Emissions trading: lessons learnt from the 1st phase of the EU ETS and prospects for the 2nd phase

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1. Introduction

In January 2005, the European Union launched an EU-wide emissions trading scheme (EU ETS) for CO_2 emissions. It covers approximately 45% of total CO_2 emissions and is thus the largest 'cap-and-trade' carbon trading scheme in the world – an ambitious and highly challenging policy experiment.[1] As it emerges from its pilot phase and prepares for phase II, the EU ETS now stands at a crossroad: will it quickly address the problems experienced in phase I and establish strong price signals in Europe, or will the prevailing uncertainty continue into phase II?

Phase I has indeed proved how much market design matters to its operation and signalling. Unlike normal markets, emissions trading schemes are designed markets, where the demand and supply are dependent on government decisions. The volume of allowance allocation determines scarcity levels and thus the ***effectiveness*** of the scheme. Furthermore, the various provisions in the allocation plans can influence investment and operational choices and thus the ***efficiency*** of the scheme. Decisions on auctioning and free allocation, as well as on how to split the allocation pie across sectors and installations, will also have ***distributional consequences***.

This special issue presents seven articles that consider the influence of allowance allocation, and inform the debate surrounding 'National allocation plans in the EU ETS: lessons and implications for phase II'. Five articles focus on recent experience with the design of national allocation plans (NAPs) for the period 2008–2012 and provide qualitative and quantitative assessments. These are complemented by two numerical simulations of trade and distributional effects. We summarize their findings in the context of the debate, which we structure into the three key criteria for ETS assessment: market efficiency; distributional effects, and environmental effectiveness.

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2. Allocation plans in relation to three key criteria

2.1. Is the EU ETS efficient?

Kemfert et al. (2006, this issue), using a general equilibrium multi-sector model, estimate significant efficiency gains from trading under the EU ETS in phase I compared with a situation without inter-sectoral or inter-regional trade. This gives net welfare gains in most countries, except for the Netherlands and Italy. They find that efficiency gains from inter-sectoral trading are greater than those from inter-regional trading.

This study assumes, as simplified economic models suggest (Montgomery, 1972), that the approach to allocation – either auctioning or free allocation – has no impact on cost-efficiency. Yet, as demonstrated by the phase I experience, certain design features of the ETS can in fact act to prevent the realization of the theoretical efficiency gains.

The 'updating' dilemma

This describes the perverse incentives created by the iterative approach to allocation – if allocation is 'updated' between trading periods and the level of an installation's future allowance is a function of today's emission levels. Thus, an installation that expects high future prices has an incentive to abate less today. Neuhoff et al. (2006a, this issue) show that most NAP-2s use the years 2004/2005 as part of their base period to decide on volume of allowances at the installation level. The NAPs have thus failed to address the early-action problem.

New entrant and closure rules

As analysed in detail by Åhman and Holmgren (2006, this issue), free distribution of allowances to new entrants coupled with the withdrawal of allocation from 'ceasing installations' creates further perverse incentives to keep inefficient plants in operation. This reduces the efficiency of the overall system. Yet Betz et al. (2006, this issue) find that there has been resistance to change in most Member States, and allocation rules for new installations have mainly remained unchanged in NAPs for phase II. Only slight amendments have been forced by the EU Commission, e.g. *ex-post* adjustments of load factors have been replaced with fixed standardized load factors.

We underline the seriousness of this pitfall together with allocation updating, as they affect investment decisions. Anecdotal evidence has shown that this has already had an adverse impact on both operational and investment behaviour, and hence dynamic efficiency is being compromised.

Price volatility and uncertainty

Price volatility has profound impacts on long-term investment risk and therefore also reduces dynamic efficiency. In addition, sharp price decreases lead to a loss in overall market value, which can reduce confidence in the market itself. EU allowance (EUA) prices are by their nature influenced by a number of factors (e.g. fuel prices, weather) as well as political decisions (e.g. international negotiation on future targets). Spot prices have been volatile since the beginning of the scheme; in extreme cases experiencing a price decline of over €10/EUA in the space of 2 days following the release of verified emissions data in April 2006. Forward and futures trading of EUAs is also active, enabling companies to manage at least short-term volatility.

To prevent such extreme price volatility in the future, greater transparency as well as more structured and regular information disclosure are necessary. More certainty beyond 2012 is also

needed for the EU ETS to drive long-term investment, including banking into post-2012 as well as setting a minimum price-floor in auctions (Hepburn et al., 2006).

2.2. Is the EU ETS distributionally fair?

Distributing allowances for free avoids directly increasing costs for firms. Advocates of this approach have claimed that giving all installations free allowances according to their need will, whilst maintaining efficient incentives in the emissions market, address ***distributional*** and ***competitiveness*** concerns of the covered sectors and prevent firms from increasing product prices.

Windfall profits

Phase I experience has proved such claims to be naïve and false. Power-sector players have indeed responded to CO_2 opportunity costs both by actively trading in the emissions market and adjusting pricing strategies. Empirical studies on Germany and the Netherlands show opportunity cost pass-through rates varying between 60% and 100% for the wholesale electricity market (Sijm et al., 2006). The windfall profits are financed from the pockets of electricity consumers (both domestic and industrial) who are not compensated by the scheme. Whilst there are genuine cases of competitiveness concerns in cases of high trade exposure and very price-sensitive demand, in aggregate, most sectors, including cement, iron and steel, refining, and pulp and paper, have the potential to profit from free allocation on aggregate sector levels, by adjusting output and pricing (Smale et al., 2006).

To complement Sijm's earlier analysis of selected EU countries, Palmer et al. (2006, this issue) use a power-sector model for the north-east of the USA to assess the amount of free allocation needed to compensate the electricity sector for the costs associated with the implementation of the US RGGI scheme. Looking at the electricity sector as a whole, 100% auctioning would not reduce profitability. The share of auctioning declines if the objective is to maintain profitability of individual power producers or individual power stations. The article discusses possible metrics that are both sufficiently objective as a basis for governments' allocation decisions and sufficiently differentiated to effectively target free allocation as a compensation for expected costs.

However, only four Member States included auctioning in phase I. For phase II, most Member States seem to acknowledge distributional aspects, but seek to address them through reduced free allowance allocation mainly to the power sector, where cost pass-through has been readily demonstrated. The draft plans propose a very limited extension of auctioning – an issue discussed further below.

Sectoral burden-sharing

An additional distributional aspect concerns the level of burden-sharing across sectors. As stated earlier, the EU ETS covers 45% of CO_2 emissions in the EU. However, when taking the reduction potential and abatement costs into account, in aggregate, EU ETS sectors have been let off easily in terms of sharing the burden of Kyoto targets relative to non-covered sectors. As shown in Figure 1 and described by Betz et al. (2006, this issue), the burdens applied to the non-covered sectors are – apart from the UK – disproportionately higher. Consequently, while many EU ETS-covered firms enjoy a significant increase in their profitability induced by free allocation, non-covered sectors or government treasuries, through purchase of Kyoto credits, must pick up the slack in order to reach their Kyoto targets.

2.3. Is the EU ETS environmentally effective?

Evaluation of the scheme's effectiveness both *ex ante* and *ex post* is not a simple task. This is not least because of trade-offs in criteria of assessment, e.g. between market efficiency and lack of political assertiveness, and that there are no firm agreements on how to draw the distinction between over-allocation and real abatement (Ellerman and Buchner, 2006).[2]

Phase I ET budget

The official data on verified emissions for 2005 revealed that the volume of EUAs allocated exceeded real emissions by around 100 million (Kettner et al., 2007).[3] How can this be explained?

A scrutiny by Rogge et al. (2006) reveals that phase I allocation was severely constrained by ***technical and time constraints***, which further complicate the application of an 'effectiveness' criteria for its assessment. For example, there are a number of technical issues which increase the probability that over-allocation may have occurred in the first phase, some of which are due to the enormous time pressure to develop the scheme:

1. Existing sector definitions for data collection (e.g. energy balances or national inventory reports) that create noise when using a top-down approach to determine emissions of the covered installations;
2. Interpretations regarding installation coverage of the EU ETS Directive – especially regarding installations such as combustion processes involving crackers in the chemical industry or furnaces in integrated steelworks;
3. Monitoring methodologies applied to gathering historic data prior to 2005;
4. Emissions verification requirements by Member States and other measures to prevent companies from overstating their historic emissions.

Because of these problems, the uncertainties in the base data were significant compared to the size of the (generally small) cutbacks targeted by the Member States. Thus, even those Member States which aimed to reduce emissions with respect to their past emissions had difficulties in doing so. In many cases, the total ET budget was in fact determined before more detailed information on the above had been gathered.

Furthermore, most Member States based the size of their ET budget on a reduction compared to ***emission trajectories***. In these cases, the uncertainties outlined above were compounded by often over-optimistic economic or sector growth rates. This is a common problem for projections of any sort, since governments and the business sector like to believe in strong economic growth. Thus, aiming for only marginal reductions against inflated projections is likely to result in over-allocation (Grubb and Neuhoff, 2006; Grubb and Ferrario, this issue).

Compared with phase I, in phase II the availability of verified and more accurate data as well as specific guidelines on installation coverage, in theory facilitate better targeting of ETS budgets by Member States. However, the debate about the use of projections to measure emission reductions is far from over. It is crucial that their underlying assumptions are assessed carefully and that they are compared to historic trends – as analysed for the EU total by Neuhoff et al. (2006b, this issue).

3. Strengthening phase II and beyond

Whether phase II is effective will depend upon both its design and the overall cap, as considered below.

3.1. The phase II EU ETS budget

Uncertainty over the environmental effectiveness of phase I puts a spotlight on the parallel question – will the EU ETS deliver credible emissions reductions in phase II? In 2006, considerable analyses have been conducted to first inform and then assess the proposed phase-II national allocation plans in the light of emerging evidence and lessons from phase I. Presented in this Special Issue are the key results emerging during this period. The conclusion on which opinions probably most firmly converged, however, is not a positive one – the NAP-2s first submitted to the Commission demonstrated little evidence of learning during the pilot phase of the scheme, undermining hopes for improvement in the ***effectiveness*** of the EU ETS in cutting GHG emissions.

Articles in this issue compare the original NAPs submitted to the EU Commission by Member States against the EU ETS Directive's own assessment criteria:

1. The total quantity of allowances to be allocated shall not be more than is likely to be needed
2. The allocation needs to be in line to reach the Kyoto target
3. Reduction potential of installations should be taken into consideration when setting the cap
4. Use of Kyoto Mechanisms should be supplementary to domestic action.

Although many Member States are using higher quality 2005 data to determine the ETS budget (Neuhoff et al., 2006a, this issue), most submitted NAPs demonstrated little commitment to substantial emissions reductions in the EU ETS sectors. Figure 1 compares allocation volumes proposed under 12 NAPs, relative to reductions required to meet Kyoto targets domestically. The diagonal line indicates the 'proportional share line', i.e. if the emission reductions for covered sectors were proportional to those of non-covered sectors required to meet the Kyoto targets.

Figure 1 shows that out of the Member States assessed, only the UK's allocation is in accordance with criteria 1 and 2. Poland and France, whilst on track for meeting their Kyoto targets, proposed over-allocation to their ET sectors, thus violating criterion 1. The plans submitted by Austria, Germany and proposed in draft by Italy, the Netherlands and Spain meet neither criterion.

Betz et al. (2006, this issue) estimate that phase II ET budgets for the 18 NAPS assessed are only 3% below the budgets in phase I (2005–2007). They also reveal a dichotomy between new and old Member States, to the extent that the envisaged reductions by EU-15 are almost over-compensated by the generous allocations by the 10 new members.

The large volume of emission credits emerging from JI and CDM could amplify these problems if NAPs do not implement viable constraints on their use. Betz et al. (2006, this issue) conclude that the potential volume of imports could mean that there would be no need for domestic reductions at all, although substantial differences exist across Member States; thus the supplementarity criterion (criterion 4) would be violated by the EU ETS sector in aggregate. As stated above, this increases the burden share for non-covered sectors or government treasuries in meeting Kyoto targets. By comparing NAPs with emissions projections derived from detailed electricity model analysis and taking account of inflows from JI and CDM markets, Neuhoff et al. (2006b, this issue) similarly conclude that proposed allocation volumes would be incompatible with sustaining EUA prices in the EU ETS.

3.2. Addressing efficiency and distributional issues through auctions

As indicated, several of the articles note that the very high level of free allocation creates a multitude of both incentive and distributional problems. Greater use of auctioning could alleviate several of

these problems, and help to establish more cost-reflective prices than was evident in phase I, thereby improving price stability. Auctioning can also be seen as fundamentally implementing the 'polluter pays' principle, and it also raises revenue for governments which could be recycled creatively, for example to ease the distributional inequalities or to help fund low-carbon investments (Grubb and Neuhoff, 2006; Palmer et al., 2006, this issue).

None of proposed allocation plans fully used the option to auction up to 10% of issued allowances, even though this is far below the levels found in the Palmer et al. (2006, this issue) analysis, and indeed the *minimum* 25% proposed for the RGGI scheme. However, the Commission decision on assessment of the first 10 NAP-2s left this open – it allows each Member State to increase the share of auctioning after the Commission's assessment and prior to the finalization of the allocation process at national level (CEC, 2006).

Politically, it may not be easy for Member States to introduce significant auctioning whilst also cutting back on their initially proposed total volumes; but there are strong grounds for doing so. Recent discussions suggest that at least some major Member States may use this flexibility around auctioning. This also raises the possibility of sufficient auction volumes to enable a coordinated minimum auction reserve price in phase II, which could bring big benefits in terms of increased price security (Hepburn et al., 2006).

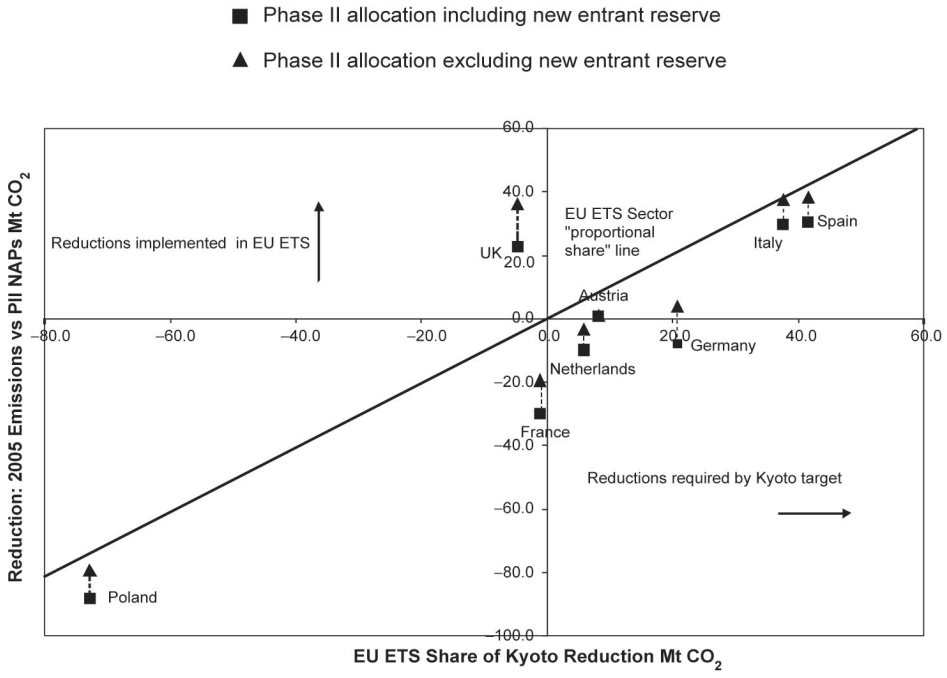

Figure 1. Comparison of proposed phase II EU ETS national allocation plants (NAPs) with estimated cutbacks required for Kyoto compliance. Note that some of the NAPs have been assessed by the Commission (end November 2006) but other NAPs were still drafts (Italy, Austria) and not officially submitted.
Source: Carbon Trust (2006) and ENTEC, with minor adaptations. (Carbon Trust, 2006).

Beyond phase II, auctioning well above 10% could be considered, and may ironically offer more effective ways than extensive free allocation to address competitiveness and leakage aspects (Demailly and Quirion, 2006) – critical issues that will need to be considered in the EU ETS review.

4. So where do we now stand?

Following the EUA price crash in May 2006, the EU Commission has come under intense pressure to restore credibility of the scheme through their review of phase II NAPs and to demonstrate that cap-and-trade schemes can deliver real environmental benefits.

The EU Commission's announcement of their decision on the first set of 10 NAPs assessed (Germany, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta, Slovakia, Sweden and the UK) did not shirk this challenge. Following a rigorous assessment,[4] the Commission asked all those Member States – except the UK – to reduce their proposed total allocation volume. The required reductions varied, but amounted to almost 7% in aggregate (including the UK) relative to the proposed allocation volume for phase II, and to their 2005 emissions. As shown in the Epilogue of Betz et al. (2006, this issue), this will lead to substantial cuts in the ET budget, especially for the new Member States. In addition, the Commission has introduced a quantitative supplementarity provision which protects the EU ETS from excessive inflows of Kyoto units should their international market price drop, e.g. with changing demands of other regions.[5]

In publishing its Communication (CEC, 2006), the Commission has indicated its intention to move away from the more qualitative guidelines in Annex 3 of the EU ETS Directive to a more rigorous quantitative process. This move is a bold step towards a harmonized allocation at the macro level. NAPs are evaluated with regard to the newly introduced transparent and objective approval process using the same formulas, and most prominently, a uniform method for calculating each Member State's ET budget has been set. Thus, the harmonization of allocation advocated by del Rio Gonzáles (2006, this issue) has started already, although so far it is more on the macro than the micro level. However, whether Member States will accept the decisions by the Commission – especially by new Member States, since they are on track to meet their Kyoto targets but still need to cut back their allocation substantially – remains to be seen.

Getting the design right is not only a significant issue for the EU ETS but for emissions trading in general. It is highly likely that other national schemes will be linked to the EU ETS in the future and will be influenced by it. Thus, the EU ETS has the opportunity of contributing to the emergence of an efficient and effective global trading. Conversely, an inefficient and ineffective EU scheme would set a dangerous international precedent.

Therefore it is very important that the European Commission rigorously evaluates the proposed second-phase NAPs and that both Member States and the EU Commission work together to solve the more fundamental design issues – such as a higher proportion of auctioning or the rules for new entrants and closure – in the long run. Only by drawing on the lessons learned can emissions trading in Europe develop to realize its full potential.

Notes

1 Recently, proposals for similar schemes have followed in other countries and States, e.g. Norway, and the north-eastern US states known as the Regional Greenhouse Gas Initiative (RGGI).

2 Ellerman and Buchner (2006) point out that a long position of the market *per se* does not provide evidence of over-allocation, as installation that undertook abatement in order to sell allowances also appear in the 'excess' data. In addition, it has been argued that equal distribution of the total allocation over the 3-year trading period has resulted in a surplus of allowances in the first year of the trading phase. This may be true for new Member States if ongoing growth was assumed during allocation, in which case there may be a deficit of allowances towards the end of the 3-year period.

3 To the author's knowledge, this comprehensive study by Kettner et al. (2007) uses the most recent and detailed database. Their figures on excess volume fall in the range quoted publicly, e.g. 80 million tons (Ellerman and Buchner, 2006) and 200 million tons (CEC 2006). However, the figures do not include the allowances that will enter the phase I market via new entrants allocation out of reserves and auctioned directly by a few MS.

4 According to the Communication published in November 2006 (CEC, 2006), a much more consistent, transparent and objective approval process was launched for NAP-2s compared with NAP-1s, based on the following process. (1) Each MS cap is assessed using a generic formula based on verified 2005 data, growth factors and reduction potential estimates, ensuring that criteria 2 and 3 are fulfilled. The factors are all derived from the same source, thus trying to counteract exaggeration of the emissions budget driven by national self-interest. (2) At least a 'fair' proportion of the 'remaining effort' (2004 GHGs compared with the Kyoto target) should be borne by the sectors covered by the ETS. (3) The substantiation of expected government purchase of Kyoto units, reliance on other policies and measures, as well as the projections of the transport sector's CO_2 emissions, are separately assessed. If those are not acceptable, the 'remaining effort' will be increased.

5 Supplementarity is assessed taking government and private-sector use of Kyoto mechanisms into account, based on three different formulas used to calculate the 'effort', where the formula that results in the greatest effort is selected. A maximum of half of that amount can be met by the government and private sector using Kyoto mechanisms. Where the government intends to meet more than 40% of its 'effort' using Kyoto mechanisms, the private sector can still use up to a maximum of 10% (CEC, 2006). The three formulas are:

   A = base year emissions – emissions allowed under Kyoto target
   B = greenhouse gas emissions in 2004 – emissions allowed under Kyoto target
   C = projected emissions in 2010 – emissions allowed under Kyoto target

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