

Policy Department
Economic and Scientific Policy

The future elements of the EU Emission Trading Scheme

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EXECUTIVE SUMMARY

On 1 January 2005, the EU Emission Trading Scheme (EU ETS) commenced. The legislation behind the scheme is the European Commission's Directive 2003/87/EC, within which Article 30 requires a review report of the EU ETS should be submitted to the European Parliament and the Council.

In response to the requirements of Article 30, the Commission published a Communication "Building a global carbon market" ⁽¹⁾, dated 13th November 2006. In this communication the Commission argued the need for experience and evaluation of the key issues. It therefore established a review process, involving consultation with stakeholders, with a view to producing legislative proposals that would take effect at the start of the third trading period, i.e. at the start of 2013. The consultation process would be carried out through a separate Working Group on the Review of the EU ETS within the framework of the European Climate Change Programme (ECCP). The Communication committed to producing a legislative proposal in 2007.

The European Parliament supported the establishment of the EU ETS, but has also pushed for its review. On 28 June 2007, the Environment Council adopted Council conclusions calling for a full review of the EU ETS. This study aims to assess some of the key issues regarding the future of the EU ETS. Whilst not attempting to cover the entire spectrum and depth of the ongoing review, the study aims to address specific issues identified by the European Parliamentary Committee on Industry, Research and Energy (ITRE) based on existing data and the author's expertise. In addition to a summary of the current EU ETS review process, these issues include:

- Allocation mechanisms in different Member States;
- The potential extension of the scheme to other transport areas, specifically automotive and marine;
- The future global setting in relation to the EU ETS including developments to the JI/CDM instruments and linking with other external emission trading schemes.

Determining caps and allocation mechanisms

A concern about the current design of the scheme expressed by many operators and would-be operators of large installations in sectors covered by the scheme is that there is too much uncertainty regarding the length and caps for future phases and the treatment of new entry and closure. The current nationally driven National Allocation Plan process is a major source of uncertainty both in terms of the overall cap and the allocation of allowances between and within sectors. The allocation of allowances to incumbents and new entrants is of major importance to participants in the scheme, since it affects their future economic prospects and competitive positions. With regard to allocation we find:

- It appears preferable to determine the overall cap at EU level, rather than the current process of nationally determined caps aggregating to an EU cap, since this is more likely to be effective at ensuring scarcity and should be a simpler, more predictable, process. This would also decouple the issues of ensuring scarcity and fair allocation.
- The decision on the length of cap to be set is a matter of finding a balance between providing longer term certainty and avoiding an expensive lock-in of a target that is difficult to achieve these two issues. For Phase III a cap in excess of 5 years is desirable, probably to 2020. In addition consideration should be given to setting a long term cap and having intermediate sub-phases over which allocations are fixed.

¹ COM(2006)676 final of 13 November 2006
IP/A/ITRE/ST/2007-08

The benefit of this is that the clarity on the overall cap would be maintained yet there would be flexibility to accommodate sector growth rates that deviate from the initial expectation.

- Any adjustment to the cap (for example in response to the EU adopting a 30% reduction target) should be according to a pre-established formula or even to a revised value established before the phase, in order to minimise the uncertainty that such adjustments would introduce.
- The approach to Phase II allocation across the EU lacked harmony, although many Member States took small steps away from grandfathered allowances towards greater use of auctioning and benchmarking. Looking forward, however, it is difficult to see how this evolutionary approach could lead to a harmonised scheme, suggesting that if harmonisation is to be a priority, the Commission needs to take action to more closely define the methodologies for installation level allocation, perhaps with specified levels or ranges for auctioning and principles to be applied in benchmarking and possibly grandfathering methods.
- Regarding so-called windfall profits for power generators, the extent to which this arises depends on the nature of national markets and indeed individual companies within the same market would be affected differently. Whilst there appear compelling arguments for reducing free allocation to power generators in response to this issue, a uniform approach across the EU would favour companies in countries with more liberal markets since they would have greater opportunities to pass on their carbon costs.
- The potential for windfall profits arising from free allocation is not unique to power generators; it applies to any industry which can pass on its carbon costs, even partially. However, as with power generators, companies within a sector could benefit differently according to their technologies and geographical location (proximity to extra-EU competition for example).
- Whilst we have not reviewed literature for all sectors or carried out any primary research, the studies reviewed in the present paper suggest that the steel, pulp and paper, and aluminium sectors are exposed to cost increases that they cannot recover. The cement sector is also particularly exposed but certain operators would have the potential to profit from free allocation.
- No single allocation mechanism will be suitable for all sectors due to differential impacts on asset values and the effect of competition from outside the scheme. A sector specific approach is essential to shelter those most vulnerable industries from the effects of the EUETS on extra-EU competition.
- For free allocation benchmarking appears preferable to grandfathering and will become increasingly so as the scheme progresses. However, for some sectors it may be unmanageably complex to develop fair and effective benchmarks, in which case grandfathering should be considered, particularly if this is the consensus view of the industry concerned.
- Overall, the downsides to output-based ex-post allocation appear very significant and any decision to adopt this approach should be considered the exception rather than the norm. However, output-based allocation could minimise leakage to greatest effect if benchmarks were defined according to the first tradable intermediary product after the CO₂ intensive process.

- There is a balance to be found between the increased abatement costs arising from new entrant allocation (either through reducing the incentive for abatement or by stimulating an inefficiently high level of investment) and the benefits of free new entrant allocation in reducing leakage, lowering consumer prices and improving security of energy supply. These factors suggest a sector specific approach, where free allocation is more justified for sectors experiencing competition from outside the scheme.

Transport

On the issue of transport, each sector, be it road, rail, aviation or maritime, emits greenhouse gases (GHGs) and thus contributes to climate change. However, the nature of each mode is different; for example, the aviation and maritime sectors are more international than road or rail. In its report *Progress towards Achieving the Kyoto Objectives* ⁽²⁾, the European Commission noted that greenhouse gas emissions from the transport sector have grown significantly since the Kyoto baseline year of 1990. There is, therefore, a need to take measures to reduce transport's CO₂ emissions, as increasing road transport emissions are the main cause of rising GHG emissions in many countries. Additionally, emissions from the maritime and aviation sectors have also been increasing significantly and are predicted to grow the fastest. Aviation is being included in the EU ETS and, therefore, key findings and recommendations regarding the potential addition of other transport areas are

- If the principle of direct emissions (i.e. the polluter pays principle) were applied in the road transport sector, end users, i.e. drivers and road hauliers, would be the trading entity. However, there are a number of problems in taking this approach, not least the impact of the complexity of the required monitoring, reporting and verification procedures and, consequently, the high transaction costs, on the cost-effectiveness of the scheme.
- The preferred option for the trading entity in an emissions trading scheme targeting the road transport is the fuel supplier. Although not consistent with the principle of direct emissions, such a scheme would be relatively simple and cost-effective compared to end users being the trading entity.
- It is possible for a scheme to be targeted at manufacturers, although, again, direct emissions would not be targeted. However, currently it would only be possible to include cars and light commercial vehicles in such a scheme, as CO₂ emissions from other vehicle types are not currently measured. If manufacturers were included in the EU ETS, the lifetime emissions of vehicles would also have to be estimated.
- For road transport, therefore, a scheme with fuel suppliers as the trading entity would seem to be the simplest and potentially most cost-effective approach. All the proposed options would generally be non-discriminatory, at least within the EU, as all relevant trading entities in the EU would be included.
- GHG emissions in the rail sector are declining, so it is far from certain that a trading system is needed, or indeed whether it would be the most cost-effective and efficient means of reducing emissions in the sector. Rail is commonly the low carbon alternative to road, so its inclusion in emissions trading could prove a disincentive to switching.

² *Progress towards Achieving the Kyoto Objectives*, Report from the European Commission, COM(2006)658, 27.10.2006 Brussels
IP/A/ITRE/ST/2007-08

- It is not yet clear whether a trading system for the maritime sector is an appropriate option. As with aviation, the ship operator appears to be the most appropriate trading entity, which would make the scheme consistent with the principle of direct emissions. Currently, however, the lack of data and procedures for monitoring, reporting and verification and the opportunities for evasive action potentially undermine the cost-effectiveness and economic efficiency of the scheme. It is likely that these could be overcome once more work has been undertaken on the monitoring, reporting and verification systems, reducing the potential for evasive action and the legal aspects of an ETS involving the maritime sector.

Future International Setting

The EU ETS has the aim of contributing to the efficiency with which the European Community and its Member States fulfil their commitments under the Kyoto Protocol. The EU ETS Directive introduces possibility of linking the Community scheme to greenhouse gas emission trading schemes in third countries and argues that by doing so, the cost-effectiveness of achieving the Community emission reduction targets would be increased. The Directive also identifies Joint Implementation (JI) and Clean Development Mechanism (CDM), also referred to as Project Based Mechanisms (PBMs), as important for both reducing global GHG emissions and increasing the cost effectiveness of the Community trading scheme. Key findings and recommendations with regards to the future global setting of the EU ETS are:

- There is a case for limiting the use of PBM credits by installations and companies within the EU ETS in order to stimulate domestic emission reductions. Any quantitative complementarity limit must balance the cost effectiveness of the scheme with the level of domestic action deemed necessary. Within this process there is a clear role for the Commission in ensuring that the complementarity limit established for each MS results in a net shortage of allowances (including PBM allowances) and thus stimulates that domestic action. By implication, the movement to a lower cap (for example in response to the adoption of a lower EU emissions target) could allow a greater use of PBM allowances whilst preserving a degree of domestic action. However, if it were the intention that a tougher cap would be met by increased domestic action this would suggest no increased use of PBM allowances.
- Negotiations for a post-2012 international climate change framework are currently underway. However, there is no guarantee that PBMs will be a component of any agreement that may result. Accordingly, it is important to introduce assurances that companies would definitely be able to use PBM credits in Phase III.
- Principal PBM developments aim to scale-up and extend the scope of the mechanism. This has the potential to generate large quantities of credits. Internationally, and within the EU ETS, stringent emission reduction targets will be needed to stimulate demand for these credits.
- In combination with a quantitative limit, a qualitative limit should also be considered, specifying, for example, that only “Gold Standard” credits should be eligible. Such a criteria would both limit the number of credits available and ensure that the EU ETS retains credibility both from an environmental and a sustainable development perspective, in a scenario with more widespread use of credits.
- There is substantial interest in emissions trading schemes around the world. Most schemes are still at the planning stage but are aiming to be operation in the near future, i.e. before 2012. Although most schemes use a cap and trade design, there are substantial differences between the separate schemes.

- The most significant differences from the perspective of linking ETS were found to be:
 - Compliance rules, for example where the obligation to “make good” any shortfall of emissions differed between schemes;
 - The nature of emissions targets, where a third party scheme is based on relative targets, a poorly designed link to the EU ETS could result in a net increase of emissions;
 - Eligible trading unit, linking two schemes that recognise different trading units, for example European Union Allowances (EUAs), Emission Reduction Units (ERUs), Certified Emission Reductions (CERs) (including Land Use Land Use Change and Forestry CERs), can cause political concern since a situation can arise in which credits can effectively be used for compliance within the trading scheme, where formally they are ineligible.
- Increasing the compatibility between schemes prior to linking will significantly aid linking them. However, it is technically possible to link widely divergent schemes using a variety of linking instruments. There are, however, disadvantages to the use of such linking instruments, principally as a result of greater complexity. This in turn can lead to higher costs and greater difficulties for accounting. At it’s most severe, greater complexity might increase the likelihood of occurrences of double counting and so could reduce the environmental effectiveness of the scheme.

1. INTRODUCTION

On 1 January 2005, the EU Emission Trading Scheme (EU ETS) commenced. The legislation behind the scheme is the European Commission's Directive 2003/87/EC, which entered into force on 25 October 2003. Article 30 of the Directive requires that a review report of the EU ETS should be submitted to the European Parliament and the Council by 30th June 2006.

Pursuant to the ETS Directive, in November 2006, the Commission published a Communication "Building a global carbon market" which established a review process for the EU ETS involving stakeholder consultation. The consultation process would be carried through a separate Working Group on the Review of the EU ETS within the framework of the European Climate Change Programme (ECCP).

1.1 The review of the EU ETS

The Commission states that the review of the EU ETS, and the work of the ECCP Working Group, will be conducted along four strategic categories:

- **The scope of the Directive**, with an initial focus on streamlining followed by expansion;
- **Further harmonization and increased predictability**, with a focus on cap setting and allocation methods;
- **Robust compliance and enforcement**, to include monitoring, reporting and verification requirements;
- **Linking with trading schemes in third countries**, to include the relationship between the EU ETS and the Clean Development Mechanism and Joint Implementation.

More detailed discussion of the EU ETS review process is made in section 2 below.

1.2 The European Parliament position

The European Parliament supported the establishment of the EU ETS, but has also pushed for its review. Recent recommendations made by the Parliament in response to the Commission's Green Paper "A European strategy for sustainable, competitive and secure energy" ⁽¹⁾ include:

- the Commission should propose a revision of the ETS including economically acceptable management of ETS credits such as a progressive move towards auctioning or benchmarking based on output; the ETS scheme should be based on a careful evaluation of economic and environmental impacts, a comprehensive assessment of the allocation methodologies, the wide use of flexible mechanisms and a review of the penalty scheme;
- during the second ETS financing period (2008-2012), financial resources should be allocated in a way that leads to action being taken to reduce CO₂ emissions and energy consumption through the modernisation of energy production plants;
- a cap and trade (C&T) emissions regime should be extended internationally and should run for a longer period than at present;

¹ COM(2006)0105, Commission's Green Paper "A European strategy for sustainable, competitive and secure energy"

- the ETS should include additional large emitting sectors including all modes of freight transport; a strategy to cut emissions from ships should be developed, following an impact assessment, and a separate system for aviation should be set up as soon as possible;
- given the volatility of prices for emission certificates, calls upon the Commission to consider mitigation option; such options should include the promotion of confidence in the market by increasing market transparency, e.g. through the timely and uniform publication of emissions data throughout the EU, as well as extended use of the flexible mechanisms of the Kyoto Protocol (Joint Implementation and Clean Development) to increase market liquidity;
- calls upon the Commission to examine by 2007 in which way national allocation methods should be further harmonised and how the ETS methodology may be simplified and rendered transparent, in line with stock market rules.

The Environment Council, on 28 June 2007, adopted Council Conclusions calling for a full review of the EU ETS, which included:

- the need for further harmonisation of the EU ETS, in particular of allocation methods and rules;
- the review should consider establishing a minimum rate of auctioning through a mandatory uniform rate of auctioning;
- an invitation to the Commission to propose harmonised methods for determining caps and a suggestion to further harmonise access to and the use project-based Kyoto mechanisms;
- the need to review the extent and scope of the scheme.

1.3 Description of the study

In this context, this study aims to assess some of the key issues regarding the future of the EU ETS. Whilst not attempting to cover the entire spectrum and depth of the ongoing review, the study aims to address specific issues identified by the European Parliamentary Committee on Industry, Research and Energy (ITRE) based on existing data and the author's expertise. The study is therefore organised with the following structure:

- **Section 2** will give a summary of the current review of the EU ETS;
- **Section 3** considers allocation mechanisms in different Member States;
- In **Section 4** discussion turns to the potential extension of the scheme to other transport areas, specifically automotive and maritime;
- **Section 5** assesses the future global setting in relation to the EU ETS including the development of JI/CDM instruments and potential links to other external or international emission trading scheme;
- Finally, **Section 6** will draw out the key conclusions and recommendations established in the study.

2. THE REVIEW OF THE EU ETS

2.1 The review process

The requirement for a review of the application of the EU ETS Directive is written into the Directive ⁽²⁾ itself. Article 30 requires a review report to be submitted to the European Parliament and the Council by 30th June 2006 and identifies a number of issues that should be considered. Article 30 also states that the review may be accompanied by legislative proposals if appropriate. The issues to consider are:

- How and whether Annex I should be amended to include other relevant sectors, inter alia the chemicals, aluminium and transport sectors, activities and emissions of other greenhouse gases listed in Annex II, with a view to further improving the economic efficiency of the scheme;
- The relationship of Community emission allowance trading with the international emissions trading that will start in 2008;
- Further harmonisation of the method of allocation (including auctioning for the time after 2012) and of the criteria for national allocation plans referred to in Annex III;
- The use of credits from project mechanisms;
- The relationship of emissions trading with other policies and measures implemented at Member State and Community level, including taxation, that pursue the same objectives;
- Whether it is appropriate for there to be a single Community registry;
- The level of excess emissions penalties, taking into account, inter alia, inflation;
- The functioning of the allowance market, covering in particular any possible market disturbances;
- How to adapt the Community scheme to an enlarged European Union;
- Pooling;
- The practicality of developing Community-wide benchmarks as a basis for allocation, taking into account the best available techniques and cost-benefit analysis.

In response to the requirements of Article 30 the Commission's published a Communication "Building a global carbon market" ⁽³⁾, dated 13th November 2006. In this communication the Commission stated that it would have been premature to produce legislative proposals by 30th June 2006 and argued the need for further experience and evaluation of the key issues. It therefore established a review process, involving consultation with stakeholders, with a view to producing legislative proposals that would take effect at the start of the third trading period, i.e. at the start of 2013. The consultation process would be carried out through a separate Working Group on the Review of the EU ETS within the framework of the European Climate Change Programme (ECCP). The Communication committed to producing a legislative proposal in 2007.

² Directive 2003/87/EC

³ COM(2006)676

The Commission states that the review process should be driven by the principles of environmental efficiency, while taking account of the cost-effectiveness of the measures proposed ⁽⁴⁾. It also states that the ECCP Working Group will develop and rank options to address the strategic issues. This suggests a clear vision for the purpose of the scheme and a systematic approach to appraisal of the options, which is discussed further in Section 2.2 below.

The issues to be addressed in the review were divided into four distinct groups, and an ECCP stakeholder review meeting was established for each group. The groups were:

- **The scope of the Directive**, with an initial focus on streamlining followed by expansion (the first WG meeting).
- **Further harmonization and increased predictability**, with a focus on cap setting and allocation methods (the third WG meeting).
- **Robust compliance and enforcement**, to include monitoring, reporting and verification requirements (the second WG meeting).
- **Linking with trading schemes in third countries**, to include the relationship between the EU ETS and the Clean Development Mechanism and Joint Implementation (the fourth WG meeting).

A more detailed description of the technical content and key issues in each area is contained in Section 2.3 below.

The review process stakeholder groups (ECCP WG meetings) followed a format of a set of presentations on each issue, immediately followed by a discussion. The Chairman summed up each part of the meeting, with formal minutes recorded and reported on the EC website.

In addition to the meeting process, a number of other activities were carried out, which are again referred to on the EC website. These are:

- A survey of views on the future of the EU ETS carried out by McKinsey and Company and Ecofys ⁽⁵⁾ between June to September 2005, seeking views from companies, government bodies, industry associations, market intermediaries and NGOs (Non-Governmental Organisations).
- A report on competitiveness carried out by McKinsey and Company and Ecofys, discussed later in the present report.
- Studies relating to treatment of small installations, expansion to other activities and gases, auction, the approach to new entry and closure and harmonisation of allocation. These can be found on the Commission's website ⁽⁶⁾.
- Stakeholders were invited to make submissions to the review (of which 49 were published on the Commissions website with stakeholder agreement).
- Other studies have been carried out on key issues, commissioned by other interested parties such as governments and institutions that fund academic research.

⁴ COM(2006)676

⁵ McKinsey and Company, Ecofys, *Report on International Competitiveness*, EC DG ENV, December 2006. (see: <http://ec.europa.eu/environment/climat/emission/pdf/etsreview/061222compreport.pdf>)

⁶ http://ec.europa.eu/environment/climat/emission/review_en.htm

2.2 The objectives for the scheme

As with any regulatory instrument, the design of the EU ETS involves a balance between a set of often conflicting factors. These commonly reflect the need to marry a theoretical approach with practical considerations, for example the economic efficiency of the scheme would benefit from a wide coverage, yet the cost effectiveness of including small installations suggests these could be excluded. In considering the relative merits of alternative approaches, therefore, it is helpful to define a set of objectives against which these approaches can be assessed.

We take as our starting point the EU Emissions Trading Directive itself ⁽⁷⁾, which states: “This Directive establishes a scheme for greenhouse gas emission allowance trading within the Community (hereinafter referred to as the ‘Community scheme’) in order to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner.”

This would imply three key criteria for scheme design; that it achieves greenhouse gas reductions, that it does so cost effectively (implying that reductions are achieved at least cost, which is what emission trading is intended to achieve, but also that costs are not unjustifiably incurred), and that it operates in an economically efficient manner (which requires a well functioning market and has implications for the nature of regulatory involvement, ease of access to the market and the provision of information).

In its Communication on the review of the Directive “Building a global carbon market” ⁽⁸⁾, the Commission re-iterated the aims of the Directive and suggested a number of supplementary, supporting, factors to bear in mind. In particular, it states “The first 18 months of the EU ETS have proven to be a very valuable learning period, showing that the simplicity and predictability of the scheme should be enhanced.” These clearly align with the desire for economic efficiency.

Furthermore, Annex III to the Directive identifies a set of criteria against which national allocation plans are to be assessed. These are discussed in more detail in Section 2.3 below, but in relation to the objectives of the scheme it is important to note that Criteria 5 requires that the plans do not discriminate between companies or sectors in a way as to unduly favour certain undertakings or activities, in accordance with the EC Treaty rules. This non-discriminatory aspect is a key practical consideration, and has led the Commission to devote a considerable part of the ECCP meeting process to the issue of the implications of allocation methodologies on the intra-EU and extra-EU competitiveness of companies within the scheme.

In addition, the Commission has stated its desire to increase the harmonisation of the scheme, since it fears that nationally driven processes lead to differing allocation plans with a detrimental impact on the internal market ⁽⁹⁾.

⁷ Directive 2003/87/EC

⁸ COM(2006)676

⁹ *Ibid.*

On the basis of the above discussion, we can determine a set of criteria with which it is possible to appraise different policy options. They are based on the Directive and subsequent Commission Communications. Our report uses these criteria in assessing the arguments put forward by others in relation to key policy options, and also in providing our own views on these issues. The criteria are:

- Environmental effectiveness (encourages greenhouse gas reductions);
- Cost effectiveness;
- Economic efficiency;
- Simplicity;
- Predictability;
- Non-discrimination;
- Harmonisation.

2.3 Experiences and shortcomings with the scheme so far

The EU ETS began operation on 1st January 2005 with Phase I, which was intended to be a pilot phase in which Governments, regulators, participants, verifiers and traders could gain experience with the operation of the scheme. With a scheme of such size and complexity it was inevitable that there would be lessons to be learnt. The key issues are discussed in more detail later in the present report but are highlighted below. Note that whilst the list below focuses on shortcomings there are notable successes with the scheme, such as the successful establishment of a carbon market, the involvement of a very large number of emitting organisations, the development of arrangements and a market to support monitoring, reporting and verification etc.

Cap setting

The total cap set for Phase I was in excess of what would be required under a business-as-usual scenario. This lack of scarcity ultimately led to the allowance price falling to close to zero with no incentive for abatement offered by the scheme. The reason for this outcome can be attributed to the way in which the cap was determined.

Firstly, many Member States did not have good quality emissions baselines on which to base their allocations. For this reason it is natural to err on the side of caution to avoid putting national industries at a disadvantage in international markets. National caps were aggregated, subject to commission approval and amendment if necessary, to a total scheme cap.

National emissions caps were generally determined in relation to business-as-usual emissions projections. Projections are both inherently uncertain and also sensitive to input assumptions. There was no consistent approach to the application of key parameters, such as fossil fuel prices or growth projections. This lack of standardisation again contributed to the adoption of high emissions baseline scenarios.

Similar issues arose in Phase II, although this was characterised by stronger decisions by the EC in which actual emissions values and models of econometric growth were used in the sentencing of NAPs.

The timeliness of cap setting was a significant issue for Phase I, since some Member States did not get their NAPs approved before the start of the scheme¹⁰. Rather than being a policy issue this is concerned with planning and familiarity of national government departments with the process of NAP preparation and approval. Such issues should therefore be avoidable in the future (indeed experience with Phase II was better). Likewise, the lack of readiness of some member States with their national registries should not be a problem for future phases.

Investment uncertainties

A major criticism of the EU ETS to date is that it does not provide sufficient certainty regarding the overall cap against which long term investments can be made. Many sectors within the scheme have asset lives well in excess of 20 years and look to payback periods far longer than current EU ETS phase lengths (the planning and construction phase for a new power station can take many years for example). The level of incentive offered by the scheme is intimately linked to political decisions regarding the overall level of aspiration and therefore longer term commitments are desired may many to provide reduced uncertainty.

Allocation to installations and windfall profits

Overall, the allocation to installations has been carried out with little harmonisation between Member States. Any differences between the treatment of competing installations in different countries may have been mitigated by the high level of free allocation in Phase I, however, in future phases (including possibly Phase II) with tighter allocations differences may be more significant and there will be a greater pressure for a more harmonised approach.

The cost of carbon established by the EU ETS introduces an additional operating cost for emitting installations. Where the carbon cost can be passed onto consumers the installation can recover some, all, or more than the cost that it has incurred. The extent to which costs can be passed onto consumers depends on the level of competition from outside the EU and the degree of regulation in the market for the product concerned. Against this backdrop the pricing strategy for an operator is a logical conclusion given the conditions of the market in which it operates.

To date within the EU ETS the vast majority of allowances have been issued to installations for free. The rationale for this is that it serves as compensation for the increased costs incurred by the operators and therefore protects them from any competitive disadvantage compared with companies outside the EU.

In a situation where an industry were able to pass through some or all of its carbon costs but were nonetheless given a large proportion of its allowances for free it could make a net profit from its inclusion in the scheme. These are what are referred to as “windfall profits” and there has been extensive discussion of these in relation to the electricity generation industry to date.

The issue of windfall profits is an important one to address in future allocation methodologies and must recognise subtleties such as the extent to which regulation (particularly in the electricity industry in some Member States) limits pass-through, the extent to which differentiation within a sector means that some companies may make a profit whilst others a loss, the degree to which industries competing in international markets may have the potential to pass through *some* of their increased costs, and so on.

¹⁰ The Member States whose plans were approved after 31st December 2004 were Poland, Czech Republic, Italy and Greece.

Use of auctioning and project credits

The national led process of developing allocation plans has led to Member States taking differing approach to the use of auctioning of allowances and the role of credits earned from Clean Development Mechanism and Joint Implementation projects. Both of these issues can affect the overall cost of compliance for participants (auctioning rather than free allocation increases the number of allowances an installation must buy and the prospect of cheaper credits overseas could offer a cheaper compliance route). A consistent approach to these issues would minimise differential impacts on competition within the EU.

However, in addition to the impact on installation, the issues of auctioning and use of project credits have significant implications for the scheme going forward. Auctioning has the potential to raise very large sums of revenue and decisions will need to be made on how to use this. Project credits will play an important role in the international effort to tackle climate change and will be important in moving towards a global carbon market.

Emissions reporting

The release of market sensitive information by Member States and the Commission can have a significant financial impact for participants in the scheme. The release of 2005 verified emissions data was generally considered not to have been as well orchestrated as it could have been. The data showed that emissions were lower than generally expected and as a consequence less abatement would be required. The natural market response was a fall in the carbon price. There is nothing wrong with this since it shows the market to be functioning well and it did not constitute a crash since trading continues during this volatile period. However, there were criticisms in the way data was released, since it was not available to all interested parties at the same time and some were therefore more vulnerable to losses on the market. The Commission set up a revised process for emissions reporting for 2006 data and the problems with the 2005 data did not re-occur.

2.4 Technical content for the review

The following sub-sections outline the technical content for the review, putting into context the main elements of the present study. They follow the order of areas identified in COM(2006)676.

2.4.1 Scope of the directive

There are two principal motivations for reviewing the scope of the Directive. Firstly, experience with the scheme so far has shown that a number of areas might warrant changes and secondly, the potential for expansion to new gases or activities needs to be examined. These are discussed below.

Member States have interpreted the definition of combustion installation within the Directive in different ways, leading to concerns over distortion of the internal market. In particular, some Member States have adopted a more narrow definition, excluding certain types of activity. In its further guidance on NAP preparation ⁽¹⁾ the Commission clarified the interpretation as covering all combustion processes and stated that the purpose to which the product of an activity is put should not be a determining factor as to whether or not an installation is covered by the Directive. The ECCP process is intended to consider ways of offering further clarity.

¹¹ COM(2005)703 final of 22nd December 2005
IP/A/ITRE/ST/2007-08

The cost-effectiveness of including small installations has been a matter of some debate, with operators of smaller installations arguing that the administrative costs they incur are disproportional to the value of the emissions covered. The threshold for exclusion in the Directive is whether any installation, which includes one or more piece of stationary technical apparatus has a rated thermal input exceeding 20MW. This does not suggest a particular emissions threshold, not does it relate to the cost effectiveness of covering any particular activity.

With respect to expansion, all emissions covered in Phase I were CO₂, as were the vast majority in Phase II. However, the Directive provided the basis for greenhouse gas emissions trading and there remains the possibility of expansion to cover the other greenhouse gases. Most notably are the potential to include N₂O from the production of ammonia and CH₄ from coal mines.

Concerning inclusion of other CO₂ producing activities, the following are key areas:

- The development of carbon capture and geological storage will require some recognition of this technology within the scheme. This will involve addressing issues such as how to define an installation in a process that occurs across many sites (with transportation stages in between), how to treat emission savings that may not be permanent, and how to monitor and verify emissions at each stage.
- The proposal to include aviation was made by the Commission in its Proposal for a Directive amending Directive 2003/87/EC (¹²). This document set out timescales for inclusion of this sector and established structural aspects such as how to regulate an emitting source that moves between Member States. A key aspect to the inclusion of aviation is the implications it has for the EU ETS as part of the international framework, since international aviation itself is not covered by the Kyoto protocol. Whilst the treatment of aviation has not been a significant part of the Commission's review process, it does set an important example for the inclusion of other modes of transport.

The issues surrounding the inclusion of surface transport are discussed in detail in section 4 below.

2.4.2 Further harmonisation and increased predictability

As discussed above, a concern about the current design of the scheme expressed by many operators and would-be operators of large installations in sectors covered by the scheme is that there is too much uncertainty against which to take investment decisions. The focus of this criticism is not any inherent variability within the carbon market (companies are used to operating within volatile commodity markets) but the extent to which the future nature of that market will depend on political involvement.

COM(2006)676 highlights that the nationally driven National Allocation Plan process is a major source of uncertainty both in terms of the overall cap and the allocation of allowances between and within sectors. The allocation of allowances to incumbents and new entrants is of major importance to participants in the scheme, since it affects their future economic prospects and competitive positions.

¹² COM(2006)818, *Proposal for a Directive amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emissions allowance trading within the Community*, Report from the European Commission, 20.12.2006 Brussels

The Commission therefore links harmonisation with predictability. The review of these issues focuses on:

- Whether it is preferable to set an EU-wide cap or persist with an arrangement similar to that for Phases I and II where national allocation plans aggregate to form the total cap.
- Over what period the total cap should be set, recognising that there is a balance between the desire to provide longer term clarity without the risk of “locking in” unachievable reduction targets.
- A more predictable approach to cap setting, potentially with harmonised assumptions and rules, particularly relating to the level of ambition from the traded and non-traded sectors.
- The optimum approach to allocation. This needs to recognise that sectors exposed to competition from outside the EU would have a strong claim for free allocation, but that the implications of this competition is uncertain and varied between sectors (and even within sectors). Likewise, when it comes to choosing between benchmarking and grandfathering for free allocation, the feasibility of determining benchmarks varies between sectors due to their different levels of complexity in terms of product and processes.

These issues are discussed in Section 3 below.

2.4.3 Robust compliance and enforcement

The review of compliance and enforcement has two drivers. Firstly it is the aim for continuous improvement taking account of experience, which will naturally lead to greater harmonisation. Secondly, a global carbon market will need to be underpinned by rigorous and consistently applied monitoring and reporting standards, to give confidence that “a tonne is a tonne”. This again suggests a greater degree of harmonisation within the scheme.

The review of compliance and enforcement focuses on:

- The robustness of monitoring and reporting guidelines and whether the MRG should be converted into a Regulation. In this respect there is a balance between increased harmonisation and loss of flexibility.
- MRV issues in relation to expansion of the scheme, potentially covering activities such as afforestation and reforestation, shipping, CCS etc. A key element is the management of uncertainties in the net emission impact of these activities.
- Verification standards and the merits of a harmonised accreditation approach.
- Whether a single EU registry is desirable or practicable.

Whilst these are important areas they are not considered in detail in the present report.

2.4.4 Linking to third countries

The Commission has stated its commitment to a global carbon market as a key instrument to tackling climate change and emphasised the EU ETS as of great strategic importance in this respect⁽¹³⁾. It already has influence on a global scale through the role Clean Development Mechanism credits (CERs) can play in the EU ETS. Many countries and regions are proposing or planning their own greenhouse gas emissions trading schemes and some have schemes in operation, which offers the potential for an evolving global network through the linking of the EU ETS and these other schemes. However, the joining of regulated markets would raise many issues, which the Commission identifies for consideration in its review. These include:

- The status of emissions trading initiatives elsewhere in the world, and the potential they may offer for linkages.
- How to achieve standardisation of compliance and enforcement in linked schemes.
- The role of CDM and JI credits, and the need for regulatory certainty for companies in this regard. This covered the pros and cons of setting limits on the use of credits. Whilst the presence of limits increases the overall cost of abatement, it would ensure an increased level of abatement within the EU. The issue is therefore inextricably linked to the role of the EU as a leader in tackling climate change. The current framework requires use of credits to be supplemental to domestic action that implies the application of quantitative limits.
- The extent to which the use of credits is actually contributing to sustainable development in developing countries and countries in economic transition.

These issues are discussed in more detail in section 5 below.

2.5 Proposed amendment to the EUETS Directive 2003/87/EC

On 23rd January 2008 the European Commission proposed a Directive amending Directive 2003/87/EC¹⁴. This proposal was made at the final drafting stage of the present report therefore it has not been possible to fully reflect the details. However, it is useful to give a summary of the main proposals:

- The definition of combustion installation will be codified and will cover all stationary combustion apparatuses resulting in the release of greenhouse gases.
- The scope of the scheme will be expanded to cover CO₂ emissions from petrochemicals, ammonia and aluminium sectors. It will also include N₂O from the production of nitric, adipic and glyoxalic acid and PFC emissions from the aluminium sector.
- Installations with combustion capacity above the 20MW thermal input threshold can be excluded if they have a capacity less than 25MW and annual emissions less than 10,000 tCO₂.
- Carbon Capture and Storage should be included in the scheme and explicitly mentioned in Annex I of the Directive. There would be no need to surrender allowances for emissions stored, however no free allocation should be given for capture, transport or storage of greenhouse gas emissions.

¹³ COM(2006)676

¹⁴ COM(2008)16, SEC(2008) 52 + 53, SEC(2008)85

- Road transport and shipping should not be included and a detailed cost-benefit analysis would be required to determine if emissions trading is the most appropriate approach for these sectors.
- A regulation should replace the current monitoring and reporting guidelines as well as improvements to the Directive to enhance the quality of the verification process.
- Penalties for non compliance will be indexed-linked.
- A Community registry will be developed for holding allowances.
- An EU-wide cap should be determined in the Directive.
- There should be an 8-year trading period to 2020 and a linear reduction in the cap to that point.
- The level of the cap needs to be cost-effective and consistent with the EU's commitment to an overall reduction in emissions of 20% by 2020 (this corresponds to a reduction of 21% below reported 2005 emissions).
- The Directive should provide for automatic and predictable adjustments to the cap upon the conclusion of an international agreement (reflecting the EU's commitment to increase its reduction target from 20% to 30% in such circumstances).
- Auctioning should be the basic principle for allocation, and should be applied for the power sector (although heat delivered to district heating or industrial installations could receive free allowances) and carbon capture and storage from 2013 onwards.
- For other sectors (including aviation) free allocation should start at 80% of their share of allowances reducing to no free allocation by 2020.
- However, the Commission will review the situation with sectors and sub sectors subject to international competition and make any necessary proposals by June 2011. Those sectors deemed to be at significant risk of carbon leakage could receive up to 100% of allowances free of charge or a system introduced to put those installations at significant risk on an equal footing with those in third countries.
- Of those allowances to be auctioned, 90% will be distributed to member states in proportion to 2005 emissions and the remaining 10% be distributed in relation to per-capita income.
- A percentage of auction revenues should be used to reduce greenhouse gas emissions, to adapt to climate change, to fund research into emission reductions, adaptation and new technologies, for measures to avoid deforestation and for addressing social impacts such as increases in electricity prices in lower and middle income homes.
- Free allocation should be based on harmonised Community-wide rules.
- Installations that close will cease to receive free allowances and new entrants will receive free allocation in line with existing installations, to come from a Community-wide new entrants' reserve.
- The EUETS should be able to link to other mandatory emissions trading systems capping absolute emissions.
- CDM credits up to the remainder of the level which were allowed in the second Phase may be used in the third Phase. This reflects the need for a limit to encourage domestic action (to meet EU emissions and renewable objectives) and the potential for the limit in Phase II to exceed the level of reductions sought.

- The amount of CDM credits may be increased in tandem with the level of emissions reductions sought (e.g. from 20% to 30% should an international agreement on emissions reduction be achieved). In either case the use of credits will be harmonised.

In section 6.4 we review the proposed amendments to the Directive with the recommendations in the present paper.

3. ALLOCATION MECHANISMS AND BENCHMARKING

3.1 Background

The purpose of this section is to provide a brief introduction to the issues surrounding allocation methods, with a focus on the financial implication of policy decisions for participants. It then describes the current legislative framework for assessing National Allocation Plans and the associated Commission guidance. This puts into context the discussions that follow in the subsequent sections.

3.1.1 Allocation and the carbon market

The allocation of allowances defines the nature of the carbon market as well as having significant financial implications for its participants. The main financial implications of each allocation aspect are as follows:

The overall cap. The cap equates to the total number of allowances distributed to the market (by whatever means). The overall cap influences the carbon price since the market should determine a price equal to the additional cost of achieving the last tonne of carbon dioxide (CO₂) reduction compared with a scenario in which carbon is unconstrained (the system marginal abatement cost).

National burdens. The relative shortfall between number of allowances allocated and the emissions in the business as usual scenario affects the economic impact of the scheme between Member States. In the absence of abatement options within a country the cost of the scheme to the national economy would relate to the size of the national emissions shortfall, since companies within the country would need to buy additional allowances from abroad. Of course this is a limiting case and in practice the impact would be moderated by cheaper abatement opportunities that these companies have.

Sector burdens. The operating cost incurred by companies participating in the scheme will depend on the price of carbon and the carbon intensity of their activities. For sectors that are unable to pass through this cost (those who face competition from companies not affected by the scheme) the free allocation of allowances may be seen as a form of compensation. The net cost to these organisations will therefore depend on the shortfall in the number of allowances issued. For companies who can pass on the cost (at least in part) the net cost will equal the cost of allowances they must surrender each year minus the value of those given for free minus the income from passing through the cost of carbon. In the event that this is a negative figure the company would have profited from the scheme (so-called windfall profits). In practice most sectors will have some potential to pass-through costs, albeit not the full cost.

Within-sector distributional effects. Any distribution method which allocates a greater proportion of allowances in relation to actual need to some installations compared with others will have a differential effect on the profitability of those installations.

New entry and closure. The provision of free allowances for new installations will impact the investment decisions for new assets.

If the location of the new installation could be either inside or outside of the EU because of a global market for its product (for example in the steel industry) then the absence of a new entrant reserve would create pressure for new assets to be built outside. If installations are required at the national level, or at least within the EU, because of the absence of extra-EU competition (such as new electricity generating capacity) then the absence of a new entrant allocation would simply lead to prices rising to the higher level necessary to stimulate new investment than would be the case with free allocation. The likelihood of the assets being built would remain unchanged.

A further point to note is that free allocation to carbon emitting technologies covered by the scheme in a market where not emitting technologies (such as renewables) would be an investment option would have the perverse outcome of incentivising new emitting assets compared with the scenario in which no new assets receive free allowances.

3.1.2 The requirements of Annex III

Annex III to Directive 2003/87/EC states that each Member State's National allocation Plan shall be based on objective and transparent criteria, including those listed in Annex III, taking due account of comments from the public. The Appendix III criteria are listed below, against which we have identified the main aspects relevant to the review:

“The total quantity of allowances to be allocated for the relevant period shall be consistent with the Member State's obligation to limit its emissions pursuant to Decision 2002/358/EC and the Kyoto Protocol, taking into account, on the one hand, the proportion of overall emissions that these allowances represent in comparison with emissions from sources not covered by this Directive and, on the other hand, national energy policies, and should be consistent with the national climate change programme. The total quantity of allowances to be allocated shall not be more than is likely to be needed for the strict application of the criteria of this Annex. Prior to 2008, the quantity shall be consistent with a path towards achieving or over-achieving each Member State's target under Decision 2002/358/ EC and the Kyoto Protocol.”

Looking to Phase III, this criterion raises an important issue concerning the interaction between the international regime and the caps set within the EU ETS. There are no national limits agreed for any subsequent compliance period of the Kyoto Protocol, and international efforts are focused on developing the international framework rather than working towards a second compliance period. Other factors that will likely come into play include the decision of the Council of Ministers to adopt a 20% carbon reduction target for 2020 for the EU, potentially becoming 30% if other countries make a similar commitment.

Overall, however, the requirement for consistency with international obligations is aligned with the need for scarcity, since international obligations will naturally involve reductions compared with business as usual expectations.

“The total quantity of allowances to be allocated shall be consistent with assessments of actual and projected progress towards fulfilling the Member States' contributions to the Community's commitments made pursuant to Decision 93/389/EEC.”

The application of baseline data and projections has historically raised difficulties with respect to the EU ETS. For Phase I many Member States did not have accurate baseline data on which to base their allocations, and as a result many were criticised for allocating more than was necessary. The Commission recognizes this factor and observes that it is not unprecedented for overestimation in the initial phase of such schemes (COM(2006)676).

For Phase II, the use of projections was also controversial, with many Member States having their caps reduced by the Commission on the grounds of the underlying projections being too high. EC decisions on Phase II NAPs are discussed below.

In general, this suggests that the existing arrangements may not be the best way of ensuring scarcity. One possibility for improvements would be to have a single EU cap, with the Member State positions taken into account when distributing the burden. Alternatively, a common set of assumptions (for example relating to fossil fuel prices or economic growth) would help to improve consistency between the projections of Member States.

“Quantities of allowances to be allocated shall be consistent with the potential, including the technological potential, of activities covered by this scheme to reduce emissions. Member States may base their distribution of allowances on average emissions of greenhouse gases by product in each activity and achievable progress in each activity.”

This criterion requires the recognition of abatement potential. Whilst the recognition of abatement potential may be politically desirable to ensure a more fairly distributed cost burden between Member States, it is less clear that accounting for abatement potential would be desirable when distributing allowances between installations within the same sector.

“The plan shall be consistent with other Community legislative and policy instruments. Account should be taken of unavoidable increases in emissions resulting from new legislative requirements.”

In relation to this criterion the implementation of the EU 2020 CO₂ target and renewable energy target will be significant. It is inevitable that new policy instruments will be required to work toward these targets and an integrated approach with the EU ETS will be necessary. For example, policies to promote renewables or reduce demand in the electricity sector will impact the emissions from power stations. The effects of these policies must be factored into the baseline against which further action from the electricity generation sector is calculated.

“The plan shall not discriminate between companies or sectors in such a way as to unduly favour certain undertakings or activities in accordance with the requirements of the Treaty, in particular Articles 87 and 88 thereof.”

This is a very significant issue, since the concern that the increased costs arising from the EU ETS could threaten the competitiveness of EU industries in global markets has been and will continue to be a major factor in allocation decisions.

“The plan shall contain information on the manner in which new entrants will be able to begin participating in the Community scheme in the Member State concerned.”

In addition to the administrative requirements, this requires clarity on any arrangements to be made for the provision of free allowances to new projects.

“The plan may accommodate early action and shall contain information on the manner in which early action is taken into account. Benchmarks derived from reference documents concerning the best available technologies may be employed by Member States in developing their National Allocation Plans, and these benchmarks can incorporate an element of accommodating early action.”

Early action can be accommodated by applying benchmarks to similar installations (since a more efficient plant would receive the same allocation as a less efficient one). However, grandfathering does not reward early action, indeed it might be considered to reward previous inaction and auctioning offers no net benefit to installations that have performed either well or poorly in the past.

“The plan shall contain information on the manner in which clean technology, including energy efficient technologies, are taken into account.”

This criterion refers to the provision of information but does not specify any requirements for the treatment of clean technologies.

“The plan shall include provisions for comments to be expressed by the public, and contain information on the arrangements by which due account will be taken of these comments before a decision on the allocation of allowances is taken.”

This criterion concerns the process for determining allocations, and not the basis for the allocations themselves.

“The plan shall contain a list of the installations covered by this Directive with the quantities of allowances intended to be allocated to each.”

This criterion requires the provision of information on allocations at installation level, but does not state how these should be determined.

“The plan may contain information on the manner in which the existence of competition from countries or entities outside the Union will be taken into account.”

This criterion is important in recognising that extra-EU competition should be taken into account. It implies that sectors without such competition should be treated differently from those that operate in a global market. However, it does not offer guidance on how this competitive impact be taken into account.

3.1.3 The guidance in COM(2003)830

Article 9 of (directive) required the Commission to issue guidance on the implementation of Annex II criteria. Article 29 also required the Commission to develop guidance to describe the circumstances under which force majeure is demonstrated. The Commission satisfied these requirements in Communication (2003)830. It would be a lengthy diversion to describe in detail the guidance provided by this document, however it is useful to note that it provided guidance on which criteria are optional and mandatory and which apply at national, sector and installation level.

3.1.4 The guidance in COM(2005)703

In Communication COM(2005)703 the Commission provided further guidance for Phase II NAPs. The purpose of this was to provide additional clarity in areas where the Annex III criteria leave scope for interpretation, with a view to moving to greater harmonization. It also took account of experience from Phase I. The revised guidance concerned:

- The role of GDP growth projections in defining national caps.
- A requirement for greater substantiation of the intention of Governments to purchase Kyoto credits.
- The substantiation of savings expected from other policies and measures.

On the varied interpretation by Member States of combustion installation for the purposes of defining scope the Commission stated that all Member States should therefore in any case include also combustion processes involving crackers, carbon black, flaring, furnaces and integrated steelworks, typically carried out in larger installations causing considerable emissions.

3.2 Cap setting and the achievement of scarcity

The requirement for scarcity is met through the establishment of an overall emissions cap that is less than would be required on a business as usual basis. The approach for Phases I and II was a bottom-up method in which Member States submitted NAPs to the Commission, who in turn assessed them against the requirements of Annex III. A weakness of this approach is that Member States will inevitably take different approaches on key issues and as has been seen in the first two phases, tend to allocate more than the Commission would deem appropriate given the targets each Member State has under the Kyoto Protocol. Indeed, for Phase II, 23 of the 27 Member States had their national cap cut by the Commission, excluding France who withdrew their original NAP and resubmitted it with a revised, lower, total that was subsequently accepted by the Commission.

The Commission's approach in assessing these NAPs was to start from verified emissions data and project requirements on the basis of two factors: GDP growth and carbon intensity¹⁵ improvement. (Account was also taken of changes in scope). This method formed the basis of the assessment against Criteria 2 and 3 of Annex III, in that the value calculated by this method was treated as a maximum allocation. GDP growth and carbon intensity were derived using the PRIMES model, taking account where necessary of developments since the most up-to-date version of PRIMES was established. The PRIMES model takes account of, *inter alia*, projections of fuel prices.

Whether or not the assumptions used by the Commission in assessing NAPs in this way were the most appropriate, the exercise must be seen as a clear demonstration of a common approach being applied to (or forced upon) Member States. The overall Phase II annual allocation was reduced by about 10% from the proposed caps and is actually now less than the 2005 verified emissions. Recognising the expansion of the scheme in Phase II and the growth of some activities, the approach is therefore likely to be seen as a success in ensuring some degree of scarcity in the market.

However, the Commission's approach to sentencing the proposed NAPs for Phase II should be seen as a fix to the problem of Member State subsidiarity, rather than a viable long-term approach to determining the overall cap. The primary alternative approach is to set a single scheme-wide cap at EU level. There would then be a process of allocating to individual installations (assuming some are allocated for free), which may involve an intermediate step of distributing allowances at national level. However, the process for distributing these allowances would be separate from the process of determining their overall number.

In the third ECCP meeting there was strong support for harmonizing the approach to cap setting. However, the view of what constitutes harmonization varied¹⁶. In particular, some Member States viewed harmonization as moving towards equal burdens, while others thought the methodology for cap setting should be harmonized but that this should allow for specific national circumstances to be taken into account.

Interestingly, there was support for an EU cap across groups with a wide range of interests. Ref 16 notes that several Member States, power generators, carbon traders and NGOs advocated an EU-wide cap. Hampton, for example expresses a carbon market view that the additional policy uncertainty from nationally determined caps damages confidence in the predictability of the scheme.

¹⁵ Carbon intensity is defined as emissions divided by GDP

¹⁶ ECCP Working Group Report of Meeting 3

The following table reviews two options for setting the overall cap against the criteria for scheme design described in Section 2.2 above:

- Option 1: The current Member State NAP process with the Commission assessing against Annex III criteria in the same or similar way as for Phase II.
- Option 2: Determination of an EU level cap (by whatever method, discussed below), followed by national burden sharing if necessary.

Table 1: Two options for setting the overall cap reviewed against the assessment criteria

Criteria	Option 1, current arrangements	Option 2, single EU cap
Environmental effectiveness	Bottom-up approach introduces uncertainty in overall environmental effectiveness (history has shown the need to cut proposed national caps)	More easily set in relation to environmental target
Cost effectiveness	N/A	N/A
Economic efficiency	N/A	N/A
Simplicity	Can be a complex and protracted way of determining the overall cap	Could in principle be simpler to apply
Predictability	The complexity makes the outcome of this approach difficult to predict	If set in relation to an established target, e.g. EU 20% target, this method could be more predictable
Non-discrimination	N/A	N/A
Harmonisation	This allows for different approaches between Member States	A more harmonized approach

Overall, it appears preferable to determine the overall cap at EU level. This could be determined in a number of ways. Most logically it would relate to an EU level emissions target, with the requirement to consider the relative effort from the traded and non-traded sectors. On this last point, Moser notes that setting caps upfront, rather than through the current NAP process, would lead to increased harmonization in the distribution of burden between traded and non-traded sectors.

Following a single EU cap there may then be a need to distribute this between Member States. At the third ECCP Working Group meeting Matthes ⁽¹⁷⁾ noted that such an arrangement would be very likely in the event that Member States take on individual international emissions commitments.

There are many ways this could be achieved, for example in proportion to historic emissions or on a per capita basis. These could even be moderated by carbon intensity projections and/or GDP growth projections, as is the current situation.

¹⁷ ECCP Working Group Report of Meeting 3
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However, the important point is that the top-down approach can separate determination of the overall cap from the distribution of allowances between Member States.

Thus, the key elements to cap setting envisaged by the European Parliament, namely to “ensure a scarcity of carbon sufficient to ensure a functioning carbon market that is fair and avoids distortions of competition for those operating in the market”¹⁸ can be decoupled. Scarcity would be determined by a single EU level cap. The impact on fairness would depend on how that cap is distributed nationally, to sectors and to installations (discussed below).

The length of time over which a cap is set can be just as critical as the price that results. Many of the installations within the scheme have long asset lives and decisions about investments and new build often have long time horizons. For this reasons many participants have called for longer-term clarity with respect to the overall emissions cap (as well as the treatment of new entrants) so that they can make more certain investment decisions.

The downside of having a longer cap is that it sets an overall commitment to achieve a carbon target that could ultimately prove very expensive to meet. Whilst this may not be a concern from an environmental perspective it has implications for the economy. The decision on what period to adopt is primarily a matter of finding a balance between these two issues. At the third ECCP meeting Kate Hampton gave a market perspective advocating a fixed cap out to 2020 and the Chairman in summing up highlighted a strong view for caps until 2020 and a complete lack of support for caps as short as 5 years. There were also discussions about linking the cap to the EU carbon reduction, which re-emphasises that 2020 is probably the best end date for Phase III (an 8 year phase).

In addition to setting a longer cap consideration should be given to decoupling the process of cap setting from that of sector level allocations. It would be quite possible to set a long term cap and have intermediate sub-phases over which allocations are fixed. The benefit of this is that the clarity on the overall cap would be maintained yet there would be flexibility to accommodate sector growth rates that deviate from the initial expectation. To provide increased predictability in this respect the methodology for distributing the cap between sectors at intermediate sub phases could be established at the start of the phase.

Finally, the EU must consider what adjustments to the EUETS cap, if any, would be necessary should the EU adopt a 30% reduction target in response to progress with international agreements. The key issues under such circumstances are identified below, against the pros and cons of adjusting the cap.

- *Pros.* A Phase III cap set on the basis of a 20% reduction target for 2020 would evidently be inadequate for achieving a 30% target. Since the EUETS is the central policy instrument it seems unlikely that the additional reductions required could be achieved from the sectors outside the scheme. Furthermore, the adjustment of the cap would likely be necessary to demonstrate commitment to a revised 2020 target.
- *Cons.* Clearly the biggest drawback that would arise from changing the cap would be the increased uncertainty over the investments in carbon abatement options. This uncertainty would arise once the decision is made that the cap could be adjusted if necessary. The overall level of uncertainty could be reduced by establishing up-front the method for calculating a revised cap (or even what that revised cap would be).

¹⁸ Specification for this work
IP/A/ITRE/ST/2007-08

3.3 Allocation mechanisms – options and experience so far

3.3.1 The main allocation mechanisms in principle

The main allocation methods for free allowances are grandfathering and benchmarking. For the sale of allowances auctions are the most common method considered.

Grandfathering distributes allowances to installations on the basis of their recent historic emissions. In most instances an average over a period is used. In general it offers a softer introduction to the scheme since the basis for installation allocations would be their historical performance and not an industry benchmark, the latter of which could introduce shortfalls affecting the less efficient. However, for this very reason grandfathering becomes a less justifiable approach as the scheme progresses.

The purpose of benchmarking is to treat similar installations in the same way. A sector is divided into groups reflecting categories of installation, although an entire sector could be represented by a single benchmark. The basis for having different categories might be that there are classes of installation within a sector serving different markets with different products or using different processes (for example different grades of paper or types of glass). The installations in each category would be identified by a production capacity (for electricity generation this might be installed capacity in MW). The benchmark would then comprise standard factors to convert the production capacity of each installation into an emissions figure, which would form the basis of the installation's allocation, possibly with a common reduction factor applied. The benchmark might recognise fuel efficiency, fuel emissions factor and production/load factor. These could be based on sector averages or standards for Best Available Technology (BAT), where the latter would result in an allocation below what an installation is likely to emit.

Allowances may be auctioned to the market in a number of ways, including uniform price or pay-as-bid methods. They may be static, with only one round of bidding, or dynamic with multiple rounds. However, the choice of auction is generally an implementation issue and has little influence on the decision of whether to auction allowances and how many to auction. For this reason we do not discuss any further the relative merits of auction approaches, other than to point out that in the interests of harmonisation a common format across the EU would be desirable.

3.3.2 Allocation methods used in Member States in Phase II

The Phase II National Allocation Plans were reviewed by Schleich, Betz and Rogge⁽¹⁹⁾. In their analysis a clear distinction is made between allocation to existing installations in the electricity industry and to existing installations in other industrial sectors. This is because benchmarks in Phase II tended to be applied to the electricity generation sector, suggesting that it is well suited to benchmarking because of its fairly homogeneous output and the ease of assigning installations to benchmarking groups⁽²⁰⁾. Benchmarks were applied to the power generation sector in the following countries: Austria, Belgium, Germany, Denmark, Estonia, Italy, Poland, Slovenia, and the UK.

In other sectors there was little use made of benchmarking in Phase II. The exceptions include Sweden where basic oxygen steel furnaces were allocated according to an EU-wide average benchmark, Latvia and Hungary (although it is unclear which sectors used benchmarks in these last two countries).

¹⁹ *EU Emission Trading – Better Job Second Time Around?*, Joachim Schleich, Regina Betz and Karoline Rogge, Fraunhofer Institute Systems and Innovation Research, 2/2007.

²⁰ *Ibid*

In both Phases I and II new entrant reserves were established by all Member States to allocate allowances for free to new projects. Schleich, Betz and Rogge ⁽²¹⁾ note that new entrant allocation is typically based on Best Available Technology (BAT) values for individual installations or BAT benchmarks for homogeneous products (or technologies). In the power sector, this generally differentiates by fuel input, with only Denmark, Luxembourg, Sweden, Flanders and Wallonia in Belgium and the UK applying uniform benchmarks. With respect to closure, most member States decided to end free allocation in the year after an installation closes. This amounts to an output subsidy, since it encourages plants to operate for long. The options for treating new entry and closure are discussed in Section 3.5.3 below.

The use of auctioning has been relatively limited in Phase II, in comparison with the total allocation. However, many more allowances will be auctioned than in Phase I. From Schleich, Betz and Rogge ⁽¹⁹⁾ the following countries will auction allowances in Phase II (with approximate volumes given):

Table 2: Auctioning in Phase II

Member State	% allocation to be auctioned	Approximate quantity to be auctioned (MtCO ₂ /year)*
Austria	1.22%	0.4
Belgium	0.3% (0.5% of Brussels)	0.2
Germany	8.8%	39.9
Hungary	4.3%	1.2
Ireland	0.5%	0.1
Italy	None to be auctioned but 5.7% to be sold at a fixed price	11.2
Lithuania	2.7%	0.2
Luxembourg	5%	0.1
The Netherlands	4%	3.4
Poland	1%	2.1
UK	7%	17.2
Total		~76
Total allocation		2083

*Note: Auctioned volumes have been derived from the percentage to be auctioned in ⁽²²⁾ and the total allocation given on the Commission's website. The figures may suffer from rounding errors.

The vast majority of allowances, therefore, will be allocated for free in relation to the historic emissions of each installation, i.e. grandfathered. The main decision to be made regarding a grandfathering allocation is on which year or years to base the allocation. Schleich, Betz and Rogge¹⁹ show that Member States tended to use a range of dates on which to base the grandfathered allocation. These ranges are generally in the period 2000 to 2005, although some used years prior to 2000 (Belgium (Walloon), Czech Republic, Denmark, Finland, Sweden and Slovakia for example).

²¹ *Ibid*

²² Schleich et al. (2007)

In some countries (the UK for example) the use of baseline data from 2005 for the grandfathering methodology was excluded on the basis that it could reward gaming in that year. As discussed in NERA (²³), updating within allocation methodologies (of whatever sort) reduces the incentive to undertake abatement measures, ultimately leading to a higher cost of meeting the emissions target for the scheme as a whole. For the use of 2005 data to determine Phase II allocations the concern was that the nature of likely allocation methods was sufficiently well signalled in 2005 that installations could increase their emissions in that year in order to secure a greater allocation in later years. Clearly this concern was not felt to be significant by all Member States since many did use 2005 in their grandfathering methodology. However, in the longer term this issue of updating may be a major factor limiting the appropriateness of grandfathering. For example, for Phase III a grandfathered allocation using a Phase II baseline would create a net incentive for firms to increase emissions in Phase II, yet the use much earlier years would make the allocations less relevant to Phase III.

In summary, the approach to Phase II allocation across the EU may be characterised as inharmonious, with little sign of Member States seeking to adopt consistent methodologies. It may also be viewed as a phase in which many Member States have taken small steps away from grandfathered allowances towards greater use of auctioning and benchmarking. Looking forward, however, it is difficult to see how this evolutionary approach could lead to a harmonised scheme. This would suggest that if harmonisation is to be a priority, the Commission needs to take action to more closely define the methodologies for installation level allocation, perhaps with specified levels or ranges for auctioning and principles to be applied in benchmarking and possibly grandfathering methods.

3.4 Allocation mechanisms – Future choices

The present section considers the effects of the three main allocation mechanisms, namely grandfathering, benchmarking and auctioning. A more detailed discussion on the different options for benchmarking can be found in subsequent sections. The use of installation level projections has not been considered here (although it has been applied in Malta where there are only two installations) on the grounds that it would be far too complex, subjective, raise issues of confidentiality and concerns about central planning.

3.4.1 Free allocation, competitiveness and windfall profits

The question of free allocation is inextricably linked to the issue of the competitive effect of the EU ETS on its participants. As discussed in section 3.1.1 above, allocation mechanisms can affect the competitiveness of sectors in markets extending beyond the EU.

Put another way, the competitive position of a sector is a key factor in determining which allocation method might be best suited for it. In a world where companies pass on a part of their carbon costs to their customers, it is difficult to justify giving those same companies free emissions allowances in excess of the level that they *cannot* pass on. Such treatment to date has led to criticisms of operators receiving windfall profits, with the focus of this criticism being the electricity sector. However, for many industries the competition they face from companies outside the EU prevents them from passing on their carbon costs, and it is this argument that is used most frequently in favour of free allocation.

To date discussions over NAPs have often been quite polar, with those seeking free allocation suggesting the limiting case that any degree of auctioning would be very damaging, with little differentiation between sectors.

²³ *Complexities of Allocation Choices in a Greenhouse Gas Emissions Trading programme*, NERA Economic Consulting, September 2007

In practice it is important to understand the degree to which industrial sectors are exposed to international competition, to what extent they would be able to pass through the costs of allowances and the degree to which they would be adversely affected by a reduction in free allocation. It is also important to recognise that not all companies within a sector are the same and therefore suffer different cost increases from the scheme. NERA⁽²⁴⁾ discuss these issues in general terms at some length, highlighting the following reasons why a simple “full pass-through provides adequate compensation” assumption may not apply:

- The presence of external competition or internal market regulation can limit pass-through.
- Pass-through can lead to firms being less competitive compared with international suppliers and domestic suppliers with lower carbon intensity, and can cause a reduction in demand. All of these factors would lead to lower output and hence profitability.
- Emissions costs can vary substantially between producers and the costs faced by individual firms may be higher or lower than the increase in prices. Therefore even with full pass-through at the margin, some producers would be worse off.
- If emissions trading reduces output then there would be effects on suppliers (both within and outside the scheme) because of a reduced demand for their products and services.

Regarding the likely impact on specific EU ETS participants McKinsey & Company and Ecofys⁽²⁵⁾ reviewed the competitive implications of the scheme for a number of critical sectors. The approach was to examine the cost implications of the EU ETS (both direct costs and those associated with electricity consumption) and with assumptions about pass-through determine the extent to which free allocation is adequate compensation for companies.

The Climate Strategies Interim Report⁽²⁶⁾ also examines the competitiveness impacts of the EU ETS (note that it uses the McKinsey work as a source). It also focuses on key sectors in the UK economy and considers the potential value at stake between the limits of no free allocation and 100% free allocation (i.e. exposure to electricity prices only). For each main sector they compare this against the UK trade intensity (value of imports as a proportion of supply plus value of exports as a proportion of demand). The analysis assumes a carbon price of €15/tCO₂ and pass-through to wholesale electricity prices of €10/MWh.

In the discussion that follows we highlight the key findings for the sectors examined in the McKinsey and Climate Strategies report. The purpose of this is not to find definitive answers to the question of what level of free allocation might be appropriate, but rather to highlight the sensitivities of sectors to the level of free allocation and the extent of uncertainties in the current understanding. In addition to the two reports introduced above we identify other references that are relevant.

The electricity generation sector

McKinsey and Ecofys explain that the net cost increase for power generation varies by technology according to its carbon intensity. For their European wholesale market model they predict that with full pass-through and a carbon cost of €20/tCO₂ the electricity price increase combined with a free allocation of 95% would result in a net cost decrease of about 25% for new power plants and between 10% and 40% for existing plant. Considering the electricity price effect only (ignoring free allocation), nuclear plant would benefit whereas gas would lose out slightly and coal would lose significantly.

²⁴ NERA Economic Consulting (2007)

²⁵ McKinsey & Company and Ecofys (2006).

²⁶ *Differentiation and dynamics of EU ETS competitiveness impacts*, Climate Strategies (C.I.R.E.D. and University of Cambridge) Research Theme 1.3 Interim Report 30 March 2007

McKinsey and Ecofys point out that the assumption of full cost pass-through is only valid under certain conditions. In competitive markets price setting is determined by fundamental economics, which will reflect the full value of CO₂ costs. In regulated or monopolistic markets price setting is not determined solely by fundamentals.

Climate Strategies reviews empirical evidence that suggests the level of cost pass-through could range between 40% and 120% of CO₂ costs. However, they also point out that the effect may vary between countries because of the level of concentration in the market and regulatory regime.

Climate Strategies also highlight the importance of differing national electricity generating mixes in determine the absolute level of cost pass through. The wholesale price is determined by the marginal cost of production therefore will reflect the carbon intensity of the marginal plant. Therefore for countries with similar average generation mixes the one with coal plant at the margin will see over twice the cost pass-through (in absolute terms) to one with gas at the margin, all other factors being equal.

The extent to which individual companies benefit would also depend on their generation mix. Regina Betz and Miso Sato⁽²⁷⁾ discuss this issue, citing analysis of the north-east USA under the RGGI scheme where 100% auctioning would not reduce overall profitability. However, if the aim were to maintain the profitability of individual power producers (or power stations) then the share of auctioning declines.

In response to the criticism of windfall profits, Bill Kyte⁽²⁸⁾ points out that the EU ETS is, by its nature, the cheapest way of meeting international targets and by implication therefore any alternative approach to cutting emissions in the power sector would be more costly for the consumer. To put electricity costs in perspective, Kyte argues that in real terms electricity prices have fallen in the last 10-15 years and that recent percentage increases have been lower than the corresponding change in oil prices.

In summary, we see a varied picture of so-called windfall profits for power generators. The extent to which this arises depends on the nature of national markets and indeed individual companies within the same market would be affected differently. Whilst there appear compelling arguments for reducing free allocation to power generators in response to this issue, it seems unlikely that this could be implemented in a uniform way across the EU without appearing to favour companies in some countries over those in others. However, an approach that applies a level of free allocation according to the state of the electricity market could draw criticism of rewarding generators in countries where liberalisation has been the slowest.

Steel sector

McKinsey and Ecofys point out that within the steel industry the two main processes have different exposure to the EU ETS. Basic Oxygen Furnace (BOF, producing mainly flat products) is more exposed and with a CO₂ price of €20/t short and mid-term costs increases would be around 17.3%. For Electric Arc Furnace (EAF, producing mainly long products) the increase would be 2.9%. McKinsey and Ecofys state that around 6% of the cost increase of BOF and 66% of the increase in EAF could be passed onto the consumers on average, because the former competes mainly on global markets and the latter on local markets.

²⁷ *Emissions trading: lessons learnt from the 1st phase of the EU ETS and prospects for the 2nd phase*, Regina Betz and Miso Sato, 2006

²⁸ Bill Kyte, *Impacts on Electricity Prices of Emissions Trading*, presentation to 3rd ECCP meeting

Now, free allocation would offer some compensation for increased costs, although for EAF most of the costs arise from indirect emissions, while only 10% are indirect in BOF. With 95% free allowances the net loss of earnings before interest and taxes would be 1.7% for BOF and 0.6% for EAF. To put these in context industry margins have been around 5% in recent years (prior to the increased demand from China) therefore even with 95% free allocation the EU ETS would have the net effect of reducing the value of the industry by up to one third. In summary, the McKinsey and Ecofys work shows that for the steel industry the costs of the EU ETS, both direct and indirect, can be relatively high such that overall profits are very sensitive to loss of free allocation.

Climate Strategies draw similar conclusions to the McKinsey and Ecofys work (and indeed cite them) in that they highlight the vulnerability of EAF due to its high indirect energy inputs. However, they also emphasise the complexities of the industry with multiple products, processes varying levels of price elasticity of demand for imports/exports and the role of large firms. For the UK they estimate the Net Value At Stake (net impact of sector costs relative to sector value-added) to be 2% with 100% free allocation and about 15% with no free allocation. Given the small margins of the industry this supports the conclusion of the previous paragraph.

Pulp and paper sector

McKinsey and Ecofys show that in general the increased costs of the pulp and paper industry arise from indirect sources. Furthermore, the overall cost increases depend quite strongly on the method of pulp production, varying between 2.1% and 7.5%. They assume 50% cost pass-through in chemical pulping and 0-20% for paper from integrated process. However, this cost pass-through only recovers a relatively small part of the total cost and even with 95% free allocation the remaining cost increase is in the order of 1.1% in processes with chemical pulp and up to 1.9% in pulp and paper production based on recovered fibre. To put this into context, McKinsey and Ecofys cite a selection of company operating margins (2004/0 in the range 2.7% to 6.5%). This implies that the EU ETS in general, and a reduction in free allocation in particular, could have a significant impact on the profitability of the pulp and paper sector.

Climate Strategies draws heavily on the McKinsey and Ecofys work but discusses in more detail the potential role of Combined Heat and Power (CHP) in sheltering the industry from grid electricity price increases when the fuel used is a waste product or biofuel. In this case the CHP plant may receive allowances that it can sell on the market or may not be covered by the scheme. In particular CHP is common amongst pulp producers in Scandinavia.

Cement sector

McKinsey and Ecofys estimate that for a typical European cement production process the costs from the EU ETS will increase by 36.5% due to the EU ETS. Most of this very significant increase (93%) is from direct emissions with electricity prices contributing the remainder. To put this cost increase in context, it is comparable with the freight costs for importing cement from northern Africa or Eastern European countries outside the EU, therefore leakage in the absence of free allocation is a very real possibility.

The potential to pass through the direct emission costs will have a strong local effect since the possibility of cost pass-through is reduced in areas close to sea ports or EU borders where the potential for substitution is highest. However, for the EU industry as a whole McKinsey and Ecofys estimate pass-through to be in the region of 0-15%. Even at the high end of this range they find price increases do little to recover costs and conclude that the level of free allowances is critical for the competitiveness impact of the EU ETS on the cement industry.

However, this sensitivity can to some extent work in the other direction in that with the level of pass-through predicted and with high (95-100%) free allocation, it is possible that cement producers could profit from the scheme.

Climate Strategies also highlight the potential for cement producers to profit from free allocation, although point to the possibility of producers adopting sub-optimal margins to protect market shares from imports in the long run. In either case, however, free allocation would be providing a benefit to cement producers. With respect to pass-through, Climate Strategies cites a study (Walker, 2006) that is inconclusive. However, it does also note that cement import is a very localised issue due to high transport costs.

Overall, it seems that the cement industry is very exposed to the costs of the EU ETS and in general a high level of free allocation is critical for the competitiveness of producers. However, the potential for cost pass-through does exist and is likely to be localised. Those who can pass-through some of their costs have the potential to profit from a high level of free allocation.

Refining sector

McKinsey and Ecofys describe a complex picture for the refining industry, which produces a wide range of products with a variety of processes. However, the study estimates that in general the cost of refining a barrel of crude oil will increase by 20.5% for a carbon price of 20/tCO₂. It suggests that carbon cost pass-through would be in the range 25 to 75% and with free allocation of 95% refinery margins would at least stay constant on average.

Aluminium

Aluminium production is not currently covered by the EU ETS therefore the only CO₂ costs it bears are indirect costs related to electricity consumption. The industry is not currently responsible for direct emission under the scheme, yet nor does it receive any free allowances. In its analysis of the aluminium industry McKinsey and Ecofys calculates that the cost of primary aluminium production will increase by 11.4% and secondary production by 0.5%. Primary and secondary production are carried out in roughly equal measure across Europe. McKinsey and Ecofys state that competition and trade flows in the aluminium market are highly international and that due to competitive intensity none of these cost increases could be passed on to the consumer.

The EU ETS is therefore detrimental to the profitability of EU based operations. Regarding leakage, McKinsey and Ecofys argue that most of the primary smelting capacity in Europe and the US is likely to be shut down in the next 20 years due to high power prices and therefore rather than being the cause of this decline, the EU ETS is likely to be a contributing/accelerating factor.

Direct emissions due to primary production are significant but smaller than indirect emissions (3.8 tCO₂ per tonne aluminium compared with indirect emissions of 4.8 tCO₂ per tonne aluminium).

Overall, therefore we see that the aluminium industry is exposed to the EU ETS through indirect costs associated with electricity consumption. This is likely to contribute to the long term decline of the industry in Europe. The inclusion of the industry in the EU ETS with a high level of free allocation would do little to change this conclusion. Inclusion with a low level of free allocation might serve to further accelerate the decline.

3.4.2 Potential for different allocation mechanisms between sectors

Clearly we can see from the above discussion that the EU ETS affects sectors in very different ways. Some may be able to pass-through some if not all of their carbon costs, whereas others may not. For some sectors carbon costs may be a significant part of their operating costs, for others this may not be the case. Furthermore, some sectors are relatively simple and lend themselves to benchmarking as the favoured method of free allocation, yet for others this may be too complex and grandfathering may be the best approach. A key question must therefore be to what extent can the scheme operate with different allocation mechanisms adopted between sectors, including different levels of auctioning between sectors.

Experience to date has shown that the scheme *can* function with different allocation mechanisms between sectors and with the generous allocations in Phase I different approaches for the same sector in different countries do not seem to have posed significant problems. Looking to the future, there is no reason in principle why different approaches between sectors should not be possible, indeed for the reasons outlined above it is desirable.

The process of implementing a sector specific approach would operate in two phases: firstly the overall carbon emissions target would be divided amongst sectors, then each sector target would be distributed among its constituent installations. The second phase could be carried out in isolation for each sector, since the way allowances are distributed amongst one sector should have no bearing on any other sector. The exception to this would be if different approaches to allocations to new entrants were to affect the competition for resources between sectors. For example a favourable allocation for a new biomass CHP plant in one sector compared with another could be disadvantageous to the second sector.

However, the process of distributing the overall cap between sectors could have important implications for competitiveness in the longer term. Climate Strategies (²⁹) identify that for many sectors the net value at stake might be relatively modest at current carbon prices, with relatively small product price rises (cost pass-through) required to maintain existing profits. With high levels of free allocation it is therefore easier for Governments to adopt an allocation plan that shelters the most vulnerable sectors. However, in the longer term, with higher carbon prices and less free allowances to go around, it will become increasingly difficult for this protectionist approach to continue.

The conclusion of this analysis is that a sector specific approach is essential, even if it will ultimately be limited in its effectiveness. By adopting a sector specific approach, those most vulnerable industries will be able to be sheltered from the effects of extra-EU competition for longer. The ultimate solution, of course, is for a global carbon market in which all industries in all regions see the same carbon price. However, this is a long term goal and in the meantime the sector specific approach to allocation will play an important role.

3.4.3 Implications of Member States withholding allowances

There would be an inherent inconsistency should a Member State adopt a target for domestic action yet treat the EUETS as its main climate policy measure, since the latter does not guarantee that reductions will occur within national borders. The simplest approach, of course, would be to adopt national targets that permit compliance through credits bought from overseas. This might be seen as a logical step in an ever more global approach to tackling climate change.

²⁹ Climate Strategies (2007)
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However, it may also be inevitable that there will be pressures from within the Member State for a national target based on domestic action (and this may even become enshrined in legislation).

If targets for domestic action were in place then Member States might consider the option of withholding allowances. However, the impacts of this would be:

- As a measure it would have a diluted impact on domestic emissions since it would cause a rise in the carbon price affecting the whole scheme. This could lead to further reductions within the Member State but alternatively these additional reductions might arise abroad.
- The withholding of allowances would create uncertainty within the carbon market and would be detrimental for the financial positions of those companies that would otherwise receive them.

It therefore does not seem the best way of stimulating domestic action; far better would be to use auction revenues to support a programme incentivising reductions nationally.

Likewise, the adoption of increased auction levels (perhaps sector specific) according to national targets would be an ineffective way of attempting to incentivise emissions reductions nationally, since it would have no net effect on the carbon price but would serve to increase the costs for national industries. The resulting different levels of auctioning would put businesses within one Member State at a disadvantage with competing businesses in others.

3.4.4 Overview of allocation choices

The present section considers the allocation choices of grandfathering, benchmarking and auctioning. Subsequent sections consider choices in relation to auction revenues and differing benchmark options.

NERA⁽³⁰⁾ analyse this issue in detail and point out that in idealised circumstances³¹ there are important aspects that are *not* affected by the choice of allocation methodology:

- The ability of participants to achieve the emissions cap is not affected by the allocation methodology. As no emissions can occur without the surrender of allowances it should be an environmental certainty that the cap will be met (or at least not exceeded) regardless of allocation methodology. In this respect decisions about environmental objectives can be decoupled for allocation choices.
- The distribution of emissions is not affected by allocation methodology, since allowances can be traded and emissions reductions should occur where the abatement cost is lowest.
- The allocation approach has no influence on the level or choice of abatement. The market should determine a carbon price equal to the marginal cost of achieving the emissions cap (the cost of the last tonne saved). All abatement cheaper than this price would be worthwhile for an organisation, regardless of the number of allowances it received for free.
- The allocation approach does not affect the allowance price, for the reasons discussed in the previous paragraph.
- The allocation approach does not influence product prices, since this is determined by the ability of participants to pass through the opportunity cost of allowances.

³⁰ NERA Economic Consulting (2007)

³¹ Idealized circumstances exclude updating effects where decisions made by participants can impact their future allocation, such as with new entrant and closure rules and updated baselines and ex-post adjustment methodologies (discussed below).

- The allocation approach does not affect investment decisions, since this will be based on future costs and revenues from a project and not the historical distribution of allowances.

In conclusion, the allocation approach should not affect the achievement of the carbon target or the efficiency of meeting that outcome.

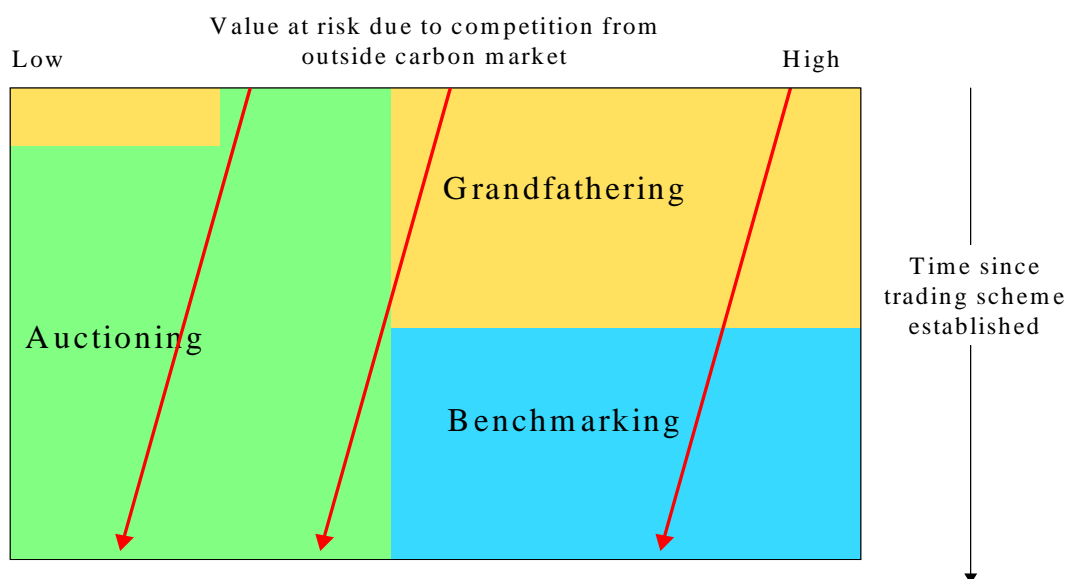
With respect to differences between allocation methodologies, NERA make the following observations regarding the approaches to distributing sector caps:

- *Grandfathering* can serve as a good way to compensate for stranded asset value, since free allocation is related to historic operation at the installation level. However, a weakness arises if the historical baseline is not expected to be similar to future operation. Grandfathering can be administratively simple and transparent, since it relies on a single variable. However, it can be seen as rewarding past inefficiencies.
- *Benchmarking* can take account of emissions reduction potential and therefore has the benefit of balancing the burden of reductions among sectors. It can also reward early action, since two notionally similar installations would be allocated the same number of allowances even if one had previously improved its efficiency. This harmonised approach to allocation may also be seen as fairer.
- *Auctioning* may be seen as the fairer option for those sectors who can pass on carbon costs to their consumers and therefore make windfall profits under free allocation approaches. A weakness of adopting sector level auction approaches as a mitigation for windfall profits is that not all firms in a sector are similarly affected and whilst some may make profits under free allocation others may suffer negative impacts.

The most appropriate allocation mechanism for any particular sector can be illustrated in the Figure 1 on the following page. The horizontal axis shows the extent to which a sector would be disadvantaged in its market if it were to be required to purchase its allowances. The vertical axis shows the length of time since the EU ETS started. The key features of Figure 1 are:

- At the low end of the competition axis auctioning is the more suitable methodology, since costs can be recovered through carbon price pass-through.
- However, there is also a boundary where a degree of free allocation may be appropriate even for sectors with little international competition (shown as grandfathering in the top left of Figure 1). This is because whilst a sector as a whole may be able to recover its increased costs, there will be individual companies who cannot recover their full costs, for example if they operate higher carbon intensity facilities than the sector average. The argument for compensating firms for loss of asset value in the early stages would imply a degree of free allocation for these sectors, albeit there would be a risk that some in the sector would benefit from windfall profits. Whilst free allocation has occurred for all installations so far, it is debateable whether compensation for loss of asset value should be a main driver for allocation in Phase III, some 8 years after the scheme first started.

Figure 1: Suitability of allocation mechanisms



- At the high end of the competition axis free allocation via either benchmarking or grandfathering is most suitable, to avoid putting the sector at a competitive disadvantage.
- In practice there will be a boundary between these extremes for which some degree of auctioning is appropriate. The position of this boundary will reflect the extent to which costs can be recovered from consumers.
- At the top end of the time axis grandfathering is probably the most appropriate free allocation methodology. This is because it is simplest, which is important for the early stages of a scheme, and can most closely compensate participants for stranded asset value (although it has the disadvantage of not rewarding early action).
- However, moving down the time axis as the scheme progresses, grandfathering will become less representative of actual need (in the absence of baseline updating) and the argument to compensate for loss of asset value becomes progressively less compelling (it is debatable how relevant it is for Phase III). In this case where free allocation is justified on grounds of competition, benchmarking is in principle the most appropriate way forward since it should create less within-sector competitive distortion.
- There is a boundary between grandfathering and benchmarking that represents an important practical constraint. Whilst in principle benchmarking may be desirable in the longer term, the complexities of defining benchmarks may make this impractical. For this reason grandfathering may have an ongoing role for some sectors (as discussed in section 3.5.1).
- Finally, the red arrows show the potential pathway for sectors in a carbon market which is progressively expanding (in geographical terms). As the carbon market expands a greater proportion of a given sector in a global market would be covered and therefore the overall competitive disadvantage for those in the scheme would be diminished. In these circumstances there may be greater opportunities for cost pass-through and therefore a greater degree of auctioning could be justified.

In summary, we cannot point to a single allocation mechanism being the preferred option since practical considerations such as the impact of the scheme on asset values and the effect of competition from outside the scheme suggest that the auctioning approach preferred by economists⁽³²⁾ may not be the best one for all sectors in the current environment. However, a longer term move towards auctioning would be preferred as the carbon market moves towards a global scale.

3.4.5 Use of auction revenues

A major issue for many when considering the role of auctioning is what will be done with the revenues generated. However, policymakers seem keen to decouple decisions on whether and how much to auction from decisions about what to do with the revenues that will be generated.

The revenues from auctioning could constitute a very significant sum of money. In Phase II about 76m allowances will be auctioned each year, which at current forward prices of around €2/tonne would amount to nearly €1.7bn per year. Looking forward, in a scenario where emissions allowances comparable with current emissions were auctioned, and a price similar to current Phase II prices was obtained, the revenue generated would be in the region of €40bn per year.

The possibilities for the use of revenues, in principle, are listed below. However, it should be noted that we have not reviewed the legal feasibility of these options. The citations below refer to comments made at the ECCP WG 3rd meeting.

The revenues could be kept at EU level, although it is not clear to what purpose it could be put, perhaps simply put to the EU budget and recycled to member States. A disadvantage with this centralised approach is that in a scenario where there is a differential level of auctioning between Member States some would be perceived as losing out to others. Furthermore, under a framework in which Member States have flexibility to determine the level of auctioning the retention of revenues at EU level might act as a disincentive to auction allowances. It would therefore only be feasible in a regime where a single EU cap is applied, with a proportion being removed for auctioning prior to the distribution of the remainder to Member States for allocation to their installations.

Distribute it to Member States. In the absence of a harmonised approach as discussed above, this option would seem preferable. However, it does not address the issue of to what use the revenues are put.

Revenues could be used for environmental objectives or to support new technologies / R&D. Hungary, for example, decided to use some of its auction revenue from Phase I to support climate change mitigation and adaptation measures. Representatives from the carbon trading sector support the use of auction revenues for environmental purposes, on the grounds that the scheme has been established to address environmental concerns and not to raise revenues.

A variation on this option is to use revenues to help other countries invest in clean technologies. These could be projects that generate credits under the Clean Development Mechanism or Joint Implementation. This would increase the incentive for cleaner development in other countries.

Distribute revenues to participants. Some Member States did not exclude that part of the auction revenues should be recycled back to energy intensive industry, the implication being that this would compensate for increases in energy costs as a result of the EU ETS. This view was supported by EuroChlor, in whose industry electricity accounts for over 50% of production costs.

³² Schleich et al. (2007)
IP/A/ITRE/ST/2007-08

However Marcu argued that the recycling of revenues should not be used to create new market distortions, and the use of revenues in this way could raise concerns about distorting the internal market and state aid.

Given the difficulty in defining fair allocation methods for free allowances, the recycling of auction revenues within the EU ETS sectors would raise a new set of distributional issues and, indeed, would undermine the use of auctioning as a less distortive approach than benchmarking.

Distribute revenues to consumers as compensation for product price increases. This would be a variation on the previous option, and it is possible that the allocation of revenues to the business sector would constitute state aid. For Phase II the Danish proposed using revenues from allowances auctioned from the electricity sector total to compensate electricity consumers outside the EU ETS. Whilst the Commission's decision on the Danish NAP did not give a verdict on this proposal it remains unclear whether this would be permitted.

The distribution of revenues to domestic electricity users would be administratively very complex and would seem to work against the principle of liberalised markets, since the pass-through of carbon costs into electricity prices is a natural market response. If there were concerns that carbon price pass-through was having a detrimental effect on those in poverty a more targeted solution would be through existing or new social support mechanisms.

General taxation / distribute it to the EU population as a compensation for the damage done to "their" part of the atmosphere. A political reality is that auction revenues might be absorbed into general taxation, particularly since they are likely to pass to the national treasury following the auctions. In a model where national spend remains independent of EU ETS auction revenue generation, the use of revenues in this way would either reduce national debts (increase surpluses) or allow a reduction in taxation from elsewhere, possibly at an individual level or at corporate level. The distribution of revenues to the wider populous would be administratively complex. It would be simpler to make adjustments to the existing taxation regime.

Overall, the ECCP recognised the issues surrounding the use of revenues, and highlighted the concerns over market distortion. However, the issue was left open.

3.5 Benchmarking possibilities

This section considers three aspects to benchmarking; the issues and feasibility relating to "conventional" ex-ante benchmarks; the issues surrounding the frequently proposed option of output-based ex-post allocation and the options for treatment of new entry and closure

3.5.1 Conventional (ex-ante) benchmarks

The potential for determining workable benchmarks will vary between sectors and we highlight some of the observations made at the third ECCP meeting in this respect towards the end of this subsection. However, it is helpful to first set out some of the overarching issues relating to the development of benchmarks, as discussed in NERA (³³):

Benchmarks could be output-, input- or capacity-based. For the electricity industry for example, output-based benchmarks would use electricity generation as the metric, input-based benchmarks would use the energy content of the fuel and capacity benchmarks would use the installed capacity of the generating plant.

The complexity of defining an acceptable set of benchmarks may limit the practical application of benchmarks for some sectors.

³³ NERA Economic Consulting (2007)
IP/A/ITRE/ST/2007-08

The definition of output or capacity for installations producing different products may be difficult, therefore benchmarking may be easier to use with homogeneous well defined outputs, such as electricity generation.

As discussed above, the potential for implementing benchmarks depends largely on the complexity of the sector concerned. The presence of a wide range of processes and products can make benchmark definition unmanageably complex. Regarding the feasibility of devising benchmarks, the following observations by sector representatives were made at the third ECCP meeting:

- In the pulp and paper industry the large variety of installations and large number of small installations would create a challenge to implementing benchmarks. Whilst there are current benchmarks in some Member States (NL, BE, AU and Germany) these are not yet fit for implementation at EU level ³⁴.
- Whilst a harmonised European benchmark in the glass industry is required, there is wide variety within the sector and benchmarking would be quite complicated ³⁵.
- Representatives from industries confirmed that about 5 benchmarks would be needed in the steel sector, one or two for the cement sector and about 20 for the chemical sector.

Overall, therefore, sector specific approaches to benchmarking are required. It is beyond the scope of this study to suggest benchmarks or provide a view on the feasibility of devising benchmarks for each sector. The EC has suggested, in summing up the discussion on allocation methodologies at the third ECCP meeting, which each sector should consider what it sees as the best benchmark approach. The possibility that a sector views grandfathering as the best approach should therefore not be excluded. Since ex-ante free allocation methods are concerned with dividing up a fixed quantity of allowances, any recommendation from a sector to pursue grandfathering should be taken seriously (whereas pleas against auctioning might be viewed with more scepticism).

3.5.2 Updated (ex-post) allocation

It is recognised that with a fixed (ex-ante) allocation the marginal cost of CO₂ for each unit of production creates an incentive for that production to be carried out outside the EU (hence the term emissions leakage). Where such alternatives exist it has been suggested that the primary impact of the EU ETS is to reduce production, rather than increase efficiency. Indeed, it is sometimes argued that production outside the EU might be less energy efficient and therefore actually result in net emissions increases for the global sector.

Many within industry have therefore proposed output-based allocations using benchmarks as a way of eliminating the incentive for emissions leakage for sectors that are subject to competition from outside the EU. The principle of output-based allocations³⁶ is that an installation would receive a number of free allowances in proportion to its actual production levels. The constant of proportionality would be the benchmark, perhaps reflecting the industry average carbon intensity or even Best Available Technology (BAT). By giving installations more allowances if they increase production (and less if they reduce production), the incentive to move production outside the scheme is reduced.

³⁴ Marco Mensink (CEPI)

³⁵ Guy Tackels (CPIV)

³⁶ not to be confused with output based benchmarks discussed in the context of ex-ante allocation in the previous section

The effectiveness of ex-post output-based benchmarks in reducing emissions leakage was reviewed by Colombier and Neuhoff (³⁷), who concluded that output based allocation can avoid emissions leakage but highlighted the importance of the point in the process at which the benchmark is based. They state that benchmarks defined according to the first tradable intermediary product after the CO₂ intensive process (for example semi finished steel, clinker, raw aluminium) can be effective, but that benchmarks for later stages introduce the risk that intermediary products could be imported.

A downside of output-based benchmarks, from the point of view of the emissions performance of the sector concerned, is the impact it could have on the incentive for innovation and substitution (³⁸). By varying allocation according to actual production the carbon price signal is not passed through into product prices, thereby removing the incentive for more innovative use of the CO₂ intensive intermediary product downstream of the benchmark or substitution of the final product with alternatives.

Looking more broadly, the use of output-based benchmarks would have implications for the effectiveness of the trading scheme. If the allocation to one or more sectors was not known until after the relevant compliance year then the scheme would either need to operate without a known cap or the allocation to other sectors would be uncertain (since they would be allocated the difference between the fixed overall cap and the eventual allocation to sectors with output-based benchmarks). The former option would reduce confidence in the traded market whereas the latter would be detrimental to the financial performance and investment in low carbon options for the affected sectors.

³⁷ *Can Sectoral Agreements and output based allocation address leakage, Working paper 6th July 2007, IDDRI and University of Cambridge based on a workshop convened by Climate Strategies.*

³⁸ *Ibid*

Table 3: A comparison of output-based (ex-post) benchmarks and conventional (ex-ante) benchmarks against the assessment criteria

Criteria	Output-based ex-post allocation	Conventional ex-ante allocation
Environmental effectiveness	Could avoid emissions leakage. However, relative rather than absolute emissions targets would be detrimental to overall environmental objective.	Could create incentive for emissions leakage, possibly leading to emissions increases
Cost effectiveness	Uncertainty over total cap and the allocation to other sectors could be detrimental to investment, thereby reducing the cost-effectiveness of the overall scheme.	Provides greater market certainty
Economic efficiency	See comment under cost-effectiveness above.	See comment under cost-effectiveness above
Simplicity	The process of ex-post adjustment could introduce complexity.	Simpler since allocations are determined at the start of the phase.
Predictability	The process of ex-post adjustment is inherently less predictable for all involved in the scheme.	More predictable since allocations are determined at the start of the phase.
Non-discrimination	A process where ex-post allocation for some sectors is at the expense of allocation to others would be seen as discriminatory.	A process in which ex-ante allocation disadvantages those industries exposed to competition from outside the EU could be seen as discriminatory.
Harmonisation	Not applicable, since harmonisation is affected by how a benchmark is implemented rather than the approach in principle.	Not applicable, since harmonisation is affected by how a benchmark is implemented rather than the approach in principle.

At the third ECCP meeting Output or performance based benchmarks were proposed by a number of sectors including the chemical (CEFIC), cement (CEMBUREAU) and glass (CPIV, at least to the extent that benchmarks should take into account unforeseeable production growth) industries and the International Federation of Industrial Energy Consumers (IFIEC Europe).

However, NGOs and the research community were not supportive on the grounds that it would represent relative rather than absolute emissions targets. In summing up, the Chairman of the third ECCP meeting was not supportive either, stating that “the Commission invites all industrial sectors to look into benchmarking, but wants to make clear that ex-post benchmarks are not compatible with the way the EU ETS is set up. For the sake of a well functioning market, ex-ante benchmarks would represent a minimum requirement, while frequent and/or regular ex-post interventions are excluded.”

Overall, the downsides to output-based ex-post allocation appear very significant and any decision to adopt this approach should be considered the exception rather than the norm. The purpose of using output-based allocation would be to minimise leakage, in which case benchmarks should be defined according to the first tradable intermediary product after the CO₂ intensive process.

Any decision to develop output based ex-post benchmarks should be based on the extent to which they can be justified on the grounds of competition (and recognising the impact such benchmarks may have on other sectors in the scheme) rather than the ease at which such benchmarks can be determined.

3.5.3 New entrants and closure

As noted above, most Member States have adopted free allocation to new entrants in Phases I and II of the scheme, determined by technology benchmarks.

As discussed in NERA (³⁹) an important feature of free new entrant allocation is that it can act to prevent leakage and alleviate competitiveness concerns, since it is a net subsidy for investments within the scheme. NERA highlight that leakage could result in higher net emissions since capacity would be built in jurisdictions without emissions constraints.

A further motivation for free new entrant allocation is that it could be perceived as fairer in cases where incumbents also receive free allocation. Indeed, Ecofys identify this as the primary argument in favour of free allocation to new entrants (⁴⁰).

Finally, NERA point out, free new entrant allocation may stimulate a greater level of investment (than when full carbon costs are taken into account) and therefore constitutes an investment subsidy. This could lead to lower consumer prices and through higher capacity levels result in improved energy security.

On the downside, free allocation to new entrants is a departure from idealised conditions, since the effect of allowing future actions of a participant to determine its future allocation is to reduce the incentive for abatement and therefore increase the overall cost of meeting the carbon cap.

Furthermore the extent of differentiation between new entrant benchmarks will affect the nature of new investment decisions, where one form of differentiation is between those projects eligible for new entrant allocation and those not. In the electricity sector, for example, new entrant allocations would favour fossil plant to the detriment of new renewables or nuclear plant. Thus, even with a single technology benchmark there would be a subsidy favouring certain emitting technologies.

The issues relating to the treatment of closing installations to some extent mirror those for new entrants. The forfeiting of future free allowances upon closure disincentivises closure as an abatement option leading to higher overall abatement costs. However, it is in effect a subsidy for existing plants to continue operating and therefore reduces leakage.

³⁹ NERA Economic Consulting (2007)

⁴⁰ *The approach to new entrants and closures in the EU ETS*, Ecofys, December 2006

NERA state that closure rules are typically coordinated with new entry rules since the emissions avoided by closure would arise through the operation of new plant. Therefore if new entrants get free allowances then closing installations would forfeit them, to avoid issuing two allowances for the same emissions. With this type of coordination the treatment of new entry and closure would act similarly to protect against leakage but both would act to increase overall abatement costs.

However, the above approach is inconsistent with the argument that barriers to entry should be aligned with the barriers to exit, since free allocation to new installations would reduce the barrier to entry yet forfeiting free allocation upon closure would increase the barrier to exit. Indeed, it is this disparity between entry and exit barriers that leads to increased capacity and reduced prices discussed earlier in this section. If maintaining aligned barriers to entry and exit were a priority then new entrants receive free allowances closing installations should keep theirs (and vice-versa). This approach, however, has not been common in the EU ETS to date.

On a practical level, a proposal to continue to issue allowances after closure raises difficulties such as: defining closure, perhaps in terms of an activity threshold; determining for how long to continue to allocate (possibly until the end of the phase or until the plant would have been expected to close anyway, the latter being very subjective); deciding whether to continue to allocate if the installation is closed for other regulatory reasons; the perception that continuing to allocate after the installation has closed is “unfair”.

Overall, NERA argue there is a balance to be found between the increased abatement costs arising from new entrant allocation/forfeiting allocation on closure (either through reducing the incentive for abatement or by stimulating an inefficiently high level of investment) and the benefits arising from reduced leakage, lower consumer prices and improved security of energy supply. These factors suggest a sector specific approach, where free allocation is more justified for sectors experiencing competition from outside the scheme. Furthermore, if the protection of industry from competition from outside the carbon market is to be a priority, then there may be a case for issuing free allowances to new entrants and requiring closing installations to forfeit subsequent allocations, even if this creates differential barriers to entry and exit.

Ecofys put emphasis on the importance of harmonising new entrant and closure rules, since different approaches can distort competition within the EU. They state that the EU has a choice about the level at which to harmonise new entrant rules and provisions and suggest there are strong arguments in favour of harmonising certain elements of the approach and allocation to installations post-2012. However, such harmonisation must be taken in tandem with harmonisation of other EU ETS rules relating to incumbents to ensure equality of treatment.

3.6 Findings and recommendations

- It appears preferable to determine the overall cap at EU level, rather than the current process of nationally determined caps aggregating to an EU cap, since this is more likely to be effective at ensuring scarcity and should be a simpler, more predictable, process. Most logically the EU cap would relate to an EU level emissions target, taking into account the relative effort from the traded and non-traded sectors. It would also decouple the issues of ensuring scarcity and fair allocation, since the latter aspect would be addressed following the determination of the overall cap.
- The decision on the length of cap to be set is primarily a matter of finding a balance between providing longer term certainty and avoiding an expensive lock-in of a target that is difficult to achieve these two issues. For Phase III a cap in excess of 5 years is desirable, probably to 2020.

In addition to setting a longer cap consideration should be given to decoupling the process of cap setting from that of sector level allocations. It would be quite possible to set a long term cap and have intermediate sub-phases over which allocations are fixed. The benefit of this is that the clarity on the overall cap would be maintained yet there would be flexibility to accommodate sector growth rates that deviate from the initial expectation.

- Any adjustment to the cap (for example in response to the EU adopting a 30% reduction target) should be according to a pre-established formula or even to a revised value established before the phase, in order to minimise the uncertainty that such adjustments would introduce.
- The approach to Phase II allocation across the EU may be characterised as inharmonious, with little sign of Member States seeking to adopt consistent methodologies. It may also be viewed as a phase in which many Member States have taken small steps away from grandfathered allowances towards greater use of auctioning and benchmarking. Looking forward, however, it is difficult to see how this evolutionary approach could lead to a harmonised scheme. This would suggest that if harmonisation is to be a priority, the Commission needs to take action to more closely define the methodologies for installation level allocation, perhaps with specified levels or ranges for auctioning and principles to be applied in benchmarking and possibly grandfathering methods.
- There is a varied picture of so-called windfall profits for power generators. The extent to which this arises depends on the nature of national markets and indeed individual companies within the same market would be affected differently. Whilst there appear compelling arguments for reducing free allocation to power generators in response to this issue, a uniform approach across the EU would appear to favour companies in countries with more liberal markets since they would have greater opportunities to pass on their carbon costs.
- The potential for windfall profits arising from free allocation is not unique to power generators, it applies to any industry which can pass on its carbon costs, even partially. However, as with power generators, companies within a sector could benefit differently according to their technologies and geographical location (proximity to extra-EU competition for example).
- Whilst we have not reviewed literature for all sectors or carried out any primary research, the studies reviewed in the present paper suggest that the steel, pulp and paper, and aluminium sectors are exposed to cost increases that they cannot recover. The cement sector is also particularly exposed but certain operators would also have the potential to profit from free allocation.
- For the scheme in general, no single allocation mechanism will be suitable for all sectors due to differential impacts on asset values and the effect of competition from outside the scheme. A sector specific approach is essential to shelter those most vulnerable industries from the effects of the EUETS on extra-EU competition. The ultimate aim, however, is for a global carbon market in which all industries in all regions see the same carbon price and allowances are auctioned (in line with the polluter pays principle). However, this is a long term goal and in the meantime the sector specific approach to allocation will play an important role.
- For free allocation in general, benchmarking appears preferable to grandfathering and will become increasingly so as the scheme progresses. However, for some sectors it may be unmanageably complex to develop fair and effective benchmarks, in which case grandfathering should be considered, particularly if this is the consensus view of the industry concerned.

- Overall, the downsides to output-based ex-post allocation appear very significant and any decision to adopt this approach should be considered the exception rather than the norm. The purpose of using output-based allocation would be to minimise leakage, in which case benchmarks should be defined according to the first tradable intermediary product after the CO₂ intensive process. Consequently, any decision to develop output based ex-post benchmarks should be based on the extent to which they can be justified on the grounds of competition (and recognising the impact such benchmarks may have on other sectors in the scheme) rather than the ease at which such benchmarks can be determined.
- There is a balance to be found between the increased abatement costs arising from new entrant allocation (either through reducing the incentive for abatement or by stimulating an inefficiently high level of investment) and the benefits of free new entrant allocation in reducing leakage, lowering consumer prices and improving security of energy supply. These factors suggest a sector specific approach, where free allocation is more justified for sectors experiencing competition from outside the scheme.

4. POTENTIAL ADDITION OF TRANSPORT AREAS

4.1 Introduction

4.1.1 The transport sector's contribution to greenhouse gas emissions

Each transport sector – road, rail, aviation and maritime – emits greenhouse gases (GHGs) and thus contributes to climate change. However, the nature of each mode is different, with the aviation and maritime sectors being more international in nature than road or rail. This has implications for the potential measures, including the design of an emissions trading scheme, which might be introduced to reduce GHG emissions. Additionally, the fact that most emissions from aviation and the maritime sectors do not take place within the territory of any particular country makes the introduction of measures to reduce such emissions more difficult. Consequently, the Kyoto Protocol only covers GHG emissions from transport that can clearly be allocated to a particular country, so the aviation and maritime sectors are explicitly excluded from the Protocol. Hence, there are no international commitments to reduce GHG emissions from aviation and maritime transport, whereas emissions from the road and rail sectors are covered by the national targets set out in the Kyoto Protocol.

In its report *Progress towards Achieving the Kyoto Objectives* (⁴¹), the European Commission noted that greenhouse gas emissions from the transport sector have grown significantly since the Kyoto baseline year of 1990. For the *EU-15*, GHG emissions from domestic transport increased by 26% between 1990 and 2004 (emissions from road transport also increased by 26% over the same period) and these are projected to increase by 35% above 1990 levels by 2010 without additional policies and measures. Transport's GHG emissions in the *EU-10* are now 28% higher than they were in 1990, even though in 1995 they had dropped to 6% below the baseline. By country, only Finland, Germany, Sweden and the UK saw relatively small increases in transport's GHG emissions between 1990 and 2004. In many countries, rising transport emissions are the main cause of rising GHG emissions, generally, e.g. in Italy, Spain, France and Poland.

Between 2003 and 2004, total GHG emissions increased and the transport sector was one of the three main sectors that contributed to this increase. However, in 2005, the European Environment Agency reports that CO₂ emissions from road transport declined by 0.8% – a drop that was mainly the result of decreases in Germany (⁴²).

In its latest annual report on transport indicators, the European Environment Agency notes that road transport accounts for 93% of transport's GHG emissions and that emissions have been continually increasing for both passenger (a 27% increase between 1990 and 2004) and freight transport (51% increase between 1990 and 2003). CO₂ emissions from international aviation and maritime transport are growing even faster – aviation and maritime have together increased by 59% between 1990 and 2004, whereas emissions from aviation alone have gone up by 86% (⁴³).

4.1.2 The proposed inclusion of transport in the EU ETS

On 20 December 2006, the European Commission published a proposal to include a mode of transport – aviation – into the EU ETS for the first time (⁴⁴).

⁴¹ COM(2006)658

⁴² <http://www.eea.europa.eu/pressroom/newsreleases/eu-greenhouse-gas-emissions-decrease-in-2005>

⁴³ European Environment Agency (2007)

⁴⁴ COM(2006)818

Key elements of the scheme, as proposed by the European Commission, are as follows:

- Aircraft operators would be the trading entity and thus be responsible for complying with the obligations of the EU ETS. Each will be administered by one Member State only.
- The scheme would apply to flights between EU airports from 2011 and all flights arriving at, or leaving, an EU airport from 2012.
- Focus of the proposal is on CO₂; other gases to be considered later.
- Allowance methodology would be harmonised across the Community and the emissions cap would be set at the Community level with reference to aviation's emissions averaged over 2004 to 2006.
- Most of the allowances will be allocated for free, although there will be limited auctioning.
- It will be an open system, as aircraft operators will be able to buy allowances from other sectors and use CDM/JI credits up to a harmonised limit.
- Domestic aviation will be treated in the same way as international aviation.

In 2007, the European Parliament reiterated its call for binding measures to be taken to reduce the GHG emissions from the transport sector, including aviation (⁴⁵), although in the course of the March 2007 ECCP meeting, MEP Anders Wijkman noted that the Parliament has supported a separate emissions trading system for aviation (⁴⁶). However, in its first reading of the Commission's proposal to include aviation in the EU ETS (⁴⁷), Parliament does not propose to amend the Commission's proposal to introduce a closed system for aviation, even though the rapporteur's report on the proposal noted that the Parliament had asked for a separate scheme (⁴⁸). Additionally, he noted that there are opportunities and risks in pursuing trading for other transport modes. In April's ECCP meeting, the Commission was asked whether shipping and road transport would be considered for inclusion in an expanded EU ETS. In response, it was noted that the inclusion of shipping in the EU ETS was one of three options that the Commission was considering to address that mode's CO₂ emissions, but that it was too early, at that time, to have a clear view as to how to address road transport and shipping.

Additionally, it was underlined that no option would be excluded at this stage. In its most recent Communication on the review of the passenger car CO₂ strategy (⁴⁹), the Commission noted that road transport would not be included in the EU ETS until Phase III (i.e. starting in 2013) at the earliest and that the Commission would explore the possibility of including it in Phase III.

⁴⁵ European Parliament Resolution on Climate Change P6_TA(2007)0038

⁴⁶ Final Report of the 1st meeting of the ECCP working group on emissions trading on the review of the EU ETS on the Scope of the Directive, March 2007

⁴⁷ Text adopted by Parliament on 13 November 2007 (P6_TA-PROV(2007)0505); see <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2007-0505&language=EN&ring=A6-2007-0402>

⁴⁸ *Report on the Proposal for a Directive amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emissions allowance trading within the Community* A6-0402/2007, 19.10.07; see P6_TA(2007)0038 <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A6-2007-0402+0+DOC+PDF+V0//EN>

⁴⁹ European Commission (2007) *Results of the review of the Community Strategy to reduce CO₂ emissions from passenger cars and light commercial vehicles*, Communication from the European Commission, COM(2007)19, 7.2.2007 Brussels

4.2 Automotive sector

4.2.1 The European automotive industry

The European automotive industry can be characterised in a number of different ways depending, for the purposes of emissions trading, on the proposed trading entity. For example, a number of trading entities have been proposed for the automotive sector, as follows:

- Oil refineries;
- Fuel suppliers;
- Vehicle manufacturers;
- Filling stations; and
- Drivers and hauliers.

If either oil refineries or fuel suppliers were the trading entities, the membership of the European Petroleum Industry Association (EUROPIA) would contribute a significant proportion of the trading entities. Seventeen oil companies, all of which own and operate refining capacity within the European Economic Area, are members of the EUROPIA. These companies account for around 90% of the existing petroleum refining capacity in the EU and around 75% of EU motor fuel retail sales⁽⁵⁰⁾. Even though EUROPIA's members account for the overwhelming majority of refinery capacity and fuel suppliers, there will clearly be other, probably smaller, companies that both refine and supply fuel, and so would be trading entities if either refineries or fuel suppliers were trading entities.

If vehicle manufacturers were designated as the trading entity, the membership of the European, Japanese and Korean manufacturers associations would provide most of these. There are 32 members of these three associations – ACEA⁽⁵¹⁾, JAMA⁽⁵²⁾ and KAMA⁽⁵³⁾ – that are covered by the existing voluntary agreements between the European Commission and car manufacturers. Additionally, there are a number of US-based manufacturers that import directly to the EU (rather than sell through European-based subsidiaries) and minor European manufacturers, which are not members of these associations. Smaller manufacturers could be excluded from any emissions trading scheme aimed at road transport, although this would introduce a distortion and potentially impact on the effectiveness of the scheme.

On the other hand, if either filling stations or end users were the designated trading entity, the number of trading entities increases significantly: there are thousands of filling stations and in 2005, there were nearly 220 million cars, 730,000 buses, 32 million (light and heavy) goods vehicles and around 25 million motorcycles and mopeds in the EU-25⁽⁵⁴⁾.

⁵⁰ <http://www.europia.be/content/Default.asp?PageID=150>

⁵¹ http://acea.thisconnect.com/index.php/about_us/members

⁵² <http://www.jama.org/about/members.htm>

⁵³ http://www.kama.or.kr/eng/MC/K_eng_mc1.jsp

⁵⁴ European Commission DG TREN and Eurostat *European Union: Energy and Transport in Figures 2006*; http://ec.europa.eu/dgs/energy_transport/figures/pocketbook/doc/2006/2006_transport_en.pdf

4.2.2 Feasibility of including road transport in emissions trading

It should be noted that the discussion about the inclusion of road transport in the EU ETS is relatively new and, even though it was discussed at the 2007 ECCP Working Group meetings, many stakeholders (including NGOs and manufacturers) are not that enthusiastic about the inclusion of road transport in the EU ETS⁽⁵⁵⁾. It is also worth noting that two reports^(56,57) examining the possible expansion of the EU ETS rejected the inclusion of road transport in the next expansion, as both concluded that there were better options for inclusion of other sectors in the short-term.

The choice of trading entity and the principle of direct emissions.

As noted above, there are a number of potential candidates to be the trading entity if road transport were to be included in the EU ETS. Three, in particular, have received the most attention in the literature – i.e. fuel suppliers; car manufacturers; and individual motorists and hauliers – with the preferred option being the fuel suppliers^(58,59). If the principle of direct emissions were to apply, then individual motorists and hauliers would be the preferred trading entity, but for road transport, the application of this principle may not be the most cost-effective option.

The most comprehensive study on the potential to use emissions trading for reducing the GHG emissions of the transport sector was undertaken for the Swedish Environmental Protection Agency by CE Delft⁽⁶⁰⁾.

The study's initial appraisal of options reviewed possible trading systems for the road transport sector that differed by trading entity (end consumers, filling station, fuel supplier or vehicle manufacturer), whether the scheme was national or international, the type of system (i.e. cap-and-trade (C&T)⁶¹ or benchmark-and-credit (B&C)⁶² and mode (passenger/freight/public). Schemes were then appraised against a number of criteria including: the emissions reduction potential of the trading entity; the transaction costs associated with the scheme; the scope of the emissions; and the technical feasibility of the scheme.

⁵⁵ MacKenzie M *EU Emissions Trading Scheme: UK Experience and the future* Presentation to the Low Carbon Vehicle Partnership/Energy Institute conference on Emission Trading and the Road Transport Sector, 1 May 2007; see <http://www.lowcvp.org.uk/assets/presentations/Mackenzie.pdf>

⁵⁶ AEA Technology and Ecofys (UK) (2006) *LETS Update: Scoping Phase Report* A report produced for the LETS Update Partners, April 2006 (<http://www.endseuropedaily.com/docs/60509b.pdf>).

⁵⁷ Ecofys (2006) *Inclusion of Additional Activities and Gases into the EU-Emissions Trading Scheme* Report under the project "Review of EU Emissions Trading Scheme" for the European Commission's DG Environment, October 2006 (http://ec.europa.eu/environment/climat/emission/pdf/etsreview/ecofys_review.pdf)

⁵⁸ E.g. IPPR (2006) *Tailpipe Trading: How to include road transport in the EU emissions trading scheme*, A proposal to the Low Carbon Vehicle Partnership Road Transport Challenge (<http://www.ippr.org.uk/publicationsandreports/publication.asp?id=472>).

⁵⁹ E.g. DfT (undated) *Road Transport and the EU Emissions Trading Scheme* (<http://www.dft.gov.uk/pgr/sustainable/climatechange/euemistrascheme>)

⁶⁰ SwEPA (2006) *Dealing with Transport Emissions: An emission trading system for the transport sector, a viable solution?* Report 5550, March 2006.

⁶¹ Under a cap-and-trade system, a limit on total emissions is set and then emission allowances are allocated to the appropriate entities within the sectors involved. These entities can then sell allowances, if they have emitted fewer emissions than the number of allowances they possess, or buy allowances in cases where the number of allowances possessed do not cover the emissions released.

⁶² A baseline-and-credit scheme is one in which a baseline emission standard is set; the performance of each entity covered by the scheme is then assessed against this standard. Those performing less well will have to buy credits from those who are performing better than the baseline standard. In a baseline-and-credit scheme, emissions are not regulated directly (unlike in a cap-and-trade scheme), only relative emissions.

The principal differences identified in the first stage appraisal of the range of options assessed for applying an emissions trading system to road transport related to differences in transaction costs and the potential for emissions reductions. Generally, the appraisal concluded that both C&T and B&C schemes aimed at end users would have high transaction costs and would be difficult to implement (as a result of the number of entities), compared to similar schemes aimed at manufacturers or fuel suppliers. An advantage in having a C&T scheme targeting end users, on the other hand, would be that end users have a lot of alternative options to reduce emissions, e.g. from purchasing a more efficient vehicle, to driving more efficiently or using the vehicle less. Filling stations and fuel suppliers have limited access to direct emissions reductions, although they could use biofuels and may be able to transfer the costs of emission allowances to end users via the price of the fuel. The first phase appraisal also concluded that B&C schemes are feasible for car and light commercial vehicle manufacturers, as the transaction costs would be relatively low, even though manufacturers are not able to influence the use of the vehicle – the only means of reducing emissions that they have is by designing more efficient cars – and therefore have limited means of reducing emissions. As a result of the first appraisal, three schemes were chosen for more in-depth appraisal, i.e.:

- A C&T scheme targeting end users;
- A C&T scheme for fuel suppliers; and
- A B&C scheme for passenger car manufacturers.

These are the three most common options discussed in the wider literature, so SwEPA/CE Delft's findings on these are integrated into the relevant discussions, below.

The main argument against a C&T scheme that has fuel suppliers as the trading entities is that fuel suppliers have no direct way to influence fuel use, although they could supply lower carbon fuels, including biofuels ⁽⁶³⁾. Fuel producers could potentially, however, indirectly influence fuel use by passing the cost of allowances on to motorists and hauliers, who may respond to the increased cost by driving less, driving more efficiently or buying an alternative vehicle. Given that the price of allowances is expected to be lower than the cost of switching fuels (if transport were included in the EU ETS), the main impact of a scheme on fuel producers is likely to be increased prices and therefore reduced fuel consumption ⁽⁶⁴⁾. However, it is possible that fuel suppliers would not pass on all of the increased costs to end users.

The lack of a direct impact on use of such a system has led some to conclude that a range of flanking measures be used in parallel to stimulate low carbon vehicles, fuels and journeys ⁽⁶⁵⁾.

The benefits of a scheme targeting fuel suppliers is that it would be relatively simple, have low transaction costs (for example, 20 companies in the UK account for 99% of the market), be politically more feasible and administratively simpler and easier. For example, the system could be based on, and linked to, that used by EU countries to collect fuel duty from fuel suppliers ⁽⁶⁶⁾. The point at which fuel duty is paid could be the point at which allowances are regulated, while fuel duty records, combined with standard emissions factors, could be the basis of the system. The number of trading entities would depend on the point at which fuel duties were paid in different Member States.

⁶³ AEA/Ecofys (2006)

⁶⁴ DfT (no date)

⁶⁵ IPPR (2006)

⁶⁶ *Ibid*

Another advantage with such a system is that the companies that would have to trade under this approach are used to being part of the EU ETS (as many would have refineries that are already covered by the scheme) ⁽⁶⁷⁾, so there would be experience of the EU ETS within the company. Historical records and emissions factors could be used to estimate historical emissions and thus inform the appropriate level of allowances that should be allocated ⁽⁶⁸⁾.

It was noted, however, that the choice of fuel supplier as the trading entity would not be consistent with the principle of direct emissions that is currently applied in the EU ETS, so consideration would need to be given to the implications for the EU ETS more widely, if this option were chosen ⁽⁶⁹⁾.

A European Commission LIFE-funded project (LETS Update), led by the England-Wales Environment Agency, considered the possibility of vehicle owners being the trading entity. Its scoping report ⁽⁷⁰⁾ AEA/Ecofys suggested that each vehicle owner could be set an annual allowance for their CO₂ emissions. However, the report noted that monitoring would currently be difficult, as the distances travelled would need to be monitored (and combined with relevant emission factors) if direct emissions were to be assessed. In the longer-term, it might be possible to operate such a system, for example using the same technology as that potentially used for universal road pricing. The report also noted that such a scheme is likely to be expensive. For example, a feasibility study ⁽⁷¹⁾ on the introduction of a national road pricing scheme in the UK in 2014 estimated that the total costs of implementing a scheme ranged between €15 billion to €3 billion, which is based on lower and upper estimates of the costs of fitting an on-board electronic transponder unit on each of the country's vehicles. Additionally, the annual operating costs have been estimated to be between €3 billion and €7.5 billion, which include administrative costs and the costs associated with the necessary telecommunications. Consequently, the cost of setting up an EU-wide emissions trading scheme for end users could run into the hundreds of billions of Euros. However, if road pricing was introduced in parallel to emissions trading, there would be additional advantages in terms of congestion savings.

In its report on the potential expansion of the EU ETS, Ecofys did not undertake a detailed assessment of the inclusion of road transport, as it concluded that the large number of small emitters would make monitoring difficult and lead to high transaction costs, as well as making verification and administration complex ⁽⁷²⁾.

IPPR also concludes that an emissions trading system targeting end users would be complex and likely to be politically difficult (as many drivers would have to buy credits to increase driving over current levels) and therefore not feasible in the short-term. Additionally, it is also worth noting that smaller industrial installations are excluded from the EU ETS and further provisions to exclude small emitters are under consideration. However, as with AEA/Ecofys, IPPR suggests that developments in information technology could probably make the system feasible and that the political and acceptability barriers could be overcome in the longer-term.

⁶⁷ DfT (undated)

⁶⁸ IPPR (2006)

⁶⁹ For example, as noted in DfT (undated)

⁷⁰ AEA Technology and Ecofys (UK) (2006)

⁷¹ DfT (2004) *Feasibility study of road pricing in the UK*

<http://www.dft.gov.uk/pgr/roads/roadpricing/feasibilitystudy/studyreport/feasibilitystudyofroadpricing4002>

⁷² Ecofys (2006a)

Watters and Tight also note that, due to the substantial differences in buying power and demand for permits, it could be too problematic to include individuals (e.g. drivers) in a scheme that also includes industry (e.g. the EU ETS) ⁽⁷³⁾. Additionally, it is likely to be difficult to arrive at an allocation methodology that would be considered to be fair ⁽⁷⁴⁾. A further argument against a scheme directly targeting end users is that it would effectively be introducing a second currency, when many people struggle with handling their finances as it is ⁽⁷⁵⁾.

The development of an emissions trading scheme where car manufacturers were the trading entities has an advantage over a scheme targeting end users, as the number of trading entities would be significantly reduced ⁽⁷⁶⁾. If manufacturers were to be the trading entity, the system could be based on the CO₂ emissions that are measured in the course of the type approval process, combined with the total numbers of cars sold both of which are already monitored by Member States. However, it is worth noting that the emissions measured in the course of the type approval process are an underestimation of real world emissions, so these would have to be estimated through the application of an additional factor. Additionally, such a scheme could only be applied to car and light commercial vehicles, at the moment, as currently there is no agreed EU-level test to measure CO₂ emissions from other vehicles, e.g. heavy-duty vehicles such as trucks and buses.

An emissions trading scheme could be applied to car manufacturers in one of two ways. EU ETS allowances could be allocated on the basis of an estimated total lifetime emissions (multiplying a car's CO₂ emissions by its expected life-time kilometres, for example). Alternatively, a separate system of trading could be set up under which mandatory targets would be set for manufacturers, which would require the purchase of credits if the respective targets were not met. However, either approach could potentially undermine the integrity of the EU ETS, as estimated emissions are being regulated. Under either option, manufacturers may invest in new technology or pass the price on to consumers. If costs were passed on to consumers, then the improvements in vehicle efficiency would not be achieved ⁽⁷⁷⁾. A solution might be to have a 'buy-only' link to the EU ETS. Furthermore, if allowances were allocated for free, some manufacturers could benefit from windfall profits, which would be likely to be highly politically contentious, whereas auctioning is likely to be resisted by manufacturers. A solution might be to have a 'buy-only' link to the EU ETS.

Few studies considered in any detail the possibility of the refineries and refilling stations being the trading entity. As noted above, SwEPA did note that refineries would not be a suitable trading entity as it is often not possible to identify which sector, or even in which country, their products might be used ⁽⁷⁸⁾. DfT, on the other hand, noted that if motorists and hauliers were the trading entity, it was likely that, in practice, fuel retailers would begin to offer services to their customers to sell the necessary EU ETS allowances to them, which would resemble the system where fuel suppliers were the trading entity ⁽⁷⁹⁾.

Environmental effectiveness (encourages greenhouse gas reductions).

SwEPA notes that the stringency of the cap or baseline is fundamentally important to the effectiveness of any scheme in delivering emissions reductions. If accurate monitoring and enforcement is in place C&T schemes will deliver the desired emission reductions, whereas B&C schemes only improve relative performance (e.g. gCO₂/km).

⁷³ Watter H and M Tight (2007) *Designing an Emissions Trading Scheme Suitable for Surface Transport* Institute for Transport Studies, University of Leeds; see <http://www.cfit.gov.uk/docs/2007/climatechange/pdf/2007climatechange-ets.pdf>

⁷⁴ DfT (undated)

⁷⁵ IPPR (2006)

⁷⁶ Ecofys (2006a)

⁷⁷ DfT (undated)

⁷⁸ SwEPA (2006)

⁷⁹ DfT (undated)

Of the main schemes considered above, both the C&T schemes – aimed at either end users or fuel suppliers – would encourage the trading entity to take actions to reduce emissions. The scheme targeting end users would do this more directly, as end users have a wider range of options available to reduce emissions, e.g. they could buy more efficient vehicles, change their driving behaviour or drive less. Fuel suppliers, on the other hand, could use lower carbon fuels, e.g. biofuels, or pass the costs of allowances on to end users, who could respond in similar ways to if they were the trading entity. However, if the trading entity were fuel suppliers, then all costs may not necessarily be passed on to drivers⁽⁸⁰⁾.

The B&C scheme aimed at manufacturers would only stimulate improved vehicle efficiency, whereas C&T schemes have the potential to encourage other forms of CO₂ reduction, e.g. driving behaviour. While a B&C scheme for manufacturers would be likely to increase the price of a new vehicle (as a result of the additional costs of developing and introducing improved technologies), these increased costs for vehicle users would be counterbalanced by savings on fuel costs resulting from improved vehicle efficiency⁸¹. Additionally, it would currently not be possible to apply a B&C scheme to the whole vehicle fleet as a CO₂ emissions test does not exist for heavy duty vehicles⁽⁸²⁾.

A closed system, i.e. one that is not linked to the EU ETS, would steer emissions reductions in transport, whereas an open system would probably result in emissions reductions elsewhere. The reason for this is that it is generally acknowledged that transport emission reductions are more expensive than those in other sectors⁽⁸³⁾ and so the inclusion of surface transport in the EU ETS, at least in the short-term, would stimulate additional behaviour to reduce carbon emissions in other sectors. The extent of this pressure on other sections to reduce further their emissions would depend on the stringency of the cap or baseline for the road transport sector. Additionally, an open system would be more cost effective (see below), as emissions reductions would take place in the most cost-effective sector (i.e. wherever abatement costs are lower).

It is noted in a number of reports that flanking measures could be introduced to reduce emissions in other road transport sectors or make up for the fact that a trading system targeting fuel suppliers would not directly incentivise different behaviour among end users⁽⁸⁴⁾. Alternatively, a B&C scheme for car manufacturers could be accompanied by measures targeting other transport modes, as well as driver training schemes, or if the stimulation of diesel is not desired for air quality reasons, then excise duties could be adjusted accordingly. All schemes could benefit from complementary taxes, the stimulation of biofuels and R&D⁽⁸⁵⁾.

Cost effectiveness

The more flexible and the larger the scope of an emissions trading scheme (e.g. an international scheme linked with the EU ETS), the lower the mitigation costs. However, transaction costs tend to increase with flexibility and scope. Consequently, the cost effectiveness of a particular scheme will be determined by an assessment of the emissions reductions related to the costs, which need to balance reduced mitigation costs against increased transaction costs.

⁸⁰ SwEPA (2006)

⁸¹ The extent to which fuel savings counterbalance increased vehicle costs depends on the costs of the improved technologies. For example, the Commission's recent proposal to require car manufacturers to reduce CO₂ emissions from new cars suggests that in achieving an average of 130gCO₂/km by 2012, savings from improved fuel efficiency more than outweigh higher vehicle costs; see <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/46&format=HTML&aged=0&language=EN&guiLanguage=en>

⁸² SwEPA (2006)

⁸³ DfT (undated)

⁸⁴ SwEPA (2006); IPPR (2006); DfT (no date)

⁸⁵ SwEPA (2006)

SwEPA does not attempt to calculate the cost-effectiveness of the three schemes that it appraises in detail⁽⁸⁶⁾. Rather, it proposes that, given the difficulties in overcoming the many obstacles to setting up an end user scheme, a scheme aimed at fuel suppliers would probably be more cost-effective. The B&C system aimed at car manufacturers would be limited in flexibility and scope, but would benefit from low transaction costs. However, the extent to which the efficiency losses might be compensated for by the lower transaction costs were not assessed.

Economic efficiency

Economic theory would argue, as noted above, that a wide ETS, encompassing many sectors and gases, would lead to greater economic efficiency. Following this argument, it could be argued that road transport should be included in the EU ETS as part of an open scheme allowing trading between transport and non-transport trading entities. Expansion of the EU ETS would, therefore, be beneficial as long as the monitoring, reporting and verification is ensured, complexity and admin costs remain limited and innovation lead times are respected (predictability)⁽⁸⁷⁾. However, it is important to note that auctioning, rather than grandfathering or benchmarking allowances, can improve the economic efficiency of the scheme.

DfT notes that the impact on the prices of EU ETS allowances of the inclusion of transport in the EU ETS would depend on a) the level of under allocation to transport; b) the cost of abating CO₂ emissions in transport compared to the costs in other sectors; and c) the price and availability of CDM credits⁽⁸⁸⁾. The report also notes that in the short-term, it is likely that the inclusion of transport in the EU ETS would lead to transport buying EU ETS allowances and using JI and CDM, as the cost of abatement in the transport sector is higher than in other sectors. In the longer-term, investment in fuel efficiency technology might be stimulated, as the price of carbon rises under more stringent caps, or even by rising oil prices and any production efficiencies achieved in renewable technologies.

The impact on competitiveness will depend on the design of the scheme. Clearly, in relation to intra-EU competitiveness, any potential adverse impact would be reduced if the scheme is EU-wide, rather than simply national. In a national C&T scheme, vehicle drivers near border areas could buy fuel from across the border, but for an EU-wide scheme, these risks would be reduced. A B&C scheme targeting car manufacturers would have limited impact on overall competitiveness of manufacturers, as long as all were included in the scheme. Users of transport would see their transport costs rise, although the extent of the increase will depend on the cost of allowances, which would depend on the level of ambition of the scheme and overall abatement costs. Also, it is possible that manufacturers would not pass on all of the additional costs to the purchasers, thus reducing the potential price signal for more efficient use of vehicles. The relative cost increases would be lower in an open system than a closed system due to the improved cost effectiveness of the former. If allowances were auctioned in any system, the revenue could be returned to the sector to limit economic impact⁽⁸⁹⁾. The OECD notes that in terms of competitiveness, auctioning tradable permits, and using the revenues raised for reducing existing distortionary taxes on business, is generally preferable to allocating allowances for free⁽⁹⁰⁾.

⁸⁶ *Ibid*

⁸⁷ Egenhofer C *Overall perspective of expanding the EU ETS* Presentation to 1st meeting of the ECCP working group on emissions trading on The Scope of the Directive, 8-9 March 2007, Brussels; see http://ec.europa.eu/environment/climat/emission/pdf/etsworkinggroup/2007_03_08/3a.pdf

⁸⁸ DfT (undated)

⁸⁹ SwEPA (2006)

⁹⁰ OECD (2003) *Environmental Taxes and Competitiveness: An overview of the issues, policy options and research needs*; see

[http://www.oilis.oecd.org/olis/2001doc.nsf/87fae4004d4fa67ac125685d005300b3/ab6efbb14d2bc421c1256d4200498849/\\$FILE/JT00145868.PDF](http://www.oilis.oecd.org/olis/2001doc.nsf/87fae4004d4fa67ac125685d005300b3/ab6efbb14d2bc421c1256d4200498849/$FILE/JT00145868.PDF)

In a closed road transport trading system, on the other hand, the price of CO₂ emissions allowances would differ (and might be higher) than if it were linked to the EU ETS ⁽⁹¹⁾. Innovation in the transport sector would also be stimulated most in a closed trading scheme, since in an open scheme, innovation will be stimulated wherever it is most cost effective to reduce emissions in all the sectors covered, which is likely to be in other sectors. A B&C system aimed at manufacturers would stimulate innovation in that sector ⁽⁹²⁾.

Assessment against other criteria

As noted above, in addition to the criteria already discussed in this section, we are assessing schemes against other criteria. For road transport, these respective assessments are as follows:

- **Simplicity:** The choice of fuel supplier as the preferred trading entity is partially due to the relative simplicity of this approach compared to a scheme where end users were the trading entity or a system where manufacturers' performance would have to be benchmarked.
- **Predictability:** The predictability of the inclusion of a new sector in the EU ETS would depend on the detail of the scheme, which it is not possible to assess at this stage.
- **Non-discrimination:** All the schemes discussed above are non-discriminatory to some extent, as each would apply to all fuel suppliers, manufacturers or end users operating in the EU. However, as the proposals would only cover operations in the EU, operations in other countries would not be covered. In this respect, the effect of the allocation method in mitigating any competitive disadvantage experienced by the EU sectors will be important. Additionally, a scheme targeting manufacturers only could be discriminatory within the road freight sector, as light commercial vehicles could be covered, whereas heavy goods vehicles would not be.
- **Harmonisation:** The extent to which the inclusion of a new sector is harmonised with the existing scheme depends on the detail of the scheme. The studies to date have not explored the operation of schemes for the road sector to the necessary level of detail.

4.3 Railway sector

4.3.1 The European rail industry

The trend in the European railway sector is towards the privatisation of previously publicly-owned industries. In some cases, national operators have been split into a series of regional or specialised (e.g. freight) operators; in other cases there has been less fragmentation. For the purposes of the discussion of emissions trading, the rail sector can be sub-divided into those locomotives and multiple units (DMUs) that use diesel and those that run on electrified lines. The electricity used by the latter is already indirectly covered by the EU ETS, as power stations are part of the latter. Hence, for this document, we are only concerned with the EU railways that use diesel.

⁹¹ SwEPA (2006)

⁹² SwEPA (2006)

The European rail industry can be characterised in a number of different ways depending, for the purposes of emissions trading, on the proposed trading entity. For example, a similar list to that for the automotive sector, as noted above, could be identified as follows⁹³:

- Refineries;
- Fuel suppliers;
- Locomotive or DMU manufacturers; and
- Train operators.

For the rail sector, the number of refineries and fuel suppliers is likely to be less than for the road sector, as less fuel is supplied and diesel trains are not used in all countries. There are perhaps between 100 and 200 train operators in the EU: the International Union of Railways (UIC) has between 80 and 90 members in the 27 Member States, not all of whom are operating companies (⁹⁴); while not all operating companies will be members of UIC, although the major ones in most countries are.

4.3.2 Feasibility of including railways in emissions trading

The inclusion of railways in the EU ETS, or in emissions trading schemes more generally, has not been widely considered in the literature. In its report on the potential inclusion of additional activities in the EU ETS, Ecofys excluded railways at an early stage and thus did not investigate the practical implications of including the mode in emissions trading (⁹⁵). The main reason for excluding railways from the more detailed analysis was a considerable downwards GHG emissions trend for the mode.

The LETS Update project similarly concluded that rail was not a suitable candidate for inclusion in emissions trading. In the project's scoping report (⁹⁶) AEA/Ecofys ruled out including railways in emissions trading due to the fact that it is a small contributor to total CO₂ (and other GHG) emissions accounting for only 0.2% of the EU-25 CO₂ emissions in 2003. Furthermore the mode's emissions are expected to decline – a 47% decrease is anticipated between 2000 and 2010 and a further 82% decline between 2010 and 2020. The anticipated decline is the result of improved engine efficiency and renewal of the existing stock with electric trains (whose associated emissions are already captured under the EU ETS, as noted above).

The CE Delft study for the Swedish EPA (⁹⁷) also excluded the railway sector from its more detailed analysis. The small contribution of diesel trains to the total EU-25 CO₂ emissions (in this case, this was given as 0.5%) was the reason given for excluding rail at an early stage in this study. However, the initial appraisal was more detailed than in the other studies noted above. The initial appraisal reviewed possible trading systems for the railway sector differing by trading entity (railway operator, locomotive/DMU manufacturer or fuel supplier), whether the national or international, the type of system (i.e. C&T or B&C) and mode (passenger/freight). As with the road sector, refineries were not considered to be a suitable trading entity, as they do not know in which sector, or even in which country, their products might be used. Schemes were then appraised against a number of criteria including: the emissions reduction potential of the trading entity; the transaction costs associated with the scheme; the scope of the emissions; and the technical feasibility of the scheme.

⁹³ Diesel locomotives or DMUs are likely to be refueled at depots in many cases, so filling stations would not be an option as it is for the automotive sector.

⁹⁴ <http://www.uic.asso.fr/baseinfo/vademecum/vademecum.php>

⁹⁵ Ecofys (2006a)

⁹⁶ AEA/Ecofys (2006)

⁹⁷ SwEPA (2006)

In similar conclusions to the analyses with respect to road transport, schemes where the train operator or locomotive/DMU manufacturer were the trading entity were assessed as positive with respect to the emission reduction possibilities of the *trading entity*. This was because, at that level the responsibility for reductions were unambiguous: operators could choose to buy more efficient locomotives and use them more efficiently⁹⁸, whereas manufacturers could design and produce more efficient locomotives (although they are unable to reduce emissions by using the train differently). However, it is important to note that long lifetimes of locomotives (several decades) mean that the potential for short-term reductions is small. Trading systems where fuel suppliers were the trading entity were considered to be negative in this respect, as fuel suppliers have limited scope to reduce emissions (apart from using lower carbon fuels, e.g. by adding biofuels to their fuel) and cannot directly influence the use of the trains. Clearly, fuel suppliers could pass through the costs of carbon to train operators, thus creating a financial incentive for changes in the way trains are used. On the other hand, train operators might pass on any increased costs to train users (of course, in regulated rail industries, this might not be possible), thus encouraging changes in passenger behaviour that could increase carbon emissions (if there was a modal shift in favour of the car for example).

In trading schemes for the railway sector, the level of transaction costs would be low, as there would be a relatively low number of trading entities. On the other hand, the scope for emissions reductions is small, given the relatively low level of emissions, and thus the authors considered that it not to be efficient to introduce an emissions trading scheme for such a small share of emissions. Finally, it was concluded that it would be relatively complicated to introduce an emissions trading scheme for such a small number of operators with relatively low emissions, so such a scheme was not appraised positively in terms of its technical feasibility.

4.3.3 Assessment against criteria

For rail transport, therefore, the assessment against the criteria identified in Section 2.2 is as follows:

- Environmental effectiveness (encourages greenhouse gas reductions): Given that there are already declining emissions in the sector, it appears that inclusion in emissions trading would not be any more effective than existing trends in the sector. Given that emissions are falling, inclusion in the EU ETS would risk introducing ‘hot air’ into the system, unless a strict cap or baseline was set.
- Cost effectiveness: As a result of the above, it is likely therefore, that the inclusion of rail into the EU emissions trading scheme would be cost-effective.
- Economic efficiency: Given the relative complexities of integrating downstream transport emissions into the emissions trading sector, and the fact that emissions are declining, it is unlikely that the inclusion of rail in the EU ETS would be efficient.
- Simplicity: The above discussion suggests that inclusion of rail transport in an emissions trading scheme would not be simple.
- Predictability: The predictability of a scheme depends on the detail of its implementation, so, given that detailed consideration of rail into emissions trading has not been undertaken, it is not possible to assess this criterion.

⁹⁸ In some countries, e.g. the UK, the situation is more complicated, as operators do not own trains, rather they lease them from rolling stock companies, who own the trains. Hence, in such situations, operators are not directly responsible for the purchase decision and therefore have few options to reduce emissions.

- **Non-discrimination:** The schemes discussed above are non-discriminatory to some extent, as each would apply to all fuel suppliers, manufacturers or operators in the EU. However, as the proposals would only cover operations in the EU, operations in other countries would not be covered, which could lead to discrimination between companies offering cross-border services, depending on how the scope of the rail industry to be covered is defined. Finally, the exclusion of rail could be seen as discriminatory where rail services compete with air services, since the latter will be included in the EU ETS.
- **Harmonisation:** The degree of harmonisation would depend on how rail were included, rather than whether it should or should not be included. Clearly, greater harmonisation would be achieved if the decision whether to include rail were taken multilaterally.

4.4 Maritime sector

4.4.1 The maritime sector

In 2004, there were nearly 2.3 million ships calling at European ports, of which around half were classified as being non-specialised cargo ships, nearly 30% were passenger ships or ferries, while the remainder were more specialised types of ship, such as liquid bulk ships (4.8% of calls), container ships (4.3%) and dry bulk ships (2.1%)⁹⁹. Some ships (e.g. cruise liners) have a relatively constant pattern of usage of European ports, whereas the calls of cargo ships can be less predictable.

4.4.2 Feasibility of including the maritime sector in emissions trading

Even though an emissions trading scheme is an option that the Commission is considering to reduce the CO₂ of the maritime sector, neither Ecofys¹⁰⁰ nor AEA/Ecofys cover international shipping¹⁰¹. However, the CE Delft study undertaken for the Swedish Environmental Protection Agency did undertake an initial appraisal of the possibility of developing an emissions trading scheme for the maritime sector¹⁰². In spite of the fact that a more detailed appraisal was not undertaken, the report concluded that a C&T scheme, possibly linked to the EU ETS, could be an attractive option for the maritime sector for the future.

It did, however, note that such a scheme could be politically difficult due to the international nature of the maritime sector, so recommended that more research would be needed on the detail of such a scheme. The report also concluded that a B&C scheme for manufacturers might be a longer-term option, although again highlighted the potential difficulties, as non-EU manufacturers would have to be included.

The report concluded that the main obstacle for the development of an emissions trading scheme for the maritime sector is the lack of monitoring data, which means that the allocation options currently under discussion are not feasible. As the feasibility and design of an emission trading system depends on the allocation method chosen, the report did not undertake a detailed assessment of the development of an emissions trading system for the maritime sector.

⁹⁹ CE Delft (2006) *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive* Report to the European Commission, December 2006 quoting Eurostat

¹⁰⁰ Ecofys (2006a)

¹⁰¹ AEA Technology/Ecofys (2006) did consider domestic navigation, but excluded this at the scoping stage, as a result of its low contribution to total CO₂ emissions.

¹⁰² SwEPA (2006)

However, an initial appraisal of options was undertaken, which considered a number of different schemes that differed by trading entity (shipping company, fuel supplier or ship manufacturer), system (C&T or B&C) and mode (passenger/freight).

The appraisal concluded that emission trading schemes where the shipping company or ship manufacturer was the trading entity had advantages, since at that level the responsibility for reductions were unambiguous: operators could choose to buy more efficient ships and engines and use these more efficiently; whereas manufacturers could only design and produce more efficient ships. As with other sectors, the report noted that manufacturers had no control over the use of the ships they built, so some potential for reducing emissions would be lost if they were the trading entity. As with the other modes, above, schemes where the fuel suppliers were the trading entity had disadvantages, as fuel suppliers have few options to reduce the carbon content of the fuel they supply and no direct responsibility over the amount of fuel used. There is the possibility that fuel suppliers might pass through any increased costs to ship operators, thus creating a financial incentive for changes in the way trains are used. However, this could simply encourage more evasive action and tankering (see below). The report also noted that the fact that ships have long lifetimes (typically 30 to 40 years) means that the potential for short-term reductions is small, although engines are replaced more regularly.

The report concluded that transaction costs would be high even though the number of trading entities is relatively low, as setting up the necessary monitoring, reporting and verification arrangements would be expensive. Additionally, the report suggested that the scope for emission reductions was limited, as maritime emissions make up only 4% of EU-25 CO₂ emissions. It was also considered that trading for the maritime sector would have problems relating to its technical feasibility, as a system aimed at fuel suppliers or ship manufacturers would need to engage non-EU companies and shipping companies lack accurate monitoring methodologies and data sources.

A final consideration for the maritime sector, which is not as much of a concern in other transport sectors, is that there is a higher risk of tankering – i.e. storing fuel for later use, e.g. buying fuel cheaply outside of Europe for use on intra-European routes – if costs of fuel in the EU increased.

In a more recent report for the European Commission, CE Delft explored in more detail the option of including CO₂ emissions from shipping in the EU ETS (¹⁰³). This included a detailed discussion of a number of design elements of a trading scheme targeting the maritime sector, including: the scope of the scheme (operators and geographical); the trading entity; the ‘climate unit’; the allocation and distribution of allowances; the scope for evasion; and monitoring.

With respect to the potential scope of the scheme, the analysis took a non-discriminatory approach in that the decision as to whether emissions from a particular vessel were included in the scheme was not dependent on the country in which either the operator or shipper is based, or the flag under which the vessel is operated. The study suggested that this approach appeared to be legally feasible and had the advantage that it maximised emissions coverage and did not introduce competitive distortions between operators. The main options for determining the geographical scope of the scheme were a system based on a certain geographical areas, e.g. certain seas, or one based on the inclusion of particular routes. The study ruled out basing a scheme on geographical areas, as if the area was too small, it would only cover a limited amount of emissions, whereas larger areas could include emissions from ships that do not use an EU port, which would pose numerous problems not least in monitoring where emissions took place. Hence, the report concluded that a route-based system was the preferred option.

¹⁰³ CE Delft (2006)
IP/A/ITRE/ST/2007-08

However, the route-based option also has a number of problems in defining the actual voyage for which emissions would be covered by the scheme. For vessels leaving or arriving at EU ports (going to, or arriving from outside of, the EU), there is the problem of defining, respectively, the destination or origin of the voyage. For both, there is the potential for evasive behaviour, e.g. ships calling in Middle Eastern, North African, Albanian or Russian ports¹⁰⁴ to shorten the voyage to or from the EU. Additionally, ships can change their destinations in the course of a journey, which would cause additional problems in defining the journey to be covered for ships leaving EU ports. Consequently, the report concludes that it is less feasible to include voyages leaving EU ports in an emissions trading scheme focusing on the maritime sector than it is to include vessels arriving at EU ports.

If only intra-EU voyages were covered by a trading scheme, i.e. voyages between EU ports, there is also the potential for evasive behaviour (particularly through Kalingrad), although this risk is potentially not as high as for other route-based options. CE quotes a 2002 Entec report that suggests that voyages between EU ports account for 11.9% of EU CO₂ emissions in the EMEP¹⁰⁵ region, whereas voyages ending at EU ports account for 15.2% of emissions. Consequently, the restriction of the scheme to intra-EU journeys would limit the environmental effectiveness of the inclusion of the maritime sector into the EU ETS.

In relation to trading entity, CE develops its previous findings by concluding that the ship operator is the most logical choice to be the trading entity for a number of reasons. First, as noted above, the operator has control over the abatement options arising from the operation of the ship and thus is well placed to choose the most cost-effective abatement measure. Additionally, the operator is best-suited to monitor and report emissions, as fuel consumption records would already be kept. Verification could make use of average emission factors and data on trips made by a particular vessel (which is collected by Lloyds); enforcement could be based on the procedure for enforcing harbour dues that already exists. The report notes that the EU ETS allows for the inclusion of gases other than CO₂, but implies that this would be complicated for other GHGs associated with shipping and so concludes that CO₂ emissions are the most appropriate climate unit.

The report concludes that the allocation of emission allowances in the maritime sector could be undertaken on the basis of historical emissions or a business-as-usual baseline. An earlier study by Entec developed a database that could be updated and used for this purpose.

However, CE does recommend calibrating the data in the database as the method used by Entec (i.e. using activity data) tends to lead to higher estimates of emissions than estimations based on fuel sales. However, for the maritime sector, CE underlines that grandfathering cannot be used for allocating allowances, as the operating patterns of so-called 'tramp operators' vary significantly from year-to-year and so there is the potential for a windfall for some operators if allowances were allocated on the basis of higher-than-usual activity using EU ports, while other operators may have to buy significant numbers of allowances. In this context CE is referring to grandfathering as meaning free allocation, in which case the conclusion would apply to free allocation based on benchmarks. Even though for operators of some types of ships, e.g. those of liners, the use of EU ports may be more predictable, the report noted that it would potentially distort competition if different allocation methods were within the same sector. The use of a benchmark has many of the same disadvantages as grandfathering. The auctioning of allowances would remove the problems associated with grandfathering, but risks competitive distortions within the transport sector more widely if other modes are treated differently.

¹⁰⁴ Most non-EU European countries have agreements with the EU, either through the European Economic Area (e.g. Norway) or through candidate/accession agreements, e.g. Croatia and Turkey, through which action could be taken to reduce the potential for evasive action. Potential evasion through Russian ports would be a particular concern with respect to Kalingrad.

¹⁰⁵ European Monitoring and Evaluation Programme region – this includes the North Sea, Irish Sea, English Channel, Baltic Sea, Black Sea and Mediterranean Sea.

From a legal perspective, under international law, ports have wide discretion to impose restrictions on ships using their facilities and thus it should in principle be possible to apply CO₂ requirements on ships. For example, the EU has already imposed unilateral standards as conditions for port entry. However, one potential legal issue is that there are currently no standards or targets for reducing GHG emissions from ships (these are not covered by the Kyoto Protocol, for example). This might reduce the ability of ports to take action on CO₂ and, even if action was taken, the range of possible enforcement actions is limited (as there is no Treaty that governs such action). The application of the ‘territorial principle’ would only apply if the non-compliance occurred while in port. Additionally, the study concluded that the inclusion of the maritime sector in the EU ETS might not be consistent with international trade law, so these interactions should be investigated further.

4.4.3 Comparisons between the maritime and aviation sectors

There are clearly similarities, but also significant differences between the aviation and maritime sectors. Both aviation and the maritime transport sectors are international in nature, as are the industries that operate in them. Hence, both are broadly governed by an international regime – ICAO for the former and IMO for the latter – which restricts the ability of countries to act unilaterally on other mode, although there is scope depending on the issues and the nature of any relevant governing agreements.

With respect to the regulation of GHG emissions, international emissions from both the aviation and maritime sectors are outside of the Kyoto Protocol, as a result of the difficulties of allocating international emissions to countries. It is interesting to note, therefore, that the proposed inclusion of aviation in emissions trading is effectively avoiding the issue of allocating emissions to countries. Additionally, as noted above, for both modes it is the operator of the plane or ship that is the most appropriate trading entity.

From the discussion above, it is evident, however, that there are also differences between the two sectors, which add a degree of complexity to developing an emissions trading system for the maritime sector that was easier to overcome for the aviation sector. As can be seen from the reports reviewed, the more work that is done on the inclusion of shipping in emissions trading, the greater the understanding that is achieved. However, there is clearly more work to be done before the maritime sector can be included in the EU ETS.

The main obstacle to be overcome is the lack of an appropriate monitoring system and data, although the most recent CE report suggests that this could be overcome. There is also the question of the shipping voyages to be included in an emissions trading scheme.

CE suggests that it would be difficult to include voyages leaving EU ports, as ships can change destinations mid-voyage, which suggests that journeys in the shipping sector are subject to more alteration than those of aviation. The principal difference between aviation and shipping in terms of transport more is that for freight aviation tends to carry high value goods the delivery of which is time-critical, whereas shipping focuses more on bulk goods that do not require delivery within as strict time periods. Hence, if the maritime sector were included in emissions trading, there is clearly more scope for evasion with shipping than there is with aviation.

4.4.4 Assessment against criteria

For the maritime sector, therefore, the assessment against the criteria identified in Section 2.2 is as follows:

- **Environmental effectiveness (encourages greenhouse gas reductions):** As above (Section 4.2.2), the environmental effectiveness of any scheme will depend on the stringency of the cap or baseline. In spite of the fact that SwEPA noted that maritime emissions are a relatively small proportion of EU-25's CO₂ emissions, these are growing (as noted in Section 4.1.1), so there is clearly a need for measures to be taken. As with aviation, the designation of the operator as trading entity would be consistent with the principle of direct emissions, so the trading entity would be the stakeholder with the greatest potential for action to reduce emissions, which would be beneficial to the environmental effectiveness of any scheme. However, on the negative side, there is significant scope for evasive action in the maritime sector, which needs to be addressed before a scheme can enter into operation.
- **Cost effectiveness:** As noted above (Section 4.2.2), the cost effectiveness of a scheme is determined by balancing the reduced mitigation costs of a wider scheme with potentially increased transaction costs. In its earlier assessment for SwEPA, CE Delft concluded that transaction costs would be high for a maritime scheme as a result of the absence of information and procedures to support the monitoring, reporting and verification of emissions.
- **Economic efficiency:** As noted above (Section 4.2.2), the more sectors and emissions that an emission trading system covers the more efficient it should be. In relation to the maritime sector, the scheme would need to include all operators using EU ports and remove the potential for evasion if adverse impacts on competition are to be avoided. Additionally, it has been argued that allowances cannot be allocated for free, so allocations need to be auctioned, which will also increase economic efficiency.
- **Simplicity:** Presently, there is a lack of data and procedures for monitoring, reporting and verifying emissions, but once there have been developed, and the political will is in place, the simplicity of an emissions trading scheme for the maritime sector could be improved. However, the problems associated with including voyages leaving EU ports add complication to a maritime scheme.
- **Predictability:** The predictability of the inclusion of the maritime sector into emissions trading depends on the detail of the scheme, so it is not possible to assess this at this time.
- **Non-discrimination:** To ensure that a scheme targeting the maritime sector is non-discriminatory it would have to cover all the ships using EU ports, and the scheme would need to cover competing modes of transport.
- **Harmonisation:** The extent to which the inclusion of the maritime sector would be harmonised with approaches aimed at other sectors, depends on the details of the scheme.

The studies to date have not explored the operation of schemes for the maritime sector to the necessary level of detail. However, a multilateral approach to the maritime sector (as has been proposed for aviation) would be better for harmonisation than allowing significant Member State variability.

4.5 Findings and recommendations

Key findings and recommendations are, therefore:

- There is a need to take measures to reduce transport's CO₂ emissions, as increasing road transport emissions are the main cause of rising GHG emissions in many countries. Additionally, emissions from the maritime and aviation sectors have also been increasing significantly.
- Aviation is being included in the EU ETS and consideration is being given to the inclusion of other transport modes in the scheme.
- Studies that have considered the imminent expansion of the EU ETS have tended to focus on expanding the scheme to non-transport sectors, as it was considered that these were more appropriate in the short-term.
- If the principle of direct emissions were applied in the road transport sector, end users, i.e. drivers and road hauliers, would be the trading entity. However, there are a number of problems in taking this approach, not least the impact of the complexity of the required monitoring, reporting and verification procedures and, consequently, the high transaction costs, on the cost-effectiveness of the scheme. Additionally, there are potential problems with including individuals in a scheme that includes multi-national companies, as a result of their significantly different buying power.
- The preferred option for the trading entity in an emissions trading scheme targeting the road transport is the fuel supplier. Although not consistent with the principle of direct emissions, such a scheme would be relatively simple and cost-effective compared to end users being the trading entity. Even though fuel suppliers have limited options to reduce fuel use, if they chose to pass the full cost of carbon (which of course they might not) to end users through the fuel price, the price signal would still reflect the costs of carbon. Given that such a system would not be as transparent to end users, flanking measures would also be needed to encourage end users to take other actions to reduce their fuel use, e.g. through car buying and driving behaviour. The purpose of the package of measures would also need to be communicated well to end users to avoid the increased costs being seen simply as another tax.
- It is possible for a scheme to be targeted at manufacturers, although, again, direct emissions would not be targeted. However, currently it would only be possible to include cars and light commercial vehicles in such a scheme, as CO₂ emissions from other vehicle types are not currently measured. If car manufacturers were included in the EU ETS, the total lifetime emissions of a car or light commercial vehicle would have to be estimated on the basis of the measured gCO₂/km of each vehicle, multiplied by an additional factor to take account of the fact that measured emissions are an underestimation of real world emissions. Alternatively, a separate B&C trading system could be set up to reduce relative emissions, although there would be less environmental certainty associated with such a scheme.
- For road transport, therefore, a scheme with fuel suppliers as the trading entity would seem to be the simplest and potentially most cost-effective approach. All the proposed options would generally be non-discriminatory, at least within the EU, as all relevant trading entities in the EU would be included.

For a scheme targeting manufacturers, there might be discriminatory aspects within the road freight sector, as light commercial vehicles could be covered, whereas heavy commercial vehicles would not be. The environmental effectiveness of any emissions trading scheme depends on the stringency of the cap or baseline. However, a closed scheme for transport, i.e. one that did not allow trading with other sectors, is likely to encourage emissions reduction in the road transport sector, whereas in an open scheme emissions reductions would probably occur in other sectors. This is due to the fact that the costs of emissions reductions in the transport sector are generally accepted to be higher than those of other sectors. Hence, the inclusion of surface transport in the EU ETS, at least in the short-term, would stimulate additional behaviour to reduce carbon emissions in other sectors. As with all trading schemes, however, the wider the scheme the greater the potential economic efficiency.

- GHG emissions in the rail sector are declining, so it is far from certain that a trading system is needed, or indeed whether it would be the most cost-effective and efficient means of reducing emissions in the sector.
- It is not yet clear whether a trading system for the maritime sector is an appropriate option. As with aviation, the ship operator appears to be the most appropriate trading entity, which would make the scheme consistent with the principle of direct emissions. Currently, however, the lack of data and procedures for monitoring, reporting and verification and the potential for evasive action potentially undermine the cost-effectiveness and economic efficiency of the scheme. The potential for evasive action appears to be more significant for the maritime sector than it is for aviation, partially as the delivery of goods by shipping is less time critical than those delivered by aviation, partially as there is a greater potential for tankering in the maritime sector and partially due to the increased flexibility and changeability of shipping voyages compared to those of aviation. Additionally, the legal implications of an emissions trading scheme targeting the maritime sector are still not clear.
- For all modes of transport, the predictability and the extent of harmonisation associated with inclusion in any emissions trading scheme could only be assessed once the detail is known.

5. FUTURE GLOBAL SETTING

5.1 Current International setting

The EU ETS, as established in Directive 2003/87/EC, has the aim of contributing to the efficiency with which the European Community and its Member States fulfil their commitments under the Kyoto Protocol. Under Council Decision 2002/358/EC, the Community and its Member States have agreed to jointly reduce their aggregate anthropogenic emissions of GHGs listed in Annex A to the Protocol by 8% compared to 1990 levels in the period 2008 to 2012.

The EU ETS Directive, introduces linking the Community scheme to greenhouse gas emission trading schemes in third countries and argues that by doing so, the cost-effectiveness of achieving the Community emission reduction targets will be increased. The Directive also identifies Joint Implementation (JI) and Clean Development Mechanism (CDM), as important for both reducing global GHG emissions and increasing the cost effectiveness of the Community trading scheme. For clarity, definitions of the two project based mechanisms (PBMs) follow:

- **Joint Implementation, JI** (*Article 6 of the Kyoto Protocol*). Any Annex I party (with a commitment subscribed in Annex B to the Protocol) may implement an emission-reducing project or a project that enhances removals by sinks in the territory of any other such party and count the resulting emission reduction units towards meetings its own Kyoto target. If a host party meets all the eligibility requirements to transfer and/or acquire emission reduction units (ERUs), it may verify reductions in anthropogenic emissions and issue the appropriate quantity of ERUs. This “simplified” procedure is referred to as the “Track 1 procedure”. If a host party does not meet all, but the minimum eligibility requirements, the process is referred to as a “Track 2 procedure” and the verification of emissions reductions has to occur through the verification process of the Joint Implementation Supervisory Committee (JISC).
- **The Clean Development Mechanism** (*Article 12 of the Kyoto Protocol*). Provides for Annex I Parties to implement project activities that reduce emissions in non-Annex I Parties, in return for certified emission reductions (CERs). The CERs generated by such projects can be used by Annex I Parties to help meet their emission targets under the Kyoto Protocol. Article 12 also stresses that such project activities are to assist the developing country host Parties in achieving sustainable development and in contributing to the ultimate objectives of the Convention. Current modalities and procedures for the CDM focus on activities that reduce emissions. Afforestation and reforestation activities are included for the first commitment period, however, Annex I Parties are limited in how much they may use CERs from such activities towards their targets.

It was made clear, in directive 2003/87/EC that the principle of complementarity applies to the EU ETS, such that in accordance with the Kyoto Protocol and Marrakech accords, the use of JI and CDM should be supplemental to domestic action.

The issue of complementarity was considered in more detail by the Linking Directive (¹⁰⁶), which amended Directive 2003/87/EC with respect to the Kyoto Protocol project mechanisms. Under the Linking Directive, Member States may allow operators to use, in the EU ETS, CERs from 2005 and ERUs from 2008.

¹⁰⁶ Directive 2004/101/EC
IP/A/ITRE/ST/2007-08

The use of CERs and ERUs by operators are allowed up to a percentage of the allocation to each installation as specified by each Member State in its National Allocation Plan. Complementarity and the role of JI and CDM in the future of the EU ETS is a key concern of the Commission's current review and these issues will be discussed in greater detail in the following section.

In recent years there has been substantial development in the area of GHG emission trading schemes and several regional and national schemes have been established globally. Section 5.3 will discuss these schemes in more detail as well as the issues associated with linking the EU ETS with an external scheme.

5.2 Future development of JI and CDM

As introduced in section 5.1, EU operators can partly meet their obligations under the EU ETS by investing in PBMs. As identified in the EU ETS and Linking Directives, this linking can provide a short term, cost-efficient way for companies to comply with their obligations. However, the negative side to this effect is that companies are deterred from taking domestic action. Risks associated with such a scenario include:

- The EU economy could become locked-in to technologies with lower carbon efficiency, so increasing the future costs of achieving necessary, more extensive anthropogenic GHG reductions. For example, in the short term, linking could favour the installation of higher emitting electricity generating capacity than would otherwise occur. The generating mix would thus be affected for the lifetime of these assets, which could potentially be greater than 40 years;
- The lack of domestic progress in reducing GHG emissions could undermine the EU's position in the international negotiations for climate agreements post-2012.

5.2.1 The advantages of project based mechanisms

The Kyoto Protocol establishes specific anthropogenic GHG emission reduction targets for industrialised nations to achieve by the period 2008 – 2012. By incorporating the principle of global cost effectiveness of emission reductions (Article 3.3, Kyoto Protocol), the United Nations Framework Convention on Climate Change (UNFCCC) encourage geographical and temporal flexibility to meet these reductions. The Linking Directive allows entities to purchase emission units from the Kyoto Protocol project based mechanisms instead of solely relying on the scheme's internal allowances and their own abatement options to meet their commitments. The logic then follows that by enabling more choice in least-cost emission reduction options the overall cost of compliance is reduced for operators within the EU ETS, in addition to Member States and the EU under the Kyoto Protocol. As well as reducing compliance costs, expanding the choice in least-cost emission reductions will lead to a higher level of market liquidity, compared to a situation where an emission trading scheme excluded the use of JI or CDM.

The binding limits of the Kyoto Protocol do not extend to developing countries. However, under the Protocol's CDM, developing countries are able to participate in the global project of emissions reductions by hosting projects. From the outset, CDM was intended as a mechanism for spreading sustainable development in developing countries, indeed the language of the Kyoto Protocol mandates a dual goal of CDM for both emissions reduction and sustainable development.

A 2006 report from the OECD estimated the annual flow of money into developing countries from CDM at US\$1 billion, in comparison to the Official Development Assistance in 2004 of around \$47.4 billion and foreign direct investment reaching \$ 172 billion in 2003 (¹⁰⁷). Nonetheless, Cosbey et al. (2006) conclude there are a number of reasons to consider the CDM an important engine of sustainable development:

- CDM investments are focussed on sustainable development as an outcome, and as such, focus on areas that clearly demonstrate that environment and development can be mutually supportive.
- The CDM can direct investment to new environmentally preferable technologies, helping to bring them closer to the mainstream.
- CDM investment has the potential to create tangible and important side benefits that will increase quality of life in developing countries.
- CDM has the potential to funnel funds into small community-based initiatives that may be unattractive to traditional investors, but which may have significant beneficial impacts.

An NGO perspective of the opportunities presented by CDM included the following: environmental technology transfer; sustainable development; poverty alleviation and livelihoods development; enhanced local capabilities (¹⁰⁸). However, NGO representatives at the Fourth meeting of the ECCP (ECCP 4) also warned of the negative credibility consequences of using credits from bad quality CDM projects and of the importance of implementing more stringent caps to stimulate internal abatement, removing the opportunity to buy cheap abatement credits.

To summarise, the advantages of PBM credits include:

- increased cost-effectiveness;
- greater market liquidity and hence less volatility;
- technology transfer to developing economies;
- sustainable development (including poverty alleviation and enhanced local capabilities).

5.2.2 Supplementarity and PBM ceilings

The inclusion of the supplementarity requirement in the Kyoto Protocol and subsequent Marrakech Accords was insisted upon by the EU. Although no numerical definition was included in the agreements, during negotiations of the Accords, the EU proposed a formulation that aimed to ensure that, starting from the level in any of the years between 1994 and 2002, at least half of the emission reductions that will be necessary to achieve compliance with the Kyoto Protocol will be realised domestically (¹⁰⁹).

¹⁰⁷ Cosbey, A., Murphy, D., Drexhage, J., and Balint, J., *Making Development Work in the CDM*, International Institute for Sustainable Development, 2006.

¹⁰⁸ Boyd, E., Hultman, N. E., Roberts, T., Corbera, E., Ebeling, J., Liverman, D. M., Brown, K., Tippmann, R., Cole, J., Mann, P., Kaiser, M., Robbins, M., Bumpus, A., Shaw, A., Ferreira, E., Bozmoski, A., Villiers, C., and Avis, J., *The Clean Development Mechanism: An assessment of current practice and future approaches for policy*, Environmental Change Institute Oxford, Tyndall Centre for Climate Change Research, In cooperation with EcoSecurities, Tyndall Working Paper No. 114, October 2007.

¹⁰⁹ (Langrock, T., and Sterk, W., Policy Brief for the EP Environment Committee EP/IV/A/2003/09/01, *Linking CDM & JI with EU Emission Allowance Trading*, Institute for European Environmental Policy, Ecologic, Wuppertal Institute for Climate, Environment and Energy, 2004. And references therein)

One of the identified downsides of supplementarity is that the use of flexible mechanisms might remove the incentive for domestic anthropogenic GHG reductions. In other words, it would be unfair that some rich industrialised nations would buy all of their committed reductions from abroad without implementing any substantial domestic climate policy. Another adverse impact on competitiveness can be imagined if other Parties would buy their way to compliance with emission reduction obligations. For example national governments would be able to purchase allowances to meet their obligations and protect national industries from the costs of abatement. Therefore, establishing a ceiling for the proportion of emission reductions obtained from PBM forces the implementation of domestic climate action and aims to provide equity across efforts to meet emission reduction commitments.

As introduced in section 5.1, from Phase II, Member States can choose to allow installations in their country to use project based credits towards meeting their EU ETS target. Following on from the discussion of supplementarity above, to try to ensure that some emissions abatement takes place nationally, Member States can choose to set restrictions on the amount of JI/CDM credits that installations will be allowed to use to meet their target. (Member States can also set restrictions on the type of JI/CDM credits that installations may use, for example restricting the use of credits from projects that mitigate non-CO₂ greenhouse gases). Under the EU ETS guidance, Member States must specify to the European Commission in their Phase II National Allocation Plan (NAP) any such quantitative or qualitative restrictions to the use of JI/CDM credits they apply. The Commission gives no quantitative guidance on an appropriate level of a JI/CDM credit limit (¹¹⁰). However, informally a 50:50 proportion is often used as a maximum for purchasing international credits. Table 4 lists the CDM/JI restriction included in the NAPs of 9 Member States that together account for roughly 80% of the emissions in the EU ETS. It can be seen that two-thirds of these MS have restricted the purchase of JI/CDM credits to below 20% of allocations.

Table 4: Restrictions to JI/CDM in 9 EU Member States

	JI/CDM restriction from NAP II (Submitted) ¹¹¹	JI/CDM restriction from NAP II (EC Decision) ¹¹²
Member State	% of MS cap	% of MS cap
France	10	13.5
Germany	12	22
Ireland	50	10
Italy	10	14.99
Netherlands	8	10
Poland	25	10
Portugal	10	10
Spain	50	~20
UK	8	8

¹¹⁰ Reece, G., Phylipsen, D., Rathman, M., Horstink, M., and Angelini, T., *Use of JI/CDM credits by participants in phase II of the EU ETS*, Ecofys, 2006.

¹¹¹ *Ibid*

¹¹² EC Press release, *Emissions trading: Commission adopts amendment decision on the Slovak National Allocation Plan for 2008 to 2012*, December 2007. See:

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1869&format=HTML&aged=0&language=EN&guiLanguage=en>

Interestingly, Reece et al. (2006) calculate that the theoretical maximum of JI/CDM credits, based on the % of allocation restrictions listed in Table 4, is more than double the estimated gross shortage of allowances for those 9 Member States in the EU ETS, clearly creating no effective restriction there. Langrock and Sterk (2004), however, find that for a number of EU-15 countries the *status quo* compliance gap, or shortage of allowances over the period 2008 - 2012, is greater than the maximum amount of emission certificates that can be acquired and surrendered in line with Member State complementarity requirements. Therefore they conclude that the status quo compliance gap cannot be closed by PBM alone, there must be domestic action. This conclusion highlights an important role for the Commission to fulfil when assessing proposed complementarity limits. That is, to ensure that the limit creates a shortage of allowances over the period of the plan, so necessitating domestic action.

In summary then, the implementation of complementarity restrictions is clearly a mechanism for driving the development of a low-carbon economy domestically. A view supported at the ECCP 4 by the Carbon Finance industry, which commented that complementarity results in higher price signals in the EU ETS than might otherwise be the case, and that this price is needed, especially in the long term, to steer capital investment into low carbon technologies. A demonstration of large domestic GHG emission reductions would also provide the EU with a strong negotiating position for any post-2012 international agreement. Indeed, in the opinion of Langrock and Sterk (2006), the credibility of the EU's climate policy depends on complying with the Kyoto Protocol in line with the complementarity requirement. Finally, the complementarity limit must balance the cost effectiveness of the scheme with the level of domestic action deemed necessary. There is a clear role for the Commission to play in ensuring that the complementarity limit established for each MS results in a net shortage of allowances (including PBM allowances) and thus stimulates that domestic action.

5.2.3 Concerns that may influence PBM acceptance

This section discusses some of the issues associated with JI/CDM that may negatively affect their acceptance within the EU.

EUA Price Depression

One of the greatest concerns regarding PBM is that, in the absence of restrictions on the proportion of credits used for compliance, an influx of CERs could depress the internal price of carbon within the EU ETS and so remove the incentive for domestic action. This concern is illustrated by the average price of a CER in 2006, which was approximately half the 2006 average price of an EUA at US\$ 22. Since 2002, however, half of the cumulative volume of CERs/ERUs have been accounted for by Hydrofluorocarbon (HFC-23) reduction and nitrous oxide (N₂O) destruction projects, which are typically characterised by low investment costs and high CER return on investment. Logic would suggest that with time the supply of high return PBMs such as these might decrease and consequently the price of CERs will rise. By contrast, renewable energy projects typically have high investment costs and offer lower CER returns on the investment. Despite this, renewable energy projects (biomass, hydro and wind) account for the second highest proportion of the expected cumulative number of credits to 2012 behind HFC reductions (¹¹³).

¹¹³ UNEP-RISOE (2007) CDM Pipeline Overview. (<http://cdmpipeline.org/overview.htm>)
IP/A/ITRE/ST/2007-08

Geographic Distribution of projects

Up to March 2007, 547 projects had been registered under the CDM Executive Board (¹¹⁴). These projects are inequitably distributed geographically, being concentrated in Asia, with a 50% share, and Latin America, which has a 40% share. Looking to the future the distribution is unlikely to change; taking into account those projects under validation and those which have requested registration (CDM pipeline), Asia is predicted to increase its share to 66% and the Latin American share is expected to decline to 30%. India and China will consolidate their position as the key players in the CDM field (¹¹⁵). Although China hosts only 15% of CDM projects, it provides 52% of the CERs, whereas India provides only 25% of CERs despite hosting the largest number of projects. This difference between projects hosted and CERs provided to market results from the different types of projects. The HFC and N₂O reduction sector discussed above is small in terms of number of projects yet dominates the provision of CERs and half of all HFC projects are located in China. Clearly this raises a concern, from an equity perspective, about the distribution of financial transfers to developing countries. For example, CDM projects in sub-Saharan Africa are projected to generate 4% of the total global volume of CERs expected to be delivered by 2012 (¹¹⁶).

Investment Risks

The interest in projects, such as HFC and N₂O reduction, that generate many CERs quickly, is driven in part by the risks associated with longer term renewable energy and energy efficiency investments. It occurs as a result of the timescale for the Kyoto Protocol's first commitment period, which ends in 2012, leading to the possibility that CERs will lose value beyond this relatively short horizon. The risks associated with the investment also influence the geographical distribution of projects. The constituents of a successful "enabling environment" for foreign direct investment (FDI), such as macroeconomic and political stability, institutional predictability, legal competence in contract law and enforcement and regulatory and business transparency, are also variables that significantly influence the geographic distribution of CDM investment (^{117, 118}).

Additionality

CDM projects are required to result in reductions that would not have happened without CDM financing. According to the Marrakech rules, a CDM project is additional "if anthropogenic emissions of greenhouse gases are reduced below those that would have occurred in the absence of the registered CDM project activity." Additionality has been one of the more difficult concepts in the CDM (¹¹⁹) and the CDM EB has developed a tool to demonstrate and assess additionality. However, Cosbey et al. (2006) list a number of criticisms for the current methods including: complexity, high transaction costs, weak environmental integrity and an overly subjective focus on investment additionality.

¹¹⁴ *Ibid*

¹¹⁵ Boyd et al. (2007)

¹¹⁶ Boyd et al. (2007)

¹¹⁷ *Ibid* (and reference therein)

¹¹⁸ Ellis, J., and Kamel, S., *Overcoming barriers to Clean Development Mechanism Projects*, Organisation for Economic Cooperation and Development (OECD) - International Energy Agency (IEA) and UNEP Riso Centre, 2007.

¹¹⁹ Cosbey et al. (2006)

Sustainable development – benefits other than GHG abatement

Section 5.2.1 identified sustainable development as one of the dual goals of CDM; the initiative was implemented to facilitate the participation of developing countries, to provide incentives and innovations for mitigation, and to transfer technology and resources for less greenhouse gas intensive development (¹²⁰). However, there is still much uncertainty regarding the sustainability of these initiatives and even the concept of what constitutes development has been contested. The Marrakech Accords emphasises that it is the host country prerogative to define whether a project contributes to sustainable development. In most countries this has been assessed by the Designated National Authority (DNA) against a set of pre-defined criteria, which encompass environmental, social and economic concerns. Cosbey et al. (2006) introduce a ‘development dividend’ that can be defined as “benefits to developing countries beyond those strictly related to climate change, in the areas of economic growth through investment; technological evolution; poverty alleviation; environmental and human health improvements.” The quality of a CDM project, in terms of the side benefits that are generated by its implementation, is a serious concern for acceptance. For example, HFC decomposition, which generates enormous quantities of CERs, is an end-of-pipe technological fix that has no apparent side benefits in terms of local quality of life, employment or transformation of the energy supply regime (¹²¹). On the other hand, energy efficiency and renewables projects offer much greater benefits. A concern raised at the ECCP 4 was that the negative credibility associated with HFC decomposition projects risked spilling over to the EU ETS.

Another concern that should be discussed in this context is project scale. A number of studies have suggested an inverse relationship between project scale and sustainable development benefits^{122, 102, 100}. However, as Boyd et al. (2007) point out, for small scale, community based CDM projects, the CDM investment is often insufficiently large to cover the proportionally high transaction cost¹²³.

5.2.4 Possible CDM developments

Based on the concerns surrounding current PBMs discussed above among others, many suggestions for how JI and CDM may evolve in the future have been proposed. This section will review some of those suggestions. It is, however, difficult to consider the future evolution of JI and CDM without also considering the framework within which they might operate, given that the Kyoto Protocol de facto comes to an end in 2012. This section therefore commences by considering some of the options that have been presented for post-Kyoto climate change frameworks.

¹²⁰ Brown, K., Adger, W. N., Boyd, E., Corbera-Elizalde, E., and Shackley, S., *How do CDM projects contribute to sustainable development*, Tyndall Centre Technical Report No. 16, Tyndall Centre for Climate Change Research, June 2004.

¹²¹ Cosbey, A., Parry, J-E., Browne, J., Dinesh Babu, Y., Bhandari, P., Drexhage, J., and Murphy, D., *Realizing the Development Dividend: Making the CDM Work for Developing Countries*, International Institute for Sustainable Development, 2005. (<http://www.iisd.org/climate/global/dividend.asp>)

¹²² Begg, K., Wilkinson, R., Theuri, D., Gitonga, S., Mathenge, M., Amisah-Arthur, H., Atugba, S., Ackon, S., Ageby, S., Meena, H., Mwakifwamba, S., and Mwakasonde, S., *Encouraging CDM energy projects to aid poverty alleviation*, Final report of project R8037 under the DFID KAR programme, 2003.

¹²³ (since some costs are fixed, see e.g. Michaelowa, A., *Policy of Sectoral CDM*, German Side Event Clustering CDM, COP/MOP 1, Montreal 2005.)

The Kyoto Protocol established compliance periods during which Annex I countries would need to demonstrate that they had achieved their committed emissions targets. The first of these periods is between 2008 and 2012 inclusive, and it was originally intended that a subsequent period would follow. However, with the failure of some significant industrialised nations to ratify the Protocol (for example the US), and increasing concerns about the projected emissions of developing countries (China for example), the main focus of current negotiations is a new framework after 2012 rather than a set of targets for a second Kyoto period.

The issue of what international framework will come into existence when the Kyoto Protocol commitment period ends in 2012 is a huge topic that has been referred to a number of times in this report already. A complete discussion of a post 2012 framework could form the basis of a report in its own right. Accordingly, this section is not intended to be exhaustive but will discuss those elements of a post 2012 agreement that are relevant to the future development of PBMs.

A review of post-2012 climate policy regimes groups the options into seven non-mutually exclusive strategies¹²⁴:

- Expansion of the Kyoto-style emission targets to further countries;
- New types of emission targets;
- Equity-based climate policy;
- Emissions reduction based on ability of specific sectors to reduce emissions;
- Technology agreements
- Adaptation-oriented climate policy;
- Emission taxes.

These groups can be subdivided into two basic sets, one that commits to quantified emission reduction targets with emission trading and the other taking non-target based approaches. Binding emissions targets can be based on (i) the continuation of ‘Kyoto-style’ absolute emission targets, (ii) intensity targets, such as emissions per unit GDP or (iii) flexible types of emission targets. Non-target based approaches could involve technology development and transfer agreements, sectoral agreements, policy based approaches, equity and development approaches, or a variety of financial measures. While there is no formal agreement to any of these approaches, those countries critical of the Kyoto Protocol are likely to prefer approaches with new types of targets or technology based policies. Michaelowa (2006) points out that the “Asia Pacific Partnership”, agreed in 2005 by Australia, China, India, Indonesia, Japan and South Korea, shows some elements of a technology agreement but without mobilising any substantial resources.

¹²⁴ Michaelowa, A., Principles of Climate Policy after 2012 – Cutting the Gordian Knot, *Intereconomics*, 2006.

The implications for PBM, and particularly for CDM, of the two broad sets of climate policies are illustrated in

Table 5. Broadly speaking, continuation of CDM requires the implementation of quantified emission reduction targets. Such targets need not necessarily be fixed and binding but could comprise flexible, voluntary or dynamic mechanisms.

Table 5: Overview of the main post-2012 climate change mitigation proposals and approaches

Main mitigation group		Approach	Type of mechanisms / targets	Impact on the CDM
Quantified emission reduction targets		1. Absolute emission reduction targets with emissions trading (continuation of Kyoto-style emission targets)	1a. Deeper fixed, binding emission targets for developed countries;	CDM remains in a similar form, may increase in importance and scale
			1b. Expansion of fixed, binding emission targets to (at least some) developing countries	
		2. Alternative indexed flexible emission targets with emissions trading	1c. Voluntary absolute targets (i.e. REDD)	Questionable, depending on nature of voluntary targets
			2a. Positively binding targets	CDM remains in its current form. Demand uncertain
			2b. Dual targets	CDM remains in current form? Demand uncertain
			2c. Price cap (safety valve)	CDM remains subject to caps? Demand uncertain
			2d. Dynamic targets (variables GDP, physical production)	CDM remains in its current form
2e. Targets based on per-capita allocation	CDM remains in its current form			
2f. Voluntary flexible targets	CDM remains subject to nature of voluntary targets			
No absolute emission reduction targets	Technology	3. Enhanced technology development and diffusion of technology	3. Technology agreements and standards (i.e. alternative technology based protocol)	No CDM
	Policy	4. Coordinated policies and measures (harmonized and non-harmonized)	4a. Charges	No CDM in its current form [CDM could re-appear in the context of the charging structure]
			4b. Taxes on emissions	Same as above
			4c. Incentive based instruments	Same as above
	Sectoral	5. Sectoral agreements and initiatives (e.g. international agreements on energy efficiency)	5. Non-target based initiatives Establishment of a voluntary "no-lose" intensity targets	No CDM
	Financial Measures	6a. Mandatory financial contributions by developed countries to technology transfer funds for developing countries 6b. Mandatory multilateral fund to help disseminate and deploy new technologies in developing countries		No CDM
			7. Non-mandatory financial contributions by developed countries to technology transfer funds	No CDM
Equity and development based	8. Sustainable development policies and measures: implementation of national policies for sustainable development		No CDM	

Boyd et al. (2007)

Two parallel processes to begin considering post-2012 action were launched at the first COP/MOP meeting at the end of 2005 in Montreal. One, under the Kyoto Protocol, was a formal negotiation of new targets, but only for developed countries that are party to the Protocol. The second, under the UNFCCC, was an informal dialogue on long-term cooperative action that explicitly was not a negotiation of commitments. There was a two-year deadline attached to these informal negotiations, culminating at the December 2007 COP/MOP 3 conference in Bali. The key decision from the Bali conference was the launch of a negotiation process that will now run in parallel with the Kyoto negotiations under a the Ad Hoc Working Group on Long-term Cooperative Action under the Convention. The decision calls for the development of a "long-term global goal for emission reductions". The group aims to complete its work in 2009 and present the outcome for adoption at COP 15 in Copenhagen.

In a separate decision at Bali, the Kyoto parties further elaborated their negotiating track and set 2009 as the deadline for adopting new commitments for Kyoto's developed country parties. The expectation is that the two tracks will converge in a comprehensive post-2012 agreement. At this stage the 'Bali roadmap' with its aim to achieve a long-term global goal for emission reductions, appears to suggest that Kyoto-style emission reductions are a likely element of a post-2012 agreement.

In the context of a continuing role for PBMs in the post-2012 international climate change framework, many proposals have been put forward for CDM-type mechanisms that aim to target one or more of the following concepts:

- Scale up and broaden CDM scope beyond project-based approach;
- Introducing own-contribution by developing countries, potentially through contributing a proportion of the investment in offset projects, which will also increase engagement with developing countries;
- Enhance the efficiency of CDM, which will reduce the associated transaction costs;
- Improve the geographical distribution of CDM projects;
- Promote other goals for PBM such as sustainable development, technology transfer, knowledge transfer and stricter application of additionality criteria.

In line with these targets, there are potentially three principal developments for improving PBMs: programmatic, sectoral and policy CDM.

Table 6 presents these mechanisms and summarises the potential benefits and issues associated with them.

Table 6: Potential benefits and issues associated with the three principal proposals for extending the current flexible mechanisms

Proposed mechanism	Description	Potential Benefits	Potential Issues
Programmatic	An unlimited number of disperse activities are implemented by a programme entity. The programme entity receives the certified emission reduction units (CERs) and provides incentives for the implementation of the single activities.	1. Reduced transaction costs	1. Current indistinction between a 'programmatic' and 'bundled' CDM (Ellis, 2006).
		2. Increased sectoral diversity of CDM projects	2. Baseline and additionality difficulties
		3. Likely to increase investment in small scale projects that have a greater impact on sustainable development	
Sectoral	Emission reductions are not achieved from individual project activities but CERs are issued, if the emissions in the sector are below a defined sectoral baseline, either to a government authority that implements policies or measures to reduce emissions in the sector, or to the private sector.	1. Wide applicability across regions and sectors (including Renewables, energy efficiency and transport)	1. Not clear what the impacts are for competitiveness
		2. Likely to lower transaction costs	2. Lack of reliable sector wide information
		3. Incentivisation of climate policy	3. Trans-national sectors limited and would involve linking across domestic and regional ETS, which might be difficult
Policy	A government or public authority receives CERs for the adoption and implementation of a policy or measure, e.g. a country may receive CERs for for implementing a more stringent building code.	1. Increased developing country engagement	1. Additionality and baseline concerns
			2. Would developing countries take on the costs of implementing policies with the current national ceilings on accepted CERs within the EU ETS

Specific methodological issues apply to all three CDM developments shown in

Table 6, for example, concerning the availability of suitable data for setting baselines and additionality checks. However, two presentations at the ECCP 4 argued in favour of greater scope for flexible mechanisms by introducing extended CDM in the form of programmatic, sectoral or policy mechanisms. Following from this recommendation, it was noted that an extended CDM has the scope to generate large quantities of credits, the demand for which would need to be matched by ambitious emission reduction targets.

Whilst considering broadening the scope of CDM, the discussion should also cover inclusion of Land Use, Land Use Change and Forestry (LULUCF) credits in the next phase of the EU ETS. This topic was raised by Emmer at the ECCP 4 with support also coming from some Member States.

On the counter side to the broad scale-up of PBM introduced above, suggestions for improving the quality of CERs accepted by the EU ETS, incorporate harmonisation and adoption of the gold standard to establish environmental and developmental credibility. Harmonisation could take the form of a restriction to acceptance of HFC-decomposition credits after the first phase. Allowing only gold standard CERs would signal the seriousness with which the EU ETS takes sustainable development. It has been proposed that an EU CDM/JI committee be established to approve projects, however industry argues that all effort should be put into improving the UN system, rather than developing parallel systems, EU specific standards and procedures, which could increase complexity and reduce transparency. Other proposals that could limit the quantity of CERs entering the EU ETS and link strongly to concerns over the equity of PBM include: (i) limiting the number of CERs that are sold by a country, perhaps based on criteria such as per capita emissions (Sao Paulo Proposal); or, (ii) discounting CERs from some countries after a certain level of supply has been attained.

The issue of CDM was given some discussion at the Bali conference (¹²⁵). Switzerland, for example, proposed an assessment of the CDM at COP/MOP 4 (December 2008). Argentina raised the issue in relation to the post-2012 period through the proposition of sectoral CDM. However, several parties preferred considering the broader issues in the context of the future action tracks and the final text on CDM makes no reference to the post-2012 period. Similarly, the text regarding JI contains no discussion of its role post-2012.

In the future then, scaling up the PBM and expanding its scope to provide greater dual benefits from its use must be weighed against the need to ensure credible, quality credits and to develop geographical equity in the investments made through these mechanisms. In addition, extending the scope of PBM could supply large numbers of credits that would need to be balanced by stronger demand, which might be driven by more stringent reduction targets. These debates are closely linked to that in the EU ETS concerning the balance between levels of PBM credit acceptance and providing an incentive for national action. The following section provides some analysis of the trade-offs within this debate.

5.2.5 Future balance between JI/CDM acceptance and incentives for domestic action

One of the Chairman's closing remarks at the ECCP 4 stated that without complementarity provisions CDM supply would most likely outstrip demand, so that prices would tumble. In response, a purist would argue this is not an issue, no complementarity restriction should be imposed within the EU ETS and the market would then provide the most cost-effective method of meeting the emission targets, after all, a tonne of CO₂ emitted to the atmosphere has the same effect no matter where geographically it is emitted from.

¹²⁵ IISD, Summary of the Thirteenth Conference of Parties to the UN Framework Convention on Climate Change and Third Meeting of Parties to the Kyoto Protocol: 3-15 December 2007, *Earth Negotiations Bulletin*, Vol. 12, No. 354, International Institute for Sustainable Development, December 2007

However, because of the concerns over PBM outlined in section 5.2.3 above, it is extremely unlikely that no supplementarity requirements will be imposed. The following discussion will outline the key arguments concerning supplementarity under the criteria introduced in section 2.2 above.

Environmental Effectiveness

Taking the purist argument identified above, if there were no limit to the level of PBM credit acceptance in the EU ETS, the environmental effectiveness of the scheme would be unaffected. Following the logic, this is because the geographical source of emissions is irrelevant to the impact and therefore an emission reduction is equivalent, no matter where it takes place. However, section 5.2.3 discussed concerns regarding the additionality of PBM credits that question the validity of the purist reasoning. Using emission credits for compliance within the EU ETS from activities that would have occurred in the absence of any PBM investment degrades the environmental effectiveness of the EU ETS. One view expressed at the ECCP 4 by a research institute estimated that 30 – 50% of CDM projects could not be viewed as being additional.

It is important also to recognise other components of environmental effectiveness in this balance, including:

- the demonstration of a successful transition towards a low-carbon economy is powerful, and would not have the same value in the absence of domestic action;
- Europe's position as a climate change leader could come under question if it fails to make reasonable domestic emission reduction;
- the credibility of European climate change policy within negotiations for a future international agreement relies on Europe meeting its Kyoto obligations primarily through domestic emission reduction action.

Cost Effectiveness

Cost effective emissions reduction within the EU ETS would be enabled by allowing installations access to the broadest range of least-cost emissions reduction allowances (section 5.2.1), which therefore argues for unlimited acceptance of PBM credits. On the counter side, considering cost-effectiveness over a longer timescale; it could be considered that the transition to a low carbon European economy would be even harder in the future if domestic action were not undertaken in the present.

Predictability

Here, predictability covers a number of definitions. Firstly, predictability in the market is considered. The predictability of the price of carbon, amongst other influences, is linked to the liquidity of the market. Market liquidity relies on the ready supply of buyers and sellers of credits and is therefore aided by the inclusion of a broad range of least-cost emission reduction allowances, a view expressed by the European electricity industry at the ECCP 4. Based on the analysis of a carbon finance organisation, also expressed at the ECCP 4, the demand for emission allowances in Phase II of the EU ETS is currently very close to the supply eligible under MS supplementarity limits.

Secondly, predictability could also apply to the role that PBM will play within any international climate change framework beyond 2012. Section 5.2.4 discussed the necessity for implementation of quantified emissions reduction targets for the continuation of PBM. It can be imagined that an EU ETS heavily linked to CDM and JI could be exposing itself to the risk that if the international framework post-2012 no longer recognises PBM allowances, the EU would need to ensure that PBMs continue to function. Ultimately, the situation might require the EU to stand in as regulator of the PBM system.

Harmonisation

As discussed in section 5.2.2, proportion of ERUs or CERs in the total allowances surrendered for compliance varies across different EU member states. A view expressed at the ECCP 4 was that in order for installations and companies to respond effectively to complementarity, it is important that this limit is harmonised across the EU with transparent rules and long-term visibility on future adjustments.

In addition, a harmonised EU approach would be better aligned with other ETS which would make linking to other schemes in the future more straightforward.

In addition to the criteria already discussed above, the balance between PBM acceptance and incentives for national action is assessed against:

- **Economic efficiency:** As has been noted previously (Section 4.2.2), the more emissions that an emissions trading system covers the more efficient it should be. Any limit to the quantity of PBM credits eligible within the EU ETS should therefore be carefully balanced against the demand for credits.
- **Simplicity:** Presently, the UNFCCC is responsible for overseeing issues surrounding PBM credits. In the interests of simplicity, this situation should be retained and if the resolution of problems is unsuccessful there, then solutions may be implemented at an EU level.
- **Non-discrimination:** The geographical equity of PBM investments has been called into question (section 5.2.3). The adoption of higher quality standards for PBM credits would address some of the issues surrounding PBM equity. Additionally the EU ETS could limit acceptance of credits from one country based on an agreed threshold (section 5.2.4.2).

5.2.6 Findings and recommendations on the future development of PBM

Key findings and recommendations with regards to the future development of PBM are, therefore:

- There is a case for limiting the use of PBM credits by installations and companies within the EU ETS in order to stimulate domestic emission reductions. Any quantitative complementarity limit must balance the cost effectiveness of the scheme with the level of domestic action deemed necessary. Within this process there is a clear role for the Commission in ensuring that the complementarity limit established for each MS results in a net shortage of allowances (including PBM allowances) and thus stimulates that domestic action. By implication, the movement to a lower cap (for example in response to the adoption of a lower EU emissions target) could allow a greater use of PBM allowances whilst preserving a degree of domestic action. However, if it were the intention that a tougher cap would be met by increased domestic action this would suggest no increased use of PBM allowances.
- Negotiations for a post-2012 international climate change framework are currently underway. However, there is no guarantee that PBMs will be a component of any agreement that may result. Accordingly, it is important to introduce assurances that companies would definitely be able to use PBM credits in the next period.
- Principal PBM developments aim to scale-up and extend the scope of the mechanism. This has the potential to generate large quantities of credits. Internationally and within the EU ETS, stringent emission reduction targets will be needed to stimulate demand for these credits and make the most of the opportunities that these mechanisms present.

- In combination with a quantitative limit, a qualitative limit should also be considered, specifying, for example, that only “Gold Standard” credits should be eligible. Such a criteria would both limit the number of credits available and ensure that the EU ETS retains credibility both from an environmental and a sustainable development perspective, in a scenario with more widespread use of credits.
- Supplementarity limits should be harmonised across the EU. This will aid compatibility and thus links with other international trading schemes in the future (section 5.3) and also aid companies within the EU ETS to operate effectively particularly where planning is concerned.

5.3 Linking to other external or international schemes

Given the recent development of GHG emission trading schemes in the USA, Canada, Australia and Japan, for example, the future international dimension of emissions trading is important to consider, particularly in the context of the EU ETS reform. This section concentrates on the subject of linking the EU ETS with other trading schemes.

In the following section, the principal trading schemes and their designs are outlined, drawing attention to the possibilities for linking with the EU ETS. Discussion then turns, in section 5.3.2, to the general advantages and disadvantages of forming links, as well as the ideal timing for doing so. Section 5.3.3 discusses the compatibility issues that should be considered prior to linking two schemes, before section 5.3.4 describes linking instruments that can be employed to overcome compatibility problems. Sections 5.3.5 to 5.3.7 consider the costs and gains of linking, the role of the EU within any linked system and the legal concerns associated with linking schemes respectively. Finally, in section 5.3.8 recommendations and conclusions are drawn about the linking between the EU ETS and other international schemes.

5.3.1 Other Central Emission Trading Schemes

USA Federal Proposal: Lieberman-McCain Climate Stewardship and Innovation Act

Presented in 2003 and 2005, this bill was reintroduced in January 2007. It proposes to cover all 6 GHGs from large stationary sources and from transportation fuels, with the target of reducing emissions to 1990 levels by 2020, 20% below 1990 levels by 2030 and 60% below 1990 levels by 2050. Up to 30% of the reduction commitments can come from “alternative means of compliance”. The penalty proposed for non-compliance is a factor of three times the market value of any allowances not submitted, without the payback or “make-good” of the missing tons. The Secretary of Commerce would determine the amount of allowances to be given away or to covered entities and the amount to be auctioned. Proceeds from auctioning would be used to reduce energy costs and assist disproportionately affected workers. The Environmental Protection Agency, who would administrate the scheme would be required to implement a comprehensive system for GHG reporting, inventorying, and reductions registrations. The National Greenhouse Gas Database would then store reported GHG emissions from covered entities and registered GHG reductions and sequestration from non-covered entities.

USA Federal Proposal: Lieberman-Warner America’s Climate Security Act

A floor time vote on the Lieberman-Warner ACSA is scheduled to take place in January/February 2008. The Bill proposes to cover electric generators, industry and liquid fuels, but not natural gas or the commercial sector. The covered entities would account in all for around 80% of total US GHG emissions. Emissions targets for those covered sources are to return emissions to 2005 levels by 2012, then reduce 15% below 2005 levels by 2020, 33% below 2005 by 2030, 52% by 2040 and 70% by 2050.

An emissions monitoring and reporting system would be established. The EPA would be charged with running the system and making data available to the public. Covered entities would be allowed to meet 15% of their compliance through borrowing from future years, 15% through domestic US offsets and 15% through purchases from non-US carbon markets.

The Act proposes the establishment of a Carbon Market Efficiency Board to act as an alternative to a safety valve in the event that the average price of an emissions credit exceeds a predetermined value. The board would be authorized to temporarily increase the amount that covered entities can borrow, lengthen the payback period of loans and loosen a given year's economy-wide emissions cap by as much as 5% on the provision that subsequent year's caps are tightened sufficiently to ensure the cumulative emissions reductions over the long term remain unchanged. Initially 24% of allowances would be auctioned, increasing to 75% by 2035 with the phase-out of free allocations.

USA State Programs: Regional Greenhouse Gas Initiative

In 2003 the then Governor of New York, George Pataki initiated the Regional Greenhouse Gas Initiative by asking the governors of Northeastern and mid-Atlantic States to join in the development of a strategy to help the region lead the nation in efforts to combat climate change. The Initiative that has been developed is a regional cap-and-trade scheme, covering 10 states, which includes CO₂ emissions from fossil fuel fired power plants greater than 25 MW nominal capacity. The cap set restricts emissions to current levels between 2009 and 2015, after which the base annual emission budget will decline by 2.5% per year, resulting in a 10% reduction below current levels by 2019. Regulated entities within the scheme can use offsets to comply with the cap but there is a ceiling to the percentage used (currently limited to 3.3% of emissions, Sherry, 2006). A series of price triggers expand the use of offsets; if \$7/ton price is reached, the limit on offset use increases to 5% of reported emissions, at a price of \$10/ton, the limit rises further to 10% of reported emissions and allowances from outside the US become valid. Initial offset types are limited but the development of additional offset categories will be pursued. A safety valve is included within the scheme such that if the average regional spot price for allowances equals or exceeds the Safety Valve Threshold (currently \$10.00 (2005\$)) for a period of 12 months on a rolling average, the compliance period may be extended by up to 3 one-year intervals. A model rule was announced in August 2006 and each state must adopt a final model rule by the end of 2008. Model Rule requires a minimum of 25% of allowances to be auctioned with the proceeds used for consumer benefit of strategic energy purposes. The remaining 75% of allowances are allocated according to the decision of each state, currently most states are in favour of near 100% auctioning.

USA State Programs: California: Nunez-Pavley AB 32: Global Warming Solutions Act

The Global Warming Solutions Act of 2006 specifies California's goal to demonstrate national and international climate change leadership by requiring that the state's GHG emissions be reduced to 1990 levels by 2020. The reduction will be accomplished through an enforceable state-wide cap on emissions that will be phased in from 2012. AB 32 directs California Air Resources Board (CARB) to develop appropriate regulations and establish a monitoring and reporting system. Additionally, the CARB is required to use the following principles in implementing the cap: distribute benefits and costs equitably; ensure there are no direct, indirect, or cumulative increases in air pollution in local communities. The Act authorises the use of market-based mechanisms and authorises the Governor to invoke a safety valve for up to 12 months at a time, in the event of extraordinary circumstances.

Canada: Domestic Emissions Trading

Canada's Climate Change Plan was released in November 2002 and established an emissions reduction target of 55 Mt for large industrial emitters. Domestic emissions trading will be an important component of the Government's approach to meeting reduction targets.

The central element of the ETS would be a baseline-and-credit system scheduled to start in 2010. The Plan proposes an emissions intensity (emissions per unit output) approach for determining emissions reduction targets for such emitters.

Therefore, firms whose actual emissions intensity in a given year is below their target would receive tradable credits equal to the difference between their target emission intensity and their actual emission intensity, multiplied by their production in that year. These credits could be banked for use in future compliance years or sold to other parties through a private sector emissions trading market. The target for intensity allocations for 2010 is 18% below 2006 levels. Following 2010 the allocation drops by 2%/yr with the plan that in the future, beyond 2020, there will be a transition to an absolute cap. Credits from domestic offsetting projects can be used for compliance, with the aim of engaging other sectors of the Canadian economy to make GHG reductions. Certain CDM credits, determined by the Canadian Government, will be eligible for a firm's compliance but with limited to 10% of its total target. Canada aims to actively work with U.S. partners to explore opportunities for linking Canada's ETS with National, regional or state systems.

Japan Voluntary Emission Trading Scheme (JVETS)

As its name implies, companies and facilities participate in the JVETS voluntarily by pledging binding emission reduction targets. Applicants to the scheme were assessed by the Ministry of Environment for the cost-effectiveness of proposed emission reductions and subsidies, up to 1/3 of investment costs, were provided to successful applicants for developing new facilities to reduce CO₂ emissions. Facilities that fail to meet their targets are required to return the subsidy. The initial allocation of allowances was based on grandfathering with baseline year emissions calculated as the average emission of the three years prior to the schemes inception in 2005. Participation in the scheme was 31 in 2005, increasing to 58 in 2006. On average over all participants the total subsidy paid for emission reduction is around US\$ 10/t-CO₂. Domestic allowances (JPAs) can be traded and banked between phases of the scheme and CERs can also be utilised for compliance. The scheme represents the first cap and trade ETS in Japan and potentially establishes the foundations for a future full-scale mandatory ETS by accumulating knowledge and experience. The scheme is already linked to the Kyoto Protocol through the acceptance of CERs.

Australia: Elements of an Australian Emissions trading scheme

In December 2006 the Prime Minister of Australia announced the establishment of a joint government-business Task Group on Emissions Trading. The Task Group recently reported on the elements of an Australian ETS and concluded that commitment to a 'cap-and-trade' model should be made in the near future, with implementation requiring some further years of careful preparation. The scheme would include a long-term aspirational emissions abatement goal with an overall emissions trajectory commencing moderately below business as usual but which progressively stabilises and then allows for deeper emissions reductions. It would aim for maximum practical coverage of all sources and sinks, and all greenhouse gases. Permit liability would be placed on direct emissions from large facilities and on upstream fuel suppliers for other energy emissions. Initially, agriculture and land use emissions would be excluded. Allocation and issuance would be based on single year emissions permits that provide an up-front, once-and-for-all, free allocation of permits as compensation to existing businesses identified as likely to suffer a disproportionate loss of value due to the introduction of a carbon price. Periodic auctioning of remaining permits will take place, with revenues used to support the emergence of low-emissions technologies and energy efficiency measures. There will be a 'safety-valve' emissions fee and the scheme will recognise a wide range of credible national and international carbon offset regimes. A clearly stated feature of the scheme is the capacity, over time, to link to other national and regional schemes.

Australian States: Greenhouse Gas Abatement Scheme, GGAS (New South Wales and Australian Central Territories)

GGAS commenced on 1 January 2003 in NSW and on 1st January 2005 in ACT with the aim of reducing GHG emissions associated with the production and use of electricity. The scheme establishes an annual State-wide greenhouse gas benchmark for the electricity sector and then requires individual benchmark participants (who buy and sell electricity in the state) to meet their allocation of the mandatory GHG benchmark, based on their share of the NSW electricity demand. The government set a state-wide benchmark of reducing GHG emissions to 7.27 tCO₂-e by 2007 and to ensure progress towards this target, progressively tighter targets were set year-on-year from 2003. Compliance with benchmarks is achieved by surrendering abatement certificates created from project-based emission reduction activities. An annual GHG benchmark statement must be submitted confirming electricity sales, GHG benchmark and the number and details of abatement certificates. If benchmarks do not reduce their average emissions to the target level, they incur a penalty of \$12 per tCO₂-e for the shortfall amount (a shortfall of up to 10% can be carried forward to the following year without incurring a penalty). Abatement certificates can be produced by Abatement Certificate Providers (ACPs) who carry out one or more of the following abatement activities:

- low-emission generation of electricity (incl. cogeneration) or improvements in energy intensity of existing generation activities (Generation Rule);
- activities that result in reduced consumption of electricity (Demand Side Abatement Rule);
- activities carried out by elective participants that reduce on-site emissions not directly related to electricity consumption (Large Users Abatement Certificate Rule);
- the capture of carbon from the atmosphere in forests (Carbon Sequestration).

Of these activities only the Generation Rule allows abatement certificates to be created from interstate activities. The scheme administrator maintains an online registry that enables GGAS to operate as an emissions trading scheme. The registry provides details of ACPs and the ownership status of abatement certificates at any point in time. Audits at commissioned annually by the compliance regulator to ensure benchmark participants have correctly calculated their certificate surrender requirement.

New Zealand Emission Trading scheme

The New Zealand government has decided in principle that the objective of the NZ ETS will be to support and encourage global efforts to reduce greenhouse gas emissions by (1) reducing New Zealand's net emissions below BAU levels and (2) complying with New Zealand's international obligations, including Kyoto Protocol commitments; while maintaining economic flexibility, equity, and environmental integrity at least cost in the long term. The scheme will be introduced across the economy through a staged process, such that by 2013 all major sectors of the NZ economy covered by emissions trading. It will include three types of participants: those with obligations to surrender emissions units to cover their direct emissions or the emissions associated with their products; those that receive freely allocated emission units, or receive emissions units for eligible afforestation, or hold other emission units that can be traded to other parties; and, those that engage in trading activities to take advantage of market opportunities.

A New Zealand Unit (NZU) will be the primary domestic unit of trade. For the first commitment period, NZUs will be fully comparable to, and backed by, Kyoto units by the end of the period for determining compliance. The NZ ETS will allow both sales to, and purchases from, international trading markets and participants will face binding consequences for non-compliance with their obligations, including penalties and make-good provisions. The scheme may be augmented by an offsets mechanism, allowing people without ETS obligations to earn emission credits for activities resulting in a reduction of total GHGs released into the atmosphere. In terms of permit allocation: industrial production firms that are trade-exposed or disproportionately affected, the agricultural sector and pre-1990 forests will be allocated free permits up to 90% of their respective 2005 emissions levels; New entrants will not receive free allocations, and closing firms will be required to return any permits allocated for free; No free allocations will be made to electricity operators, liquid fossil fuel suppliers or landfill operators, remaining permits will be auctioned to cover these sectors; Free allocation will be gradually phased out over the period 2013 to 2025.

The NZ ETS will place no restriction on the AAUs that can enter the NZ ETS for the first commitment period. However, the government is afforded the power to place restrictions on the type of CERs and ERUs that can be brought into the NZ ETS. The government has identified the need to include a price cap or a price floor, however there is the potential for a price cap post-2012.

5.3.2 Advantages and disadvantages of linking schemes

There are a number of commonly accepted advantages and disadvantages associated with linking emissions trading schemes and these are summarised in Table 7.

Perhaps the most widely expressed benefit of linking is the basic economic advantage it provides, reducing overall compliance costs and also reducing the volatility of the market price of allowances. This is achieved by enabling broader access to low cost emissions reductions. The argument follows that strengthening international cooperation through linking might then make it more attractive for other nations to participate by taking on emission reduction targets. In addition, the inclusion of more participants within a system could help minimise leakage as entities are prevented from relocating their emissions to countries with less stringent or no emission reduction policy. As linking evolves towards a global market, the carbon price that is generated should stimulate investment in new technologies and through flexible mechanisms such as CDM and JI, should engage with and provide investment to countries and sectors currently not accounted for under ETS. Should negotiations fail to secure an international climate change agreement post-2012, a global carbon market would ensure that international climate policy was not absent.

On the other-hand, there are potential risks associated with linking ETS, typically for poorly designed linkages. Most importantly, considering the primary goal of emissions trading is to reduce overall emissions, a poorly designed linked ETS could allow overall emissions to rise or otherwise compromise environmental effectiveness. Economically, linking can affect competition between companies, for example if two schemes being linked have a different methodology for allocating allowances (discussed in section 5.3.4). Linking emissions trading schemes can also change emissions levels; if the schemes are domestic then one country is likely to be a net importer of allowances or credits, while the other is a net exporter. This means that actual emissions are below the aggregate emissions cap/baseline in the net exporter country whilst emissions will be higher than the desired trajectory in the net importer country. Where applicable, this may make achievement of its national emissions limitation commitment more difficult. In general, national and international targets that recognise trading as a compliance route serve to further encourage linking.

Table 7: Potential Benefits and risks associated with linking national or regional emissions trading schemes

Potential Benefits	Potential Risks
Expands markets and increases cost-effectiveness by increasing market liquidity and diversity in marginal abatement costs: greater access to low costs emissions reductions	Poorly-designed linked ETS can undermine the environmental effectiveness of the scheme
Strengthens cooperation between parties with binding targets and increases incentives to others to take such targets onboard	By-passes environmental guarantees
Evolution towards a global carbon market; putting a price on carbon stimulates investment in cleaner technologies	Affects competition between companies
Links through flexible mechanisms such as JI/CDM enhance technology transfer to, and incorporates into reduction efforts, countries and sectors not covered by individual ETS	Overly-complicated “gateways” (mechanisms to regulate trade between systems) increase transaction costs
Linked ETS could serve as a fall-back option to prevent a total collapse of international climate policy if post-2012 negotiations do not succeed	Alters emissions trajectories, which could make Kyoto compliance more difficult for one of the schemes (if applicable)

Having discussed the advantages of linking trading schemes it is of interest to consider what might be the optimal timing for linking the EU ETS to another ETS. Since the EU ETS is extant it could be suggested that the optimal timing for linking would be before any of the other schemes commence. Such a strategy would allow for some harmonisation and planning prior to linking. However, GGAS and JVETS are both operating and many other schemes are well into the planning process. Accordingly, linking prior to commencement might not be a feasible option. There are two issues that are worth considering with regard to timing of linking:

- Firstly, the timing of compliance periods; linking systems with different compliance periods could weaken the environmental effect of an ETS that has a later start date by allowing credits to flow into it that were accrued and banked for years prior to the start-up of the ETS. However, to have a large effect, the volume of banked credits would need to equal a significant proportion of the total size of the linked system and it is reasonable to assume that this is unlikely to be the case.
- Secondly, the status of international climate change agreements should be taken into account. If a link is to be made through a common allowance, such as CDM, it is important that the evolution of CDM in a post-2012 framework is considered (e.g. section 5.2.4). One could also argue that linking the EU ETS with another scheme shortly before the end of a Kyoto period might present difficulties since price differences may allow operators within the EU ETS to take advantage of arbitrage and sell significant volumes of allowances into the other market. This could undermine Member States and the EU’s accounting for compliance with the Kyoto.

5.3.3 Compatibility issues for linking the EU ETS to another scheme

The following discussion of the key issues that affect linking the EU ETS with other schemes is based on the arguments put forwards by participants of the ECCP 4, and analysis carried out by Blyth and Bosi (2004), Haites (2003) and Ellis (2006). The discussion aims to identify situations that could arise in linking the EU ETS with the other trading schemes identified in section 5.3.2.

Coverage. Differences in coverage of gases and sectors change the cost of abatement, and will affect carbon prices. However, this should not cause difficulty when linking schemes. Six GHGs were included in the Kyoto Protocol and in many countries the reduction of non-CO₂ GHGs is more cost-effective than the reduction of CO₂ emissions. Therefore, the inclusion of non-CO₂ emissions within an ETS should allow entities to meet their targets at lower cost. However, non-CO₂ emissions are often harder to calculate and involve greater uncertainties, for which reason they have generally been excluded from the EU ETS to date (there have been calls for the opt-in of N₂O in the future e.g. Jensesen, ECCP 1). Inclusion of additional gases therefore introduces uncertainty into the system, but as long as the associated emissions reduction are sufficiently verifiable to maintain the legitimacy of the traded unit, there is no reason why two schemes of different gases should not be linked. Similarly, some schemes cover emissions from different sectors and sources. The key compatible features must be:

- All sources are monitored with comparable accuracy, otherwise there may be more uncertainty associated with emission units traded in one system than in another, which may influence the political desirability of linking;
- Different schemes should use the same values of global warming potential to convert emissions of non-CO₂ gases to CO₂ equivalency.

Direct and indirect accounting. Certain schemes account for direct (point of source) emissions whilst others consider indirect emissions, e.g. where emissions from electricity production are assigned to the end-users of the electricity. When linking schemes based on direct and indirect emissions, care must be taken to avoid double counting of emissions, a particular issue when accounting for emissions from electricity that is traded across an international border. For example, since the CO₂ associated with electricity production within the EU ETS is strictly accountable on the site of production (i.e. a direct ETS) any electricity exports to countries outside the EU will essentially be accounted as carbon free. This would have the effect of reducing the grid's average emission-factor for electricity consumption in any importing country/installation with an indirect trading scheme, such as the NSW and ACT GGAS scheme.

Trading unit. The EU ETS defines an EU-allowance as the unit of trade specifically within the context of the emissions trading directive. Allocated by Member States to installations within their national boundaries, it allows the operator to emit one tonne of carbon dioxide equivalent during a specified period. The EU-ETS also recognises the use of CERs and ERUs, from CDM and JI projects respectively. However, the Directive does not allow individual installations to submit AAUs for compliance. The reasoning behind this decision is that under the Kyoto Protocol, some Annex B countries have been allocated emissions commitments that are well above their projected emissions for 2012, leading to a surplus of units, referred to as "hot air", that can be supplied on the international market at low cost.

Assuming a bilateral arrangement, once the EU ETS links with another scheme, allowances from that scheme could also be used by EU installation operators for compliance within the EU ETS. Linking with a scheme that has a different recognition of external units could have implications for the EU ETS both through the total supply of credits and through the type of credits used for offset. For example, linking the EU ETS with the proposed New Zealand ETS, which recognises both AAUs and LULUCF CERs as eligible for compliance purposes, has implications for the EU ETS. Firstly, the supply of eligible credits into the NZ ETS will affect the total supply into the combined scheme and if this total supply is higher relative to the total demand then prices will tend to drop. The same is true *vice versa*. Additionally, AAUs and LULUCF CERs that are ineligible under the EU ETS could be used to offset some EU ETS installations' emissions, since an installation in the NZ ETS could retain their AAUs and LULUCF CERs for domestic compliance and transfer only EU ETS-eligible units to EU installations.

As well as limiting the type of eligible offsets, many ETS also limit the eligible location of offset projects and proportion of the total compliance target that can be achieved with them. The RGGI, for example, stipulates that 3.3% of the target can be met using offsets from US-based providers until the carbon price reaches \$10/ton, at which point offset cap rises to 10% and international offsets become eligible.

Absolute versus relative targets. The EU ETS sets an absolute level on CO₂ emissions during the compliance period. However, other schemes may be based on relative targets. For example, in the case of the Canadian scheme, the target is based on emission intensity. In a relative scheme, the final allocation of allowances to a company can only take place once the final figure for the company's growth is known. Linking an ex-post allocation system, such as the Canadian ETS, to the EU ETS ex-ante allocation scheme would not deliver the same liquidity benefits as linking two schemes that were the same. Linking two such schemes could also result in the combined system emitting more than the individual non-linked systems. For example, a generous indexed target could encourage increased production in that scheme, which then sells its surplus units to the country with a fixed target.

However, it should be noted that Canada has an overall national target under the Kyoto Protocol. Therefore, if it chooses to meet this target, during times of higher than expected production, it has an obligation to balance emissions with reductions from non-covered sectors or by buying emissions reductions from abroad.

Stringency of targets. The relative stringency of the targets between two schemes should be taken into consideration. Within the EU ETS the criteria for the national allocation plans means that consistency with the Kyoto targets is the minimum criterion for allocation. Ensuring full equity of efforts at the sectoral or installation level is very unlikely to be achieved between two different schemes. Therefore companies in different ETS will therefore experience a different initial distribution of wealth (assuming some allowances are issued for free), although they will all see the same costs of carbon, hence operating costs would be unaffected. Equally, the differing manner in which rewards are made for early action will result in a different wealth allocation between companies. This could lead to comparative advantages for companies in one scheme relative to competitors in another. However, such competitiveness arguments relating to the relative stringency of schemes would occur in the absence of linking if the two schemes operated separately. The stringency of targets may be politically important when considering linking, but differences in relative stringency will not adversely affect the benefits of linking schemes together. That is, unless the stringency of a scheme is so low that its targets are above business as usual levels. In such a case the combined emissions of the linked schemes could be higher than the emissions of the separate schemes, so linking might cause negative environmental performance.

Allocation methodology. Once established, the price of carbon is set by the supply and demand for allowances, however, the price should be independent of the method of initial allocation. Therefore beyond the difference in wealth transfer associated with allocation, which could be significant, linking schemes should not introduce additional financial distortion. However, it should be noted that the treatment of subsequent allocation rules, for example updating of allocations and concerning plant closure or new entrants, would lead to distributional effects. In the EU ETS, allocations for the second period by Member States may take into account emission reduction occurring during the first period by, for example, taking the base year used for the second allocation from the period 2005 – 2007. If allowances in the second period are allocated on the basis of emissions in the first period, companies may have an incentive to forego emission reduction in the first period. The same effect may occur for future phases if there were an expectation that this type of updating would continue. Such a strategy would be profitable if the expected allowance price for the second period is higher than the allowance price in the current period. Linking schemes with different approaches to updating could facilitate such strategy by giving access to a greater market of cheaper first period allowances.

Monitoring, reporting and verification (MRV). MRV is fundamentally important to achieving a credible GHG trading system and creating confidence in the traded units. Actual installation level MRV systems are, however, likely to be different for separate ETS. The main consideration is to what extent differences in MRV might affect the legitimacy of the currency in the trading scheme. At the ECCP 4 a global emissions compliance framework was proposed, to build trust through transparency, accountability and integrity, through:

- A structure based upon global institutions with local mirroring;
- Public parties organise private parties;
- A four-tier model for monitoring, reporting, verification and compliance standards, with global standards as the base of the tier, then the emissions trading system, followed by the industry and headed by the company entity;
- Enabling technologies (e.g. workflow management, advanced data acquisition software, connecting systems within companies, link data from multiple sources by competent authorities, advanced auditing and inspection tools and public availability of company data).

Compliance framework and penalty regime. Under the EU ETS, each tonne of CO₂ emitted by a covered installation must then be covered by an allowance or eligible credit (CER or ERU). Any emissions not covered by an allowance are then subject to an excess emissions penalty per tonne CO₂ and the excess emissions must then be covered by allowances in the following calendar year. Since the payment of the penalty does not release the operator from the obligation to cover its full emissions each year with allowances or other eligible units, the EU ETS penalty regime does not act as a cap on allowance price. In the situation that two ETS have different penalty rates, but do not remove the obligation of each installation to cover their full emissions, then linking between the schemes should be straightforward. The only condition is that the penalties are sufficient to ensure overall compliance. With this in mind, linking between the EU ETS and a voluntary emissions trading scheme, such as the Japanese scheme, could be difficult because of concerns over the stringency of any target and the commitment to compliance that a voluntary participant might be willing to take on in the context of uncertain carbon prices.

In the situation where the EU ETS would be linked with a system that does not require making good excess allowances and thus fixes an upper limit on the price of allowances on that market, there are greater concerns.

If the scheme belonged to a nation with a Kyoto Protocol obligation, then the additional emissions would have to be covered by additional reduction credits from other sectors or international credits. However, in the linked system, these fixed price allowances might also be available to EU installations, meaning that government expenditure would, in effect, be directed to reducing compliance costs in foreign companies; an unlikely situation. Therefore, a limitation of the exchange of these credits would be required, which will be discussed in section 5.3.5. Of the emissions trading schemes described in section 5.3.1, the Australian NETS, the Lieberman-McCain Climate Stewardship Act and the Canadian ETS do not include a “make good” clause in their design.

The preceding discussion covered many of the issues of compatibility associated with linking emissions trading schemes and outlined some of the difficulties that could be encountered if the EU ETS were linked with some of the other trading schemes introduced in section 5.3.1. In the context of linking the EU ETS, the principle difficulties identified were:

- Compliance issues. The EU ETS has a financial penalty and a “make good” provision for non-compliance. It is suggested that there may be difficulties if the EU ETS was linked with either the Australian NETS, the Lieberman-McCain Climate Stewardship Act since neither include a make good clause. The Japanese VETS is based on voluntary emissions targets. The Canadian ETS has not indicated that it will require replacement of excess emissions. Therefore linking with either of these schemes might raise questions about the environmental credibility of the linked system based on the environmental effectiveness of the partner scheme.
- Eligible trading units. Within the EU ETS AAUs and CERs from LULUCF are ineligible for compliance. The NZ ETS, however, accepts these credits and so if the two were linked then emissions from installations within the EU could be offset by emissions reduction from currently ineligible sources, which could be politically contentious. The RGGI only accepts international offsets beyond the maximum price cap of \$10/tCO₂-eq.
- Absolute versus relative targets. The EU ETS sets an absolute level on CO₂ emissions during the compliance period. In the case of the Canadian ETS, the target is based on emissions intensity. There is concern that an entity within a relative scheme can achieve over-compliance with its emissions intensity target while increasing its absolute emissions. The surplus credits generated would not correspond to any emissions reduction in the relative scheme and, in a linked system, if sold to entities within the absolute scheme as offsets for emissions there, would generate a further emissions increase. It should be noted, however, that where the relative scheme is hosted by a Kyoto Party, such as in Canada, an obligation exists to balance the surplus credits generated in the above example with offsets.

5.3.4 Linking instruments

Linking between different emissions trading schemes can be achieved through a number of mechanisms including:

- Directly, by making the allowances from the different ETSs fully fungible and valid for compliance in each ETS;
- Indirectly, by governments acting as mediators that receive allowances from market actors wishing to make a transfer, convert them into AAUs, and transfer them to another government, which then converts them into their respective system’s allowances. Alternatively, ETSs can be linked to registries/mechanisms and systems that generate emission credits from project based mechanisms, such as CDM credits.

Individual links can be unilateral (where units from system A can be used in system B, but not *vice versa*) or bilateral (where units from system A or B can be used for compliance in both systems A and B).

As has been discussed in the previous section, the literature on linking emissions trading schemes concludes that it is technically possible to link schemes with widely divergent characteristics. However, the greater the similarity of their designs the easier it becomes. Blyth and Bosi (2004) concludes that linking is usually environmentally neutral, but some design features can lead to detrimental environmental performance if the schemes are linked than if they remain separate. Technical solutions to enable flexibility and to protect the environmental effectiveness, as well as to ensure reliability and accountability, are usually available. Here we will discuss some of the instruments as proposed in the literature for overcoming those compatibility issues outlined in section 5.3.4.

Compliance issues

Limiting the exchange of additional allowances issued to a market under a scheme with a price cap (point 8 in section 5.3.4) could be achieved through:

- An ‘exchange rate’ could be introduced to maintain the price cap in the linking market, implying that an EU ETS allowance represents a different environmental amount compared to the unit in the linked scheme. However, this would break the principle of fungibility of units throughout the system, reducing the economic efficiency of the system and causing a particular problem in accounting for CDM or JI credits, which should have a common environmental value in any system.
- Some type of gateway, whereby installations in the EU ETS would be restricted from buying allowances from the linked scheme once the market price goes above the level of the price cap. This would avoid the possibility that companies in the linked scheme could simply buy at the level of the price cap and then sell at a higher market price. However, it would be difficult to determine the conditions under which the gateway should be open.
- Only issuing additional allowances to domestic companies and only up to the amount that covers the difference between their actual emissions during the year and their initial allocation. Whilst not completely preventing companies taking advantage of lower-than-market-rate allowances, it would prevent unlimited selling of additional allowances into the EU ETS and reduce the liability of the government implementing the price cap.

All three options tend to split the market but Blyth and Bosi (2004) concludes that the third option provides the most practicable solution though the most efficient would be to harmonise the approach to the penalty regime.

Eligible trading units

In the period 2008 – 2012, the transfer of EU allowances between installations in different Member States will be backed up by a corresponding adjustment of AAUs under the Kyoto Protocol. A pre-requisite for linking with the EU ETS, for countries that have an obligation under the Kyoto Protocol, is likely to be that non-EU domestic scheme allowances are also backed up with AAUs¹²⁶. When linking to a country with no Kyoto commitment a system for the mutual recognition of national allowances would need to be developed to maintain confidence in the environmental effectiveness of trading between the two schemes.

¹²⁶ (Blyth and Bosi, 2004)
IP/A/ITRE/ST/2007-08

As discussed in point 3 of section 5.3.4, the use of AAUs for compliance is excluded in the EU ETS, therefore linking to a scheme where AAUs can be used by entities for compliance purposes may cause difficulties. Therefore, Ellis and Tirpak (2006) propose that a gateway could be implemented to restrict trade in certain types of offset but that such a measure could be artificial given the fungibility of Kyoto units, a view also expressed by the IEA in the ECCP 4.

Absolute versus relative targets

Blyth and Bosi (2004) propose four possible policy solutions to deal with this problem: (i) a tax on trade between the two schemes, (ii) introducing an exchange rate to adjust for relative allowance values, (iii) adjusting allocation to the rate-based sectors to account for changes in expectations of growth levels resulting from linkage of the schemes, and (iii) tightening the allocation in the absolute scheme. Whilst each of these options could address the environmental concern associated with the effects of linking absolute and relative schemes, they would nevertheless introduce complexity into the scheme, and some of the options could reduce the efficiency of the market. In deciding on the need to introduce such policy measures, governments would need to balance the possible environmental benefits against the potential efficiency losses of introducing such restrictions on trade.

One of the conclusions of the recent ECCP 4 discussions was that flexibility measures, such as discussed above, are important for linking with the various systems emerging internationally. These measures working along with harmonisation efforts at this stage, will simplify the process of linking at a later stage.

5.3.5 Costs and gains associated with linking

If emissions trading schemes are well functioning and sufficiently liquid, then linking two schemes should result in a single carbon price across the combined system. A reasonable assumption can be made that the carbon price will fall somewhere between the pre-link prices in the two separate schemes. It follows, therefore, that linking implies a price rise in one scheme and a fall in the other, resulting in winners and losers. Net sellers of emission units in the cheaper scheme will be better off in the combined scheme, whereas net buyers in the cheaper scheme will be worse off in the linked scheme. The situation is reversed for the more expensive scheme: net sellers will be worse off in the linked scheme and net buyers will be better off as a result of the relatively lower price. Nonetheless, the total compliance cost for the combined scheme will be lower than if the two schemes were operating separately and thus both economies should benefit from the linked trading environment.

5.3.6 The role of the EU in a linked system

The EU ETS is the first large-scale emissions trading scheme for CO₂ world-wide. As such it could be regarded as the most advanced ETS since it has developed and refined systems and standards that allow it to operate effectively. Two scenarios can be imagined for a future global linked ETS:

- The EU ETS could form a hub, from which links emanate to other schemes distributed around the globe;
- A network of ETS could exist with links existing between many or all schemes.

In the first scenario, the role of the EU is primarily to form links between the separate trading schemes. For the second scenario, a primary role is less clear, the UN would potentially preside over the system and PBM could be envisaged as the prime linking mechanism.

What is clear for both conceptual scenarios, there is an important process of harmonisation that is necessary before widespread linking can occur. Therefore, it could be considered that the EU with its experience of linked domestic ETS, could provide the stable framework and initiative to facilitate harmonisation. To some extent, industry benchmarks inside the EU ETS already establish a precedent for those outside the scheme.

5.3.7 Legal concerns for linking EU ETS with other trading schemes

Article 25 of the Emissions Trading Directive¹²⁷ limits linkages by agreement to Annex B Kyoto Parties. Paragraph 18 of the Linking Directive states however that “following the entry into force of the Kyoto Protocol, the Commission should examine whether it could be possible to conclude agreements with countries listed in Annex B to the Kyoto Protocol which have yet to ratify the Protocol, to provide for the recognition of allowances between the Community scheme and mandatory greenhouse gas emissions trading schemes capping absolute emissions established within those countries”, thereby establishing the potential for linking with non-Kyoto ratifying parties.

As was demonstrated in the recent ECCP 4, there are many different legal forms of linking, these include:

- Multilateral/bilateral treaty;
- Political agreement;
- Agreement to adopt reciprocal legislation with mutual recognition of traded units;
- Private law agreements;
- Indirect links, such as non-Kyoto Parties investing in CDM projects.

Of these different forms of linking multilateral or bilateral agreements are the most formal, being transparent and legally binding. However, they require a large amount of management, for example, a central governing body of parties, a scientific committee, regular meetings, agreement reviews and amendments, as well as the capacity to resolve disputes. As a result, they can be slow to negotiate and amend. Another drawback of such agreements is that sub-national entities can't participate directly. This final point is important since for Canada and Australia, only the federal government has the power to enter into treaties. Additionally, in the US, no state can enter into an agreement with a foreign power without the consent of congress. Currently in these countries, regional ETS appear to be more advanced than national schemes, therefore it is important to consider how linking might take place at a sub-national level and it is likely that something less formal than a treaty would be better suited.

Political arrangements, such as a political announcement or memorandum of understanding, are easier to negotiate and easier to amend than a treaty, enabling agreement with sub-national entities, but they are not legally binding. More formal than a treaty but still more flexible, is a reciprocal agreement to adopt reciprocal legislation in each jurisdiction, which allows for mutual recognition and is legally binding in each separate jurisdiction. The drawbacks on this occasion are that there is the potential for unilateral termination and there is a need for similar units and criteria for MRV. Of relevance for the EU ETS, credits from non-Kyoto Parties would not be backed by AAUs under such a commitment. Finally, private law agreements form the basis of much of the commercial linking of ETS, for example contracts for delivery or swaps of credits to engage in arbitrage between systems. Under a private law agreement anyone can hold EUAs in a MS registry, so EUAs could be used or bought by other schemes, if recognised by those schemes. Trading of CERs could take place between MS and non-Kyoto Parties or sub-national entities that plan to allow international credits as offsets.

¹²⁷ Directive 2003/87/EC
IP/A/ITRE/ST/2007-08

5.3.8 Conclusions and recommendations regarding linking to other ETS

The key findings from section 5.3 are:

- There is substantial interest in emissions trading schemes around the world. Most schemes are still at the planning stage but are aiming to be operation in the near future, i.e. before 2012. Although most schemes use a cap and trade design, there are substantial differences between the separate schemes.
- The most significant differences from the perspective of linking ETS were found to be:
 - Compliance rules, for example where the obligation to “make good” any shortfall of emissions differed between schemes;
 - The nature of emissions targets, where a third party scheme is based on relative targets, a poorly designed link to the EU ETS could result in a net increase of emissions;
 - Eligible trading unit, linking two schemes that recognise different trading units, for example European Union Allowances (EUAs), Emission Reduction Units (ERUs), Certified Emission Reductions (CERs) (including Land Use Land Use Change and Forestry CERs), can cause political concern since a situation can arise in which credits can effectively be used for compliance within the trading scheme, where formally they are ineligible.
- Increasing the compatibility between schemes prior to linking will significantly aid linking them. However, it is technically possible to link widely divergent schemes using a variety of linking instruments. There are, however, disadvantages to the use of such linking instruments, principally as a result of greater complexity. This in turn can lead to higher costs and greater difficulties for accounting. At its most severe, greater complexity might increase the likelihood of occurrences of double counting and so could reduce the environmental effectiveness of the scheme.

6. CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the key findings and recommendations from the study.

6.1 Determining caps and allocation mechanisms

- It appears preferable to determine the overall cap at EU level, rather than the current process of nationally determined caps aggregating to an EU cap, since this is more likely to be effective at ensuring scarcity and should be a simpler, more predictable, process. This would also decouple the issues of ensuring scarcity and fair allocation.
- The decision on the length of cap to be set is a matter of finding a balance between providing longer term certainty and avoiding an expensive lock-in of a target that is difficult to achieve these two issues. For Phase III a cap in excess of 5 years is desirable, probably to 2020. In addition consideration should be given to setting a long term cap and having intermediate sub-phases over which allocations are fixed. The benefit of this is that the clarity on the overall cap would be maintained yet there would be flexibility to accommodate sector growth rates that deviate from the initial expectation.
- Any adjustment to the cap (for example in response to the EU adopting a 30% reduction target) should be according to a pre-established formula or even to a revised value established before the phase, in order to minimise the uncertainty that such adjustments would introduce.
- The approach to Phase II allocation across the EU lacked harmony, although many Member States took small steps away from grandfathered allowances towards greater use of auctioning and benchmarking. Looking forward, however, it is difficult to see how this evolutionary approach could lead to a harmonised scheme, suggesting that if harmonisation is to be a priority, the Commission needs to take action to more closely define the methodologies for installation level allocation, perhaps with specified levels or ranges for auctioning and principles to be applied in benchmarking and possibly grandfathering methods.
- Regarding so-called windfall profits for power generators, the extent to which this arises depends on the nature of national markets and indeed individual companies within the same market would be affected differently. Whilst there appear compelling arguments for reducing free allocation to power generators in response to this issue, a uniform approach across the EU would favour companies in countries with more liberal markets since they would have greater opportunities to pass on their carbon costs.
- The potential for windfall profits arising from free allocation is not unique to power generators; it applies to any industry which can pass on its carbon costs, even partially. However, as with power generators, companies within a sector could benefit differently according to their technologies and geographical location (proximity to extra-EU competition for example).
- Whilst we have not reviewed literature for all sectors or carried out any primary research, the studies reviewed in the present paper suggest that the steel, pulp and paper, and aluminium sectors are exposed to cost increases that they cannot recover. The cement sector is also particularly exposed but certain operators would have the potential to profit from free allocation.

- No single allocation mechanism will be suitable for all sectors due to differential impacts on asset values and the effect of competition from outside the scheme. A sector specific approach is essential to shelter those most vulnerable industries from the effects of the EUETS on extra-EU competition.
- For free allocation benchmarking appears preferable to grandfathering and will become increasingly so as the scheme progresses. However, for some sectors it may be unmanageably complex to develop fair and effective benchmarks, in which case grandfathering should be considered, particularly if this is the consensus view of the industry concerned.
- Overall, the downsides to output-based ex-post allocation appear very significant and any decision to adopt this approach should be considered the exception rather than the norm. However, output-based allocation could minimise leakage to greatest effect if benchmarks were defined according to the first tradable intermediary product after the CO₂ intensive process.
- There is a balance to be found between the increased abatement costs arising from new entrant allocation (either through reducing the incentive for abatement or by stimulating an inefficiently high level of investment) and the benefits of free new entrant allocation in reducing leakage, lowering consumer prices and improving security of energy supply. These factors suggest a sector specific approach, where free allocation is more justified for sectors experiencing competition from outside the scheme.

6.2 Transport

- If the principle of direct emissions (i.e. the polluter pays principle) were applied in the road transport sector, end users, i.e. drivers and road hauliers, would be the trading entity. However, there are a number of problems in taking this approach, not least the impact of the complexity of the required monitoring, reporting and verification procedures and, consequently, the high transaction costs on the cost-effectiveness of the scheme.
- The preferred option for the trading entity in an emissions trading scheme targeting the road transport is the fuel supplier. Although not consistent with the principle of direct emissions, such a scheme would be relatively simple and cost-effective compared to end users being the trading entity.
- It is possible for a scheme to be targeted at manufacturers, although, again, direct emissions would not be targeted. However, currently it would only be possible to include cars and light commercial vehicles in such a scheme, as CO₂ emissions from other vehicle types are not currently measured. If manufacturers were included in the EU ETS, the lifetime emissions of vehicles would also have to be estimated.
- For road transport, therefore, a scheme with fuel suppliers as the trading entity would seem to be the simplest and potentially most cost-effective approach. All the proposed options would generally be non-discriminatory, at least within the EU, as all relevant trading entities in the EU would be included.
- GHG emissions in the rail sector are declining, so it is far from certain that a trading system is needed, or indeed whether it would be the most cost-effective and efficient means of reducing emissions in the sector. Rail is commonly the low carbon alternative to road, so its inclusion in emissions trading could prove a disincentive to switching.

- It is not yet clear whether a trading system for the maritime sector is an appropriate option. As with aviation, the ship operator appears to be the most appropriate trading entity, which would make the scheme consistent with the principle of direct emissions. Currently, however, the lack of data and procedures for monitoring, reporting and verification and the opportunities for evasive action potentially undermine the cost-effectiveness and economic efficiency of the scheme. It is likely that these could be overcome once more work has been undertaken on the monitoring, reporting and verification systems, reducing the potential for evasive action and the legal aspects of an ETS involving the maritime sector.

6.3 Future International Setting

- There is a case for limiting the use of PBM credits by installations and companies within the EU ETS in order to stimulate domestic emission reductions. Any quantitative complementarity limit must balance the cost effectiveness of the scheme with the level of domestic action deemed necessary. Within this process there is a clear role for the Commission in ensuring that the complementarity limit established for each MS results in a net shortage of allowances (including PBM allowances) and thus stimulates that domestic action. By implication, the movement to a lower cap (for example in response to the adoption of a lower EU emissions target) could allow a greater use of PBM allowances whilst preserving a degree of domestic action. However, if it were the intention that a tougher cap would be met by increased domestic action this would suggest no increased use of PBM allowances.
- Negotiations for a post-2012 international climate change framework are currently underway. However, there is no guarantee that PBMs will be a component of any agreement that may result. Accordingly, it is important to introduce assurances that companies would definitely be able to use PBM credits in Phase III.
- Principal PBM developments aim to scale-up and extend the scope of the mechanism. This has the potential to generate large quantities of credits. Internationally, and within the EU ETS, stringent emission reduction targets will be needed to stimulate demand for these credits.
- In combination with a quantitative limit, a qualitative limit should also be considered, specifying, for example, that only “Gold Standard” credits should be eligible. Such a criteria would both limit the number of credits available and ensure that the EU ETS retains credibility both from an environmental and a sustainable development perspective, in a scenario with more widespread use of credits.
- There is substantial interest in emissions trading schemes around the world. Most schemes are still at the planning stage but are aiming to be operation in the near future, i.e. before 2012. Although most schemes use a cap and trade design, there are substantial differences between the separate schemes.
- The most significant differences from the perspective of linking ETS were found to be:
 - Compliance rules, for example where the obligation to “make good” any shortfall of emissions differed between schemes;
 - The nature of emissions targets, where a third party scheme is based on relative targets, a poorly designed link to the EU ETS could result in a net increase of emissions;

- Eligible trading unit, linking two schemes that recognise different trading units, for example European Union Allowances (EUAs), Emission Reduction Units (ERUs), Certified Emission Reductions (CERs) (including Land Use Land Use Change and Forestry CERs), can cause political concern since a situation can arise in which credits can effectively be used for compliance within the trading scheme, where formally they are ineligible.
- Increasing the compatibility between schemes prior to linking will significantly aid linking them. However, it is technically possible to link widely divergent schemes using a variety of linking instruments. There are, however, disadvantages to the use of such linking instruments, principally as a result of greater complexity. This in turn can lead to higher costs and greater difficulties for accounting. At its most severe, greater complexity might increase the likelihood of occurrences of double counting and so could reduce the environmental effectiveness of the scheme.

6.4 Comparison with proposed amendment to Directive

This section compares the conclusions of the present study with the proposals made by the European Commission for amendments to the Emissions Trading Directive. As is evident from the present study, the choices to be made on many issues concern a balance between often conflicting drivers and the final decisions will depend on the relative priorities of these drivers. This report was prepared to final draft status in advance of Commission's publication of its proposed amendments, with the current section being added at the very end of the drafting process.

The Commission's proposals are summarised in section 2.5 and the table below includes those proposals that correspond to issues examined in the present study.

Table 8: Comparison with key amendments proposed for Directive

Commissions proposal	Present study
Carbon Capture and Storage should be included in the scheme and explicitly mentioned in Annex I of the Directive. There would be no need to surrender allowances for emissions stored, however no free allocation should be given for capture, transport or storage of greenhouse gas emissions.	<i>[these factors]</i> suggest a sector specific approach <i>[to new entry and closure]</i> , where free allocation is more justified for sectors experiencing competition from outside the scheme (section 3.5).
Road transport and shipping should not be included and a detailed cost-benefit analysis would be required to determine if emissions trading is the most appropriate approach for these sectors.	Two reports examining the possible expansion of the EU ETS rejected the inclusion of road transport in the next expansion, as both concluded that there were better options for inclusion of other sectors in the short-term (section 4.2.2). It is not yet clear whether a trading system for the maritime sector is an appropriate option (section 4.4.2).
An EU-wide cap should be determined in the Directive.	Overall, it appears preferable to determine the overall cap at EU level (section 3.2).
There should be an 8-year trading period to 2020 and a linear reduction in the cap to that point.	2020 is probably the best end date for Phase III (an 8 year phase) (section 3.2).
The level of the cap needs to be cost-effective and consistent with the EU's commitment to an overall reduction in emissions of 20% by 2020 (this corresponds to a reduction of 21% below reported 2005 emissions).	Most logically <i>[the cap]</i> would relate to an EU level emissions target (section 3.2).
The Directive should provide for automatic and predictable adjustments to the cap upon the conclusion of an international agreement (reflecting the EU's commitment to increase its reduction target from 20% to 30% in such circumstances).	Any adjustment to the cap (for example in response to the EU adopting a 30% reduction target) should be according to a pre-established formula or even to a revised value established before the phase, in order to minimise the uncertainty that such adjustments would introduce (section 3.2).
Auctioning should be the basic principle for allocation, and should be applied for the power sector (although heat delivered to district heating or industrial installations could receive free allowances) and carbon capture and storage from 2013 onwards.	In summary, we cannot point to a single allocation mechanism being the preferred option since practical considerations such as the impact of the scheme on asset values and the effect of competition from outside the scheme suggest that the auctioning approach preferred by economists may not be the best one for all sectors in the current environment. However, a longer term move towards auctioning would be preferred as the carbon
For other sectors (including aviation) free allocation should start at 80% of their share of allowances reducing to no free allocation by 2020.	

<p>However, the Commission will review the situation with sectors and subsectors subject to international competition and make any necessary proposals by June 2011. Those sectors deemed to be at significant risk of carbon leakage could receive up to 100% of allowances free of charge or a system introduced to put those installations at significant risk on an equal footing with those in third countries.</p>	<p>market moves towards a global scale (section 3.4.3).</p>
<p>Of those allowances to be auctioned, 90% will be distributed to member states in proportion to 2005 emissions and the remaining 10% be distributed in relation to per-capita income.</p>	<p>No firm conclusion on how to distribute auction revenues (section 3.4.4).</p>
<p>A percentage of auction revenues should be used to reduce greenhouse gas emissions, to adapt to climate change, to fund research into emission reductions, adaptation and new technologies, for measures to avoid deforestation and for addressing social impacts such as increases in electricity prices in lower and middle income homes.</p>	<p>The distribution of revenues to domestic electricity users would be administratively very complex and would seem to work against the principle of liberalised markets, since the pass-through of carbon costs into electricity prices is a natural market response. If there were concerns that carbon price pass-through was having a detrimental effect on those in poverty a more targeted solution would be through existing or new social support mechanisms (section 3.4.4).</p>
<p>Free allocation should be based on harmonised Community-wide rules.</p>	<p>If harmonisation is to be a priority, the Commission needs to take action to more closely define the methodologies for installation level allocation, perhaps with specified levels or ranges for auctioning and principles to be applied in benchmarking and possibly grandfathering methods (section 3.3.2).</p>
<p>Installations that close will cease to receive free allowances and new entrants will receive free allocation in line with existing installations, to from come from a Community-wide new entrants' reserve.</p>	<p>If the protection of industry from competition from outside the carbon market is to be a priority, then there may be a case for issuing free allowances to new entrants and requiring closing installations to forfeit subsequent allocations, even if this creates differential barriers to entry and exit (section 3.5.3).</p>
<p>The EUETS should be able to link to other mandatory emissions trading systems capping absolute emissions.</p>	<p>where a third party scheme is based on relative targets, a poorly designed link to the EU ETS could result in a net increase of emissions (section 5.3.3).</p>
<p>CDM credits up to the remainder of the level which were allowed in the second Phase may be used in the third Phase. This reflects the need for as limit to encourage domestic action (to meet EU emissions and</p>	<p>There is a case for limiting the use of PBM credits by installations and companies within the EU ETS in order to stimulate domestic emission reductions. Any quantitative supplementarity limit must balance the cost</p>

<p>renewable objectives) and the potential for the limit in Phase II to exceed the level of reductions sought.</p>	<p>effectiveness of the scheme with the level of domestic action deemed necessary. Within this process there is a clear role for the Commission in ensuring that the complementarity limit established for each MS results in a net shortage of allowances (including PBM allowances) and thus stimulates that domestic action (section 5.2.5).</p>
<p>The amount of CDM credits may be increased in tandem with the level of emissions reductions sought (e.g. from 20% to 30% should an international agreement on emissions reduction be achieved). In either case the use of credits will be harmonised.</p>	<p>The movement to a lower cap (for example in response to the adoption of a lower EU emissions target) could allow a greater use of PBM allowances whilst preserving a degree of domestic action. However, if it were the intention that a tougher cap would be met by increased domestic action this would suggest no increased use of PBM allowances (section 5.2.6).</p>

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GLOSSARY OF TERMS

The list below contains a short description of some of the more significant terms used in this study. It is not intended to be a comprehensive listing of all technical terms, but provides clarity on issues where there may be scope for interpretation

Annex I country	Refers to countries listed in Annex I of the United Nations Framework Convention on Climate Change. It lists developed countries and those undergoing a transition to a market economy.
Auctioning	The process of distributing allowances for free in an auction format. There are many different types of auction.
Baseline and credit (B&C)	A baseline-and-credit scheme is one in which a baseline emission standard is set; the performance of each entity covered by the scheme is then assessed against this standard. Those performing less well will have to buy credits from those who are performing better than the baseline standard. In a baseline-and-credit scheme, emissions are not regulated directly (unlike in a cap-and-trade scheme), only relative emissions.
Benchmarking	The process of distributing allowances freely on the basis of a common formula applied to similar installations. Benchmarks could be output-, input- or capacity-based
Clean Development Mechanism (CDM)	An emission-reducing project implemented by an Annex I country in the territory of a non Annex I country. Established by the Kyoto Protocol
Grandfathering	The process of distributing allowances freely to each installation in proportion to its historic emissions. Note: it is also common to use the term <i>grandfathering</i> to refer to free allocation in general (grandfathered emissions rights), however, to avoid confusion with specific allocation options we have not used the term in this context.
Joint Implementation (JI)	An emission-reducing project or a project that enhances removals by sinks implemented by an Annex I country in the territory of another Annex I country. Established by the Kyoto Protocol
Project Based Mechanisms (PBMs)	Refers collectively to JI and CDM