 2008.

The above-mentioned update will also be important in assessing the impacts and/or deciding on the contribution of different sectors (ETS and non-ETS) to the overall emissions constraint, the development of potential EU-wide sectoral caps (see Section 4.2), and other choices related to the allocation methodology.

4.2 EU-wide sectoral caps

What to harmonise

The EU-wide sectoral cap harmonises the ambition level among installations in different Member States for certain sectors. Under the EU-wide sectoral cap, assessment of comparability of effort between different Member States can be easier and further harmonisation of sectoral allocation methodologies is facilitated.

[24] http://ec.europa.eu/environment/enveco/climate_change/sectoral_objectives.htm
[25] SERPEC-CC (Sectoral Emission Reduction Potentials and Economic Costs for Climate Change) awarded under the 6th Framework Programme, submitted by the same consortium responsible for the Sectoral Objectives project.

Steps to be taken
This approach would require:

- In case post-2012 targets will (also) be defined at the Member State level, decide how the EU-wide sectoral caps relate to Member State targets;
- At the EU level, agree on common sector definitions and which types of installations are included and which are not (see Section 4.3). This includes taking into account identifying which participants compete against each other to make sure that all relevant installations are included within the same sector, covered by the same approach[26];
- Decide on whether the emission reductions required under the EU-wide sectoral caps are the same for all sectors, i.e. the same as the reduction required under the EU-wide cap for the economy as a whole;
- If not, decide on which differentiation factors need to be taken into account in setting sectoral caps for each of the sectors;
- At the EU level agree on the cap for the various sectors, the rule for allocation and its specific values

Data availability
The above-mentioned SERPEC project will also be important here to assess the impacts and/or decide on the contribution of different sectors to the EU-wide cap.

Development of common sector definitions under EU-wide sectoral caps will require detailed sectoral knowledge on a large number of sectors. This issue and the potential consequences of harmonisation for other policy areas using sector definitions are discussed in Section 4.3.

4.3 Common sector definitions

What to harmonise
The use of EU-wide sectoral caps will require clear and harmonised sector definitions. In addition, possible further harmonisation of allocation methodologies on a Member State level is likely to be sector-dependent. In this case, clear sector definitions must be provided. If growth rates are used in future allocation, either

[26] E.g. for electricity producers: can the approach be applied to the large stand-alone power producers or should it also be applied to process-integrated CHP units and smaller on-site generators?

to decide on allocation levels or to assess efforts under an allocation derived from other approaches, harmonised sector definitions are also important.

Steps to be taken

This approach requires:

- At the EU level, determine sector definitions for the sectors mentioned in (including those added to) Annex I of the Directive, specifically listing all the individual installation types included. This should also address overlap between sectors included in the ETS, e.g. lime kilns (part of the mineral industry in Annex I) that are located in the pulp and paper industry (mentioned as a separate sector in Annex I), and overlap with sectors not covered in the ETS, e.g. lime plants in the chemical industry.
- At the EU level determine in which sector the various combustion plants should be categorised. This includes questions such as which sub-divisions to use for electricity producers (CHP separately, different technologies separately, different fuels, on-site/off-site, etc).
- At the EU level define rules for dealing with energy and carbon flows that cross sector boundaries in the allocation, for example CHP plants providing heat to industry and power to the grid.
- At the national level determine whether the location and ownership of a plant is relevant for either benchmark methodology or recycling of revenues of auctioning, if applicable. Examples could be if the benchmark depends on locally available raw materials or if the installation is located within a different industry[27], covered by a different tax regime.

Data availability

As became evident in the discussions in the implementation of Phase I and II on the definition of combustion installations, information on sectoral definitions and which type of installations are included or excluded, is not always readily available. Sources such as the CITL or the individual NAPs do usually not include sufficient specification of this kind. In some Member States, information such as capacity, which could be useful for benchmarking, is collected as part of the NAP development or permitting process. This level of information is not universally available though, even in those countries where it is nominally collected.

[27] E.g. a lime kiln on a paper production site

Information such as the capacity of an installation, production rates, sectoral definition etc would be useful for various purposes, e.g. developing sectoral caps or allocation methodologies, benchmarking, etc, and might be collected during permitting and stored in the CITL. There are however commercial sensitivities with certain of these data, which might limit the extent to which they could be published. The legal basis for collecting the data may also need to be strengthened.

Development of common sector definitions under EU-wide sectoral caps will require detailed sectoral knowledge on a large number of sectors. Partly, this can build on the expertise available within the national emission authorities and e.g. energy agencies. It is likely though that more technical expertise would be required.

It should be noted that different sector definitions may exist at the moment for other purposes than the EU ETS, e.g. other EU or national legislation and statistics. Examples of legislation may include environmental permitting and the IPPC Directive, the RES-E Directive or national voluntary agreements. EU ETS sector definitions in the past may have been linked to those other areas. These areas can provide a starting point for developing a common set of definitions and cross-sector carbon flow accounting rules.

International energy statistics (and derived carbon statistics[28]) may be a useful starting point. Organisations such as the IEA and Eurostat have experience with improving the consistency of many national definitions and accounting rules in the compilation of their international data sets. This means they are aware of the main issues in such a harmonisation and have already identified some of the differences between national approaches.

Given the sectoral aggregation level in energy statistics, it is likely that extra effort will be needed, especially for smaller sectors such as the sub-sectors of the non-metallic minerals industry (cement, ceramics, glass), non-energy sector combustion installations and potential future participants in e.g. the chemical industry and the non-ferrous metals industry. Also, non-combustion emissions (process emissions of CO_2, non-CO_2 emissions) are not covered in current statistics.

[28] E.g. IEA's CO_2 emissions from fuel combustion

At the same time as providing a starting point for further harmonisation, the existence of the different conventions in other areas of legislation and statistics raises a concern about consistency of the rules and definitions in the different areas. It needs to be considered to which extent harmonising sector definitions for the EU ETS will affect those other areas. It seems unlikely that any new set of rules developed and harmonised for the EU ETS will become the standard for all other areas of policy making as well as for the statistics. Therefore, considerable attention is needed to the possibility of translating between the different sets of data and definitions and limiting the reporting burden for sectors.

As a preparation for the harmonisation of sectoral definitions, information can be requested in the permitting procedure under the ETS Directive on the current categorisation and sector definitions. To limit the required effort and knowledge of the permit applicant and ensure matching national definitions to any future common definitions, work would need to be done in advance. This would entail devising a questionnaire or template that guides the applicant through questions such as:

- What is the main product of your installations and what are by-products?
- Does this fluctuate over time?[29]
- Are you independent (supplying to the general market) or do you supply to a specific plant/company? If the latter, what is the main product of that plant company?
- Is that supply guaranteed by a contract only, or are there also physical links (grid connections, steam pipes, etc)?
- Besides the products described above do you supply any energy or material streams to other installations or parties (e.g. waste energy, waste materials, CO_2, etc)? If so, to which sector do they belong?

The monitoring procedure should include provisions for monitoring the energy and material flows to other installations as well as for signalling any occurrence of switching sector categories over time.

The CITL would need to indicate the sector categorisation. This should start with clearly defining the current sector delineation. When the differences in sector definitions across Member States

[29] For certain types of plants what is considered the main product can vary over time, e.g. because it is dependent on the input materials used (petrochemical plants, pulp & paper plants). This means that in some statistics their sector categorisation can change from one year to another.

have become clear this could be extended to include a 'translation scheme', which allows linking the national categories to common EU categories. It would also need to be considered whether the CITL would need to reflect cross-sector energy and material streams (as far as not covered in the monitoring and reporting, i.e. reflected in the verified emission data).

4.4 Combination of top-down and bottom-up approach to determine the cap

What to harmonise

For a meaningful implementation of the combined top-down and bottom-up approach (in case growth rates an emission reduction potentials and cost are used to determine national caps), Member States must use reasonably comparable modelling frameworks and approaches.

Steps to be taken

This approach requires:

- At the EU level evaluating and comparing current national modelling approaches
- Developing new modelling capacity where this is missing
- Improve consistency of modelling approaches between Member States. This may also be achieved by (also) using scenarios from EU (Primes) modelling.
- At the EU level identify and agree on possible checks and balances on the bottom-up projections (e.g. comparing with historic projections, independent projections)
- At the EU level agree on how to use both top-down and bottom-up information to determine the allocation (up to Member State, use average of the 2 approaches, etc).

Consistency of modelling should at least include:

- Inclusion of all greenhouse gases
- Inclusion of all sectors and the use of comparable sector definitions
- Modelling of effectiveness of implemented policies and measures[30]
- Using a similar time horizon (base years and target years)

[30] Not simply including e.g. the target of a voluntary agreement as a given, but estimate how much of the target is going to be reached given the design of the policy instrument (e.g. incentives, sanctions)

- Using comparable macro-economic indicators (global and regional GDP growth, population growth, energy prices).

It must be noted that the above would not only benefit the EU ETS. The mentioned lack of modelling capacity and consistency of approaches also causes considerable problems in the context of the EU Monitoring Mechanism.

Data availability
The harmonisation of modelling approaches meeting the above-mentioned criteria will require substantial modelling and analytical capacity in some Member States. An alternative is the adoption of e.g. the PRIMES scenarios as leading in decision-making on the ETS. This will however lead to discussions with Member States about the suitability of PRIMES to model their national circumstances and policy implementation.

4.5 Use of similar rules to determine growth rates

What to harmonise
In case national or sectoral allocation takes account of growth rates, it will be necessary to assess whether growth rates are inflated or not to limit competitive distortion. This is difficult to say with certainty, but some guidance might be possible.

Steps to be taken
This approach would require:
- At the EU level identify which type of growth rates could be used in the allocation process (e.g. GDP, emissions, energy consumption, production; historic or projections)
- At the EU level agree on the definitions of the different types of growth rates (economic units, physical units, sector definitions)
- At the EU level define the obligations for Member States to provide information on the various types of growth rates in NAPs, Monitoring Mechanisms, National Communication
- Analyse relations between the different growth rates and if possible define rules to determine the (range of) growth rates. These could e.g. be based on a maximum defined deviation

from historic growth rates or a maximum deviation from EU level sectoral growth rates[31].

- Define exceptions in which growth rates used in the allocation can exceed those determined by the rules, and which procedure to follow in that case. This could for instance include a situation where historic growth rates can clearly be shown not to be representative (e.g. extremely different weather patterns, disruption of fuel or material supplies, major change in economic situation).

Data availability

Different definitions used for growth rates have been identified in the Lets Update project[32] and could be used as a starting point for discussions. For the definition of rules, information on growth rates as currently used and their relationship is needed to provide an empirical basis. Lets Update has shown that this information is currently either not available or not clearly defined. Some data should be available from the tables to be submitted with the NAPs as requested by the Commission in the 2nd Guidance Document. This will however not be sufficient. Also, the issue of growth rates should be dealt with in parallel to sector definitions, to ensure the consistency.

4.6 Combination of benchmarking and auctioning

What to harmonise

In this combination of benchmarking and auctioning as the general approach to allocation (for all or some sectors), benchmarking is used to distribute a basic amount of allowances for free based on a relatively ambitious performance benchmark and a certain production level. Operators that cannot meet the benchmark may buy additional allowances in an auction or on the market. A decision on the balance between the benchmarked allocation and the auction will need to be taken at the start of the process. At one level, benchmarking could determine a large part of the allocation (say 90%) and at another, a more even balance between benchmarking and auctioning could be considered. As the proportion of benchmarked allocation decreases simpler benchmarks could be used while costs to industry would increase in the

[31] See also the LETS Update project for a more elaborate example of such a rule. : http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/

[32] See Working Group C report: http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/

absence of recycling of auction revenues. Where benchmarking is a more significant part of the allocation, more effort would be needed to develop and agree those benchmarks.

Steps to be taken

The following steps must be taken to implement the approach:

- At the EU or national level determine the balance between benchmarking and auctioning
- At the EU level agree on which sectors are suitable for benchmarking (see also Section 4.8 on harmonising sectors for benchmarking);
- At the EU level agree on common sector definitions (see also Section 4.3 on harmonisation of sector definitions);
- At the EU level agree on benchmarking rules and benchmarking values (see also Section 4.9 on harmonisation of benchmarking methodologies);
- At the EU level agree on how to determine the activity/production level to use with the benchmark - historic, recent, forecasted or a benchmark in itself;
- At the national level determine growth rates to calculate the total amount of free allowances if forecasting is selected from the four options above (see also Section 4.5 on harmonisation of growth rates). If benchmarking is combined with the sectoral caps approach discussed in the previous section, this may not be needed (see discussion on page 23);
- At the national level determine whether and how auctioning revenues will be recycled;

Data availability

The main area for further work for this approach is the development of benchmark rules and values. Data availability for this is described in Section 4.9. It is important to note that, in combination with EU-wide sectoral caps the work on benchmarking can be limited to those sectors where benchmarking is relatively easy.

Where the production level to be used in combination with the benchmark is based on growth rates, the harmonisation of these growth rates is important. Data availability for this is described in Section 4.5.

4.7 Using the same sectors for auctioning

What to harmonise

For this approach, the sectors suitable for auctioning should be identified. This will in general be sectors that are less exposed to competition outside Europe and can pass on the cost of the allowances to their customers. It must be noted that in case more countries adopt stringent climate targets on the longer term the argument of exposure to outside competition will become less relevant and the scope for auctioning would increase.

Steps to be taken

This approach would require:

- Assessment of the value at stake in sectors
- Assessment of the international exposure of sectors
- Assessment of the possibility of pass-through of cost
- At the EU level agree on the sectors suitable for (different degrees of) auctioning

Data availability

The international exposure of sectors can to some extent be obtained from import/export statistics. A proper assessment of the above issues may need improved modelling capacity. Earlier analyses in the LETS Update project[33] suggests that current models cannot appropriately deal with these issues, because sectors are not modelled at a detailed enough level or are limited to one country.

4.8 Using the same sectors for benchmarking

What to harmonise

For this approach, the sectors suitable for benchmarking should be identified. This will in general be sectors that are energy or carbon-intensive and have a relatively homogenous product mix.

Steps to be taken

This approach would require:

- Assessment of the carbon intensity of sectors (this does not have to be done at a country level but a generic level)

[33] See e.g. the Working Group A/B report on expansion to other sectors and the Sustainability Appraisal report: http://www.environment-agency.gov.uk/business/444217/590750/590838/1294204/1295326/1291719/

- At the national level assess the different products, technologies, fuels and input materials used
- Identify which of these are relevant to distinguish in benchmarking
- Identify which sectors have a sufficiently low number of required benchmarks
- At the EU level agree on the sectors that are suitable for benchmarking

Data availability

A substantive amount of work has been done on the development of methodologies for benchmarking, whether in the context of the EU ETS, national policy development, industrial commercial benchmarks or analytical work. This work can be used to identify sectors that are suitable for benchmarking and a first step in identifying products, technologies, fuels and input materials to be distinguished. Examples are the work on benchmarking in the UK in the context of the EU ETS[34], voluntary agreements in the Netherlands, Belgium and New Zealand, the Solomon benchmarking for refineries and the petrochemical industry[35] and the INEDIS network[36].

Information on national products, technologies, fuels and input materials could be partly obtained from statistics, but will partly also need to be determined with industry associations and experts.

4.9 Use same benchmarking rules and/or values

What to harmonise

The benchmarking rules basically describe which products, technologies, fuels and input materials are relevant to distinguish in a benchmarking approach, as mentioned in the preceding harmonisation option. This can be done either by developing separate benchmarks for each of the relevant factors or by incorporating correction factors for each of them.

[34] Both for new entrants (Phase I - FES, Phase II - NERA) and incumbents for phase II (Entec-Nera);

[35] Results are not publicly available. Solomon considers the results to be owned by its clients. Therefore, Solomon data have been used in public policy studies before, be it on an aggregated basis, after permission for use had been obtained from some of the participating companies (see 'Benchmarking the energy efficiency of the Dutch energy-intensive industry' in: Phylipsen, 2000: *International Comparisons & National Commitments; analysing energy and technology differences in the climate debate*, PhD).

[36] International Network on Energy Demand analysis In the Industrial Sector. See also the 'Handbook on International Comparisons of Energy Efficiency in the manufacturing Sector' developed in this context.

In addition, in the context of the EU ETS the rules need to provide which activity/production level to use in combination with the benchmark - historic, recent, forecasted or a benchmark in itself.

Steps to be taken

This approach requires:

- Definition of and agreement on a methodological approach to define the rules in a consistent way across sectors. An example of such an approach is to use output-based benchmarks only, meaning that different benchmarks are used for different products. Different technologies will only have different benchmarks if they lead to different products. In this example, electric arc furnaces (producing secondary steel) would have a separate benchmark from basic oxygen furnaces (producing primary steel). On the other hand, two different technologies, using two different types of raw materials, but both producing the same ammonia (partial oxidation of oil residues and steam reforming of natural gas) will only have one benchmark (based on the least carbon-intensive route). Other rules could be added, e.g. related to security of supply (fuel-specific benchmarks in the electricity sector) or the availability of input materials (e.g. limited availability of scrap metals).
- Apply the methodology to the different sectors to identify the benchmarks to be distinguished and the correction factors to be applied in each sector
- At the EU level agree on the benchmarks and correction factors to be applied
- At the EU level decide whether or not to harmonise the benchmark values
- If benchmark values are to be harmonised, agree on the general ambition level. This means agreeing on whether the benchmark value should represent e.g. the national, EU or global average value or the national, EU or global best practice value.
- Agree on whether benchmarking should take place on the basis of CO2 emissions or energy consumption and whether load factors should be benchmarked as well.
- Establish and agree on the numerical values of the benchmarks.

Data availability

As indicated in the previous section, a substantial body of work is available on benchmarking. Methodological approaches to act as a framework to develop comparable benchmarking sectoral methodologies exist that have been developed in international expert groups[37]. More recent work on further refinement of methodologies has been carried out. In addition, benchmarks are used in industry for other purposes than the EU ETS (e.g. International Iron & Steel Institute, Solomon).

In addition, information on actual performance levels (in GJ/t of product or t CO_2/t of product) is available for certain sectors, e.g. from commercial benchmark studies, the Dutch benchmarking covenant and other similar national policy initiatives. An issue that may need to be addressed is the confidentiality and ownership of the data in relation to the requirements of publicly available information in the context of the EU ETS. Also in analytical work, much has been done to collect credible information on actual performance. From this, for selected sectors either information on best practice is available[38] or a distribution of actual plant performances of plants around the world[39].

Further work will be needed to make e.g. energy efficiency benchmarking applicable to CO_2 benchmarking for the various sectors, or to develop benchmarks for sectors that have not been sufficiently covered in the various sources mentioned above. For some sectors with a highly diverse product portfolio, benchmarking will not be feasible or meaningful.

IPPC BREFS are often mentioned as a source for benchmarking data. However, in general it can be questioned whether BREFs are really suitable for this purpose. BREFS have been developed for other purposes, i.e. looking at Best Available Technology from a broader environmental point of view, not from the more limited energy or GHG emissions point of view. Energy and GHG emission data in the BREFS are limited. In addition, data in the BREFS often do not represent actual BAT, but often more 'typical' figures or averages.

BREFs might be further developed for the purpose of benchmarking. However, in doing so, they would loose their value for their

[37] 'Handbook on International Comparisons of Energy Efficiency in the manufacturing Sector'
[38] Lowest energy consumption or GHG emissions per unit of relevant product observed worldwide, e.g. for iron & steel, cement.
[39] E.g. for refineries, petrochemical plants, ammonia plants.

original purpose (broader environmental optimisation). A similar approach to developing the BREFs could be followed that are dedicated to identify best practice in terms of GHG emissions, but much of the work would need to redone from this narrower perspective. The joint approach with industry as followed in the BREFs is vary valuable for the development of benchmarks as well, as industry expertise and support are indispensable in this process. It mist however be prevented that industry involvement leads to a weakening of the ambition level of the identified BAT or best practice. The decoupling of the technical exercise of developing the benchmarks from the political end they will be used for may be difficult.

Ideally, the CITL would not only list verified emission per installation but also production data. However, such data are generally considered to be highly commercially sensitive. A starting point could be to include the installations' capacity in the database (according to a common definition). In addition, it could be required that participants that are interested in receiving a benchmark-based allocation[40] report their production voluntarily in the CITL. It must be noted that if production data are to be used for establishing the allocation, verification of these data may be necessary[41]. Additional information required for developing benchmarks could be collected in the CITL as well (product types, technology types, etc). However, confidentiality issues are likely to become stronger as more details at the plant level become public.

4.10 Same approach to CHP

What to harmonise

In case there is general agreement that CHP should enjoy preferential allocation rules in the EU ETS, a harmonised approach across countries and sectors is preferable.

Steps to be taken

This approach requires:

- Define what qualifies as CHP (e.g. does this also include large power plants from which waste heat is extracted for district heating? Does the installation have to work in CHP mode constantly or only part of the time?)

[40] Or an allocation based on their share in a sector's production or a projected growth in production

[41] Note though that this has not been done in many Member States in Phase I.

- At the EU level agree on whether or not to distinguish high efficiency CHP from other CHP
- If such a distinction is made, agree at the EU level on the definition of high quality
- At the EU level agree on what preferential allocation rule should be applied to CHP (CHP bonus, CHP reserve)
- Agree on the level of the incentive (maximum allowed bonus, size of CHP NER)

Data availability

The CHP Directive[42] is the reference piece of European legislation for the cogeneration sector. In the CHP Directive cogeneration is defined as "the simultaneous generation in one process of thermal energy and electrical and/or mechanical energy". This category includes a range of facilities from the large CCGT (combined cycle gas turbine) power plants to small scale cogeneration units with installed capacity below 1MW to even smaller micro-cogeneration units with a maximum capacity of 50kW[43]. However, no conclusive definition of CHP plants is provided that is useful for the discussions here. It also does not specify if CHP units should be operating in continuous CHP mode or not to qualify as CHP.

High Quality CHP is referred to as High Efficiency in the CHP Directive. High efficiency cogeneration installations are those that can reduce primary energy use by at least 10% by combined production instead of separate production of electricity and heat. The categorization of CHP into High Quality CHP and CHP is not embraced in all Member States. Those countries adopting this distinction have suggested their own definition of high efficiency CHP and this is reflected in the respective NAP. These are Austria, Poland, Sweden and the UK[44]. In the UK, the definition of High Quality CHP is detailed in the CHP quality assurance standards report[45] that might be a useful starting point for further discussions on definitions.

[42] Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEDirective 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EE
[43] Annex I lists the type of units and technology covered by the Directive.
[44] In Austria only a 5% reduction of combined generation compared to separate generation is required. Poland the minimum efficiency of combined generation is set at 65%.
[45] https://www.chpqa.com/guidance_notes/documents/Standard_-_FINAL_VERSION.pdf

Under the CHP Directive the production of heat through cogeneration must be consistent with demand. Additional support for the ETS has to be considered together with existing national incentives under the CHP Directive to avoid double dipping. Compliance with Criteria 1 and 3 of the ETS requires consistency with EU and national policies and the need to consider whether additional support from ETS is necessary in addition to existing policies.

4.11 Harmonisation of base period selection

What to harmonise

In case grandfathering would (partly) be used for the allocation, a base period needs to be selected. Often, operators have the choice to leave out years that can be argued to be not representative.

Steps to be taken

This approach requires:

- At the EU level agree on whether base period selection (rules) should be the same for all sectors
- At the EU level agree on how many base years to use in the base period
- At the EU level agree which base years to use (or pose limits to how far back years can be chosen by Member States)
- At the EU level define rules for dealing with missing base period data

Data availability

Data will need to be gathered for the agreed base period. Selection of a base period that corresponds with what most Member States are using will limit the effort required. On the longer term, data availability will be less of an issue as data will be collected continuously under the EU ETS. Only for newly added sectors, sources and countries effort may be required.

5 Conclusions

A number of options for further harmonisation have been identified in Section 3 and their pros and cons have been described. For the most promising options, Section 4 describes which steps need to be taken to implement the option.

The key choice is whether caps are in the future agreed at the EU level or whether they continue to be determined decentralised at the Member State level in accordance with more or less operational common criteria. An EU-wide approach to cap-setting offers a broader range of options to harmonise allocation rules at the sector and installation level, while harmonisation options remain limited with national cap-setting.

A number of the options assessed can have a considerable impact in terms of limiting distortion and improving incentives but will require a substantive amount of work. This includes harmonisation of the use of a combination of top-down and bottom-up approaches, the use of benchmarking and sector definitions.

Other options are easier to harmonise, but only represent relatively limited improvements compared to the current system. This includes options such as harmonisation on grandfathering and harmonisation of the base period selection.

It must be noted that a number of elements for further harmonisation discussed in the previous sections as individual harmonisation options are relevant or required for some of the other options. This includes common sector definitions and the determination of growth rates.

Note that the important harmonisation options relating to new entrants, closure and transfer rules and the definition of combustion installations have not been discussed here, as they have both been addressed in separate papers.