

Last e-JIQ (August) analysed the architecture of, and experience with, the EU Emissions Trading Scheme thus far based on a discussion between Prof Catrinus J. Jepma - JIQ Chief Editor - and Dr Jos Delbeke - Director for Climate Change and Air in EC's DG Environment. This e-JIQ issue keeps the discussion alive with a reaction from Dr Erik Haites - President of Margaree Consultants. His argument is included from page 7 onwards to which Prof Jepma responds.

Some EU ETS 'tags'

We are now about halfway the 2005-07 EU ETS 'test phase'. Moreover, at the time of writing (11 August 2006) most of the EU Member States have now published their proposals for the National Allocation Plans (NAPs) for the second phase 2008-12 of the EU ETS. Although some of these have been formally notified to the European Commission (EC), most NAP proposals still have the status of a draft for public consultation (of all EU countries, only Estonia actually managed to reach the EC's 30 June deadline). It thus seems a good moment to make a first assessment of the EU ETS. Has it met the expectations, or have we seen a number of unexpected difficulties?

The picture is mixed. Let us see what the main issues have been so far, and what their underlying reasons may have been. In this note six issues come to the fore, some of which are linked to the system's architecture and which thus could to some extent have been anticipated. Other issues, however, could not have been foreseen.

A first, not unexpected 'issue' was that allowance prices have not provided a clear incentive for investors. A general uncertainty for investors is that the cycle of political decision-making with respect to the allocation of allowances is much shorter than the lifetime of many of the energy sector investments affected by such decisions. Allocations have been made for 3 years during the 2005-07 test phase, and will be made for 5 years for the next phase. No one even knows whether the system will continue after 2012.¹

In contrast, investment decisions about *e.g.*, massive power plants, renewable-based power production or new technology are generally made with a much longer time horizon in mind: some decades at least. If the ETS was meant to provide guidance to investors as to how, where, and to what extent to redirect their finance towards cleaner technology, the allowance prices proved thus far a very poor indicator.

In fact, as we have seen last spring when allowance prices dropped within three weeks from over €31 to below €9/tCO₂, the ETS-based incentives seem so unpredictable that it is no surprise that many investors complain about allowance



Catrinus J. Jepma



Jos Delbeke

JD: The Directive does not contain a sunset clause and the EU ETS will therefore continue.

CJ: Yes, but political commitment, rather than legal clauses, determines how long systems will last.

JD: This is not a default of the instrument, or any other alternative instrument, but rather a fact of life due to the absence of targets agreed across the world beyond 2012.

CJ: The fact is, however, that allowance prices are inherently more volatile (and probably less predictable) than the most obvious alternative instrument, i.e. carbon taxes where tax rates can be fixed just as much as the policy-maker wants. So, there are alternatives with less volatility.

¹ A PwC survey based on responses from 116 senior executives from about 100 utilities in over 40 countries revealed that 16 per cent expect both the EU ETS and KP to collapse after 2012.

price volatility. It could be that allowance prices will become more stable and, although that is definitely not the same, more predictable as the system matures, but that is far from certain.

Periodic, politically driven adjustments in allocations, sudden news about emissions of major players in the ETS, or volatility on the linked CDM market (and JI market from 2008 onwards) may keep the allowance prices trend fairly unpredictable, also on the long run.

The above leads to the question whether those who in the past preferred a gradually increasing carbon tax system over a cap-and-trade system did not have a point in that taxes may provide a much more consistent incentive for investors than inherently volatile credit prices, and whether such a tax would eventually be a better stimulus towards modern clean technology.²

There is no easy solution to increase the predictability of the allowance price trend, unless of course the authorities would make clear statements that they will try to steer the allocations in such a way that allowance prices will stabilise at a certain long-term level. The latter, however, is inconsistent with the cap-and-trade concept and with the duration of the political cycle, and therefore probably impossible to achieve. The recent call made by RWE npower CEO, Andy Duff, to establish a 15-year phase III EU ETS allocation period, and for banking and borrowing by others, should therefore be taken seriously, even if this would neither guarantee EUA market stability, nor a clear credit price trend.³

A second 'issue' was the price volatility itself. Even hard-nosed traders in the credit market had to admit that the sudden price drop of last April had taken them by surprise [I remember a discussion that I had with one of them in March of this year when I warned that person that allowance prices would become much lower than the about €30/tCO₂ market price of that moment. He replied that prices would certainly go much higher! To my malicious delight, I realised somewhat later that not listening to me had cost him a lot of money]. In fact, when the allowance price collapsed, a number of market parties panicked, because they realised that if the allowance price would drop to zero in the next stage of the test phase, which still is quite possible, this would not only imply losses for those holding surplus allowances (long positions), but also for the (still small number of) traders since there would no longer be any trade at all (instead of the about 80-90 Mt average monthly trade seen in the first half of 2006). When we assume that traders can easily capture a 1% margin on average and that the average EUA price amounts to €20, while disregarding any other margins, traders could easily have an income loss of at least about €190 million/year!

The reason why prices collapsed was supposedly that a number of days before the 15 May deadline, several countries (including big ones such as Germany and Italy) unexpectedly (and accidentally?) and to the surprise of the then bullish market announced that their

JD: Other successful trading schemes have shown similar early volatility and prices have become more steady over time.

CJ: On this I tend to disagree. The most important other ETS for instance, the US SO₂ Emissions Trading Scheme, started in 1995. In 2004, the tenth year of its existence, prices went up from a \$200/t level in January to over \$1,500/t in December of that year. Since then, we have seen a period with substantially increased price volatility, compared to the earlier period. Also because financial players have taken control of a large share of the allowances, future trends are impossible to predict. What has improved are the possibilities to hedge against future price risks.

JD: It is important to note in this respect that it was agreed up-front to have periodic allocations and that the first emissions data collected and verified at the national and plant level, should be taken into account for the decision about caps in the next period. The EC has strongly recommended in its second allocation guidance for Member States not to base allocations on first period data. Moreover, the allowance price will always show some volatility as it reacts to fundamentals: the weather, oil and gas prices, CDM supply, etc. And this is in fact necessary to hit a quantity constraint. If you work with a tax, you know the price tag, but not the environmental outcome, which is in the end also a product of changing fundamentals.

CJ: Yes, it is true that the environmental outcome of a tax is uncertain, but, from the perspective of investors, the incentive is much more stable and predictable. My point is that in the end the latter may be more effective for the environmental result than a scheme that sets the environmental target upfront.

JD: Do you see political acceptability for a gradually increasing carbon tax? Don't you think that the emergence of a carbon price, even while volatile, has really made people in the boardrooms across the continent give carbon a thought when making investment decisions, despite the uncertain future?

CJ: We have lived with a host of taxes for centuries now. Why wouldn't we be able to live with a tax on carbon emissions? Instead, 'emissions trading' is a relatively new concept with which we have little experience. Why would the existence of carbon credit prices make investors more aware of the need to take mitigation into account than the existence of a tax?

JD: Some people advocate price caps, others advocate a minimum price. Fact is that what the EU ETS is designed to do is to create competition among carbon abatement technologies so that the most efficient technology makes it in the market. Isn't it that some people, advocating a minimum long-term price, want to make sure that their technology is commercially viable in a carbon constrained world, i.e. not too expensive.

CJ: I am not advocating a minimum price but I believe that some guidance to investors regarding the likely future price range would be very helpful in their active search for new, cleaner technologies. I believe that without any clear idea about the allowance price trend, many investors will postpone such desirable clean investments and prefer to take a wait-and-see attitude. That would be detrimental to the final target: mitigation through altered investment patterns.

2 A poll conducted in January 2006 (<http://www.montelpowernews.com>), based on responses from 300 individuals in the energy industry, revealed that some 60 per cent did not believe the EU ETS to be the most cost-effective way to mitigate CO₂ emissions.

3 See Carbon Finance (2006), Vol. 3, Issue 4, p. 7.

actual 2005 emissions were much lower than the allocated amounts. Moreover, as the market expected that other countries would provide similar news, prices collapsed and virtually wiped over €40 billion off the EU ETS market value. In the slight panic that followed, countries were asked by the EC to postpone the release of their 2005 data (taking for granted the risk of leaking inside information). By 15 May, 21 Member States (representing 88% of allocated allowances) had released the 2005 emission data of their installations, and, as a group, turned out to be 62.8 Mt (or about 3.4%) long. Clearly, there was no co-ordination of the release of emissions data, and this needs to be improved. An efficient market needs timely, public and reliable information, not rumours or leaks.

In the meantime, we may wonder whether further allowance price shocks will follow. For instance, there will be a similar announcement of the 2006 emissions next year.

Moreover, a wave of CERs may enter the EUA market at short notice, so that, if CER-EUA arbitrage is really going to work well and no sudden restrictions on CER use will be imposed⁴, prices could easily fall below the present level of around €16/tCO₂.

Moreover, some large-scale energy consuming industry activity could suddenly move through a shifting import-export balance, etc., although this is probably not going to happen overnight. Such factors are not easy to model, so that even traders using advanced modelling tools may still be taken by surprise. A separate but related factor is the precision of the relevant data itself. For instance, consider the following remark by Konstantin Lenz, analyst at Markedskraft in Carbon Special edition of 10 May 2006, p. 6:

“People involved in the verification process have told me that there is an error margin of up to 10 per cent in the measurement of emissions; this is huge given that other important drivers in the power market, such as weather or wind factors, can normally change the level of emissions by only 2 or 3 per cent. For those involved in the verification process to say ‘Sorry. Our system is not well developed’ is just not good enough for a multi-billion euro market.”

A third point that I would like to mention is that the system has been implemented by the Member States in such a manner that very little banking opportunities exist between the first and the second allocation period. This explains the significant, albeit clearly diminishing⁵, difference between the level of the EUA spot prices and the corresponding forward price levels for 2008. Consequently, due to the absence of banking, 31 December 2007 is doomsday⁶: if you have not complied by then, you have to buy your missing allowances later against an unknown price and pay a €40/tCO₂ penalty in addition. As few installations want to run the

JD: Why should there be? Emissions don't change dramatically from year to year.

CJ: You have a point here; we now may have a better feeling of what next year's emissions will be as we have learned from the 2005 data. Let's wait and see.

JD: This will, however, not happen overnight and create price shocks as it takes quite some lead-time to generate CERs.

CJ: True, but the present CDM pipeline suggests massive additional supply of CERs during the next few years that could have a substantial EUA market impact.

JD: Up to 10% does not mean that the average uncertainty is 10%. The monitoring and reporting rules have already been revised for the second trading period to improve the accuracy and make them tighter. One needs to start somewhere (and then improve).

CJ: Overseeing all such market turbulence, I cannot help but think of the calm and peaceful world a system of carbon/energy taxation would have provided. Maybe somewhat more dull, but isn't life exciting enough without credit prices bumping up and down?

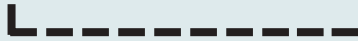
JD: If the political challenge of agreeing a carbon tax can be overcome, yes, I might agree. Furthermore, the uncertainty range of monitoring and reporting emissions for a carbon tax are not different than for a trading regime.

4 There may be a trend towards such restriction in NAP II. Germany, for instance, has proposed a 12 per cent ceiling per installation for the use of CDM and JI credits for NAP II, and other countries also consider restrictions of various kinds (e.g., the Netherlands has set an 8% limit to JI/CDM credits for Dutch EU ETS installations).

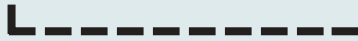
5 The present price difference is just a few euros but has been substantially larger before.

6 Final data on 2007 are due before 1 May 2008; if you like, you may consider that date doomsday.

risk of facing such a situation, the market will probably clear when we approach the end of 2007. Since supply and demand elasticities will by that time probably be rather small, balancing either net short, or net long positions can easily lead to huge price swings, especially if traders start gaming (i.e. give the impression that the market is short by 'hiding' stored reserves).



Luckily, at least some banking can take place though, partly indirectly, because CERs can be carried over, and partly directly because apparently France and Poland have designed their system in such a manner that banking of unused EUAs is possible for them (why has it been left to the discretion of individual Member States whether or not to allow intra-phase banking, so that strange asymmetries in the EU-system could appear?). This may help in mitigating the risk of price shocks between the EU ETS first and second phase, but the final impact of such banking options is impossible to predict. What remains to worry about though is that while some banking seems possible, borrowing is impossible. This asymmetry may be beneficial for traders who want to try to benefit from gaming by the end of the first phase. For instance, if allowance prices become very low at the end of the first phase, CERs or French/Polish EUAs can be kept out of the market (to be used in the second stage) to drive the prices up. However, if allowance prices become very high, no EUAs can be borrowed from phase II in order to increase phase-I supply and reduce the allowance prices.⁷



JD: De facto, in case there would be scarcity in phase I, which seems rather unlikely against 2005 emissions data, the maximum price for a phase I allowance will be the price for a phase II allowance plus €40. Furthermore, banking is a good design feature and was made mandatory in the Directive from phase II onwards, but from phase I to II and in view of the learning character of the first period, I believe Member States have made a good choice. If phase I has no scarcity, a banking provision would have allowed all the phase I surplus to be carried forward to phase II.

CJ: Just a thought - would similar market gaming be possible in a world with tax schemes? I don't think so.

A fourth issue is the role of CERs in the system through the Linking Directive. This is obviously related to the success of the CDM. For a long time, there has been uncertainty about the CDM perspective (for some criticism, see a number of my earlier editorials), mainly because of the odd introduction in the past of the project additionality criterion and subsequent overly strict interpretation of that concept by the CDM Meth Panel/ EB. However, heavy criticism on this may have helped to move to the present, much more realistic and positive approach on this issue, so that in the second half of 2005 the CDM-sun started to shine and now a wave of CERs is expected to enter the market during this and the following years (for some figures, see my editorial in *JIQ* Vol. 11, No. 4 and Jane Ellis' contribution to *JIQ* Vol. 12, No. 2, pp.1-2).

However, let us not be overly optimistic about the EB's move towards greater realism, because in the meantime a new obstacle in the CDM process has appeared, namely the so-called Registration and Issuance Team (RIT), which plays a dubious role. This Team recently indicated that it wanted to review about half of the CDM project-based requests for registration. This could mark another obstacle to a swift and healthy start of a CDM market. One could wonder whether the RIT is playing the role it should, because the CDM projects that enter the registration phase, but which are withheld from registration by the RIT, have already been approved by professionally trained and *accredited* validators. It seems a bit odd that in a later stage persons who have not been professionally trained for verification, and who have neither been accredited for such tasks, would feel in a position to in fact dismiss earlier professional assessments. Still, that is what the RIT effectively is doing.

⁷ Except, of course, for the option not to comply and pay the penalty, but that is most likely theory.

Anyhow, CERs are entering the market at a hopefully rapidly increasing scale, thereby pushing down EUA prices. What has become clear in the meantime, is that there is no one single CER market value, because some CERs carry different risks: *e.g.*, failure of the underlying project, *etc.* However, the market is developing several hedging facilities to cover these risks, so that risk seems to become a less important obstacle for CERs to enter the EUA market, even in the short run. So, CERs traded in the secondary market, which are good for EU ETS compliance, do have uniform prices.

What does pose some risk, in the short run though, is whether the so-called International Transaction Log (ITL) will be available on time. The ITL is a computerised system under the Kyoto Protocol that records the issuance, transfer and cancellation of several carbon units, including the transfer of CERs from the CDM to National Registries of Kyoto Protocol Parties. Without the ITL operational, it is difficult, if not impossible to introduce CERs in the EUA market. That software development paralyses the market functioning is not something one would expect in the ICT-driven world of today, but yet it seems to happen. UNFCCC officials recently confirmed that the system will work well by spring 2007⁸ although this does not guarantee that market players are completely convinced.⁹

The introduction and proper functioning of this system could have a clear downward price impact on the EUA market. Remember that the projects registered by the end of July 2006 represent a total amount of CERs of 10.8 mln (of the 16.3 mln that had entered the issuance cycle), but that, given the number of projects in the Registration and Validation cycle, this number can theoretically grow to 85 mln by the end of this year and to 230 mln by the end of next year. Of course, not all CERs will enter the EUA market, but if arbitrage starts working well (CER prices are still below EUA prices) and, say, half of this volume would enter the EU market, prices could drop easily. This is the more likely as, at such volumes, EUA prices will then be driven by CER-based marginal costs, rather than the reverse, which is what we seem to have had until now.

A fifth 'issue' is transaction costs. For instance, it turned out not to be so easy to team up all member states in the EU-wide system of registries as was anticipated. By the end of April 2006, five Member States still have not opened their registry where companies can access their credits. This is a serious issue, because without such a link, emissions of these countries' companies cannot be checked, and these companies cannot fully participate in emissions trading either. This explains why the EC announced last spring legal warnings against Member States that violate EU climate change legislation.

This issue is related to the wider issue of the EU ETS transaction costs. Such costs are enormous, because all of the approximately

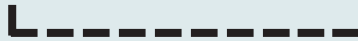
JD: While the ITL issue is important, it's a one-off issue, i.e. once it's up and running, nobody will ever worry about it again.

CJ: Another thought - all such unpredictable institutional developments may substantially alter credit price levels, and make many people very nervous. Do you also start dreaming of a tax-based system with slowly and predictably changing tax rates?

8 On 15 August 2006, the UNFCCC has announced that it awarded the multi-million dollar contract to build the ITL. According to the UNFCCC, the infrastructure is scheduled to become fully operation by April 2007 (<http://unfccc.int>).

9 Seb Walhain of Fortis Bank in an interview with 'Environmental Finance', May 2006, pp. 21-23, for instance: "[the ITL] will definitely be up and running in Phase II. But for the first Phase, you can't be 100% sure." Moreover, market participants are not convinced that CERs can enter the ETS without the ITL. Also there is a fear in the market that if companies have already paid for CERs, but the ITL is not up and running, then they may need yet to buy EUAs to achieve compliance. All such fussy information makes one wonder who is playing what information games.

12,000 installations that are now covered by the scheme¹⁰ have to be monitored to check their actual emissions. This requires a lot of new measurement devices, protocols, experts, etc., especially since the May emissions vs. allowances data that caused all that market turbulence have shown that installations have been fairly successful in gaming, *i.e.* strategically overestimating their own past emissions to raise the allowances allocated to them. Officials with verification companies repeatedly have indicated that the installations were 'surprised' by the amount of work necessary to comply with the EU ETS verification and reporting requirements. Moreover, many installations had trouble with properly understanding these requirements: in many cases the corporate people passed the message through to site-level staff, whose level of education turned out to be insufficient. In other cases, companies had installed all correct measuring equipment but did not verify their correct calibration, etc.¹¹



All this raises the question whether at some point the number of installations should not be reduced instead of expanded, as seems to be the policy trend. A small number of really big emitters are responsible for the bulk of CO₂ emissions now covered by the scheme. Why not restrict the scheme to just a few thousand installations and leave them with the task to internalise the CO₂ emission externalities? This would not only substantially reduce overall transaction costs, but, assuming all major energy producers would be covered by the scheme, these players together would also perfectly be capable to pass on the carbon penalty onto the various energy users who could then be left out of the EU ETS allowances straightjacket.

This could also, at least partly, address a sixth 'issue' of the scheme, *i.e.* the 'rent' created by the scheme that moreover seems to accrue unequally to the system players. To illustrate this point, let us look at the concept. Ideally the scheme would work in such a way that the intermediate players, *e.g.*, power producers, would be able to lift the energy price with the credit price, and then, to the extent that they will be able to capture a rent, channel back that rent to the government.

If the government would decide to use that revenue for further environmental measures, a double dividend could be achieved: the end users would have an incentive to use less energy, thereby contributing to emission reduction, whereas the government would get additional resources to support further mitigation measures.

In reality, however, there is evidence that the EU ETS does not work like that. Because allowances are grandfathered, and most installations seem to succeed in passing on allowance prices onto end users without being charged accordingly, they eventually capture windfall profits. Especially utilities, which face little international competition anyhow, are alleged to capture such profits from the system.¹² Obviously, the size of the windfall profit depends on the additional costs that utilities incur in order to comply with the system, but the net result so far has been clearly positive. The industrial installations in the EU ETS will obviously pay more for their energy consumption, but may be able to pass

CJ: Isn't just filling in your tax scheme not only much simpler, but also much less costly, especially if energy rather than carbon is the tax base?

JD: It's true that it takes an effort to build up the EU ETS infrastructure (monitoring, registries etc.), but we have done that now. Next to that, monitoring does not come free of charge under a tax either, if you do it seriously. Finally, I expect that there will be falling costs and prices for monitoring, as more competitors offer services and people get better in doing things.

10 A number which will substantially grow in the second stage, *e.g.*, if unlike the present phase, *all* combustion installations above a capacity threshold of 20 MW, and possibly aviation, are going to be included in the scheme.

11 Platts, Emissions Daily (2006), May 12, pp. 3-4.

12 In Germany, for instance, the Federal cartel office even investigated whether the four incumbent utilities have abused their market position by passing on emissions allowances costs directly to consumers.

the extra costs on to their customers. Because a large number of industrial installations seem to have surplus allowances that they can sell to utilities, they may eventually benefit as well, although this will of course differ from one installation to the other.

This model suggests that the group that eventually pays for the rent captured by the collective installations or, in any case, captured by the collective utilities, is the group of the final end users, or consumers, who eventually pay the bill for the net windfall gain. It would be very interesting to see a final welfare analysis of the EU ETS as it has developed so far, but, given the loose information, it is very well feasible that eventually the scheme leads to a fairly massive transfer of resources from the energy end-users to the energy producers (and energy traders). If that were true, one cannot avoid the question if such an outcome could just as easily have resulted from a CO₂ taxing scheme, whereby the emitters are taxed and could make sure that they can level off such a tax onto end users.

JD: It is not altogether clear to what extent the EU ETS has pushed up power prices or whether this was due to oil and gas price increases. Furthermore, some of the rent, expressed in higher utility profits, is returned to the public by way of corporate taxes, a factor to take into account in a welfare analysis, too.

In short, the EU ETS is up and running, which makes many people happy. But many aspects still need further improvement.

CJ: A final thought - many of the above tags could be prevented by a tax.

Catrinus J. Jepma
Chief editor

Reaction by Dr Erik Haites

Dear Catrinus,

I found the review of the EU ETS in the August e-JIQ disappointing. The review purported to assess the performance of the EU ETS, a CO₂ emissions trading scheme (ETS) that has been operational for about 18 months. Many of the comments state or imply that a carbon tax would be preferable. An ETS, rather than a carbon tax, had sufficient political support to be implemented. Under those circumstances implying that a carbon tax would be better is fair only if you demonstrate that the ETS is working so poorly that it needs to be replaced. While your review indicates that the ETS can be improved, I don't think it demonstrated that it needs to be replaced.

Most economists agree that for the same emissions sources a carbon tax and an ETS are similar except that the emission reductions achieved by the tax are uncertain while the cost (market price) of the reductions achieved by the trading scheme is uncertain. Either a tax or a trading scheme could be implemented for the carbon content of fossil fuels at the point they enter the economy. The political choice was a trading scheme for CO₂ emissions by large sources. A fair comparison with a carbon tax would involve a tax on emissions by large sources. Such a tax would need to be implemented as an EU tax with distribution of the revenue or as a harmonised tax implemented by each member state. To ensure that each large source pays the correct tax, its emissions would need to be monitored and

verified. Those requirements would be virtually identical to the monitoring and verification requirements of the ETS.

One criticism of the ETS is that the national caps for Phase I are not very stringent. I think that is a fair comment. But I am not convinced that a carbon tax would have been more stringent. With a carbon tax industry would have lobbied the member state governments for exemptions, lower rates, reductions to other taxes (such as corporate income taxes or VAT on fuels), or other changes such as increased depreciation allowances. The carbon taxes in Denmark and Norway involved different rates for different types of sources for example. The result would be a lower effective rate for the carbon tax - a less stringent target.

With a trading scheme a relatively lax cap becomes evident to the public in the form of a bank of allowances and relatively low prices. The cap can be made more stringent and the bank can be reduced. A carbon tax does not generate similar public signals to support an increase in the tax.

Another criticism of the ETS is that it does not provide a good price signal for the evaluation of emission reduction investments. Price fluctuations are an inherent feature of a trading scheme. However, this may not be a large drawback relative to a carbon tax in practice. Tax rates are usually adjusted in government budgets with very little notice. A carbon tax could be structured to provide more notice of rate changes (especially if it is a harmonised tax implemented by all member states) but it is unlikely that the rate would be fixed more than 5 years into the future. A predictable and slowly changing tax is the exception, not the norm. Carbon tax adjustments would often be unpredictable and occur on short notice. It is not clear that such unpredictable changes provide a better price signal than the market price for allowances in an emissions trading scheme.

Evidence suggests that in practice price information 5 to 8 years into the future is sufficient for firms; beyond 8 years the present value of costs has little impact on investment decisions. In the US SO₂ programme allowances are distributed 30 years into the future. The quantity of allowances traded drops sharply from the current year to 5 to 8 years into the future, with very only small quantities of allowances for years further into the future being traded. Markets created by emissions trading schemes provide price information

for much of this period - contracts for EU allowances through 2009 are traded and since they can be banked until 2012, prices through 2012 are effectively available. Contracts for CERs (which can be used for ETS compliance) include options for units generated after 2012, so firms in the EU ETS that want price information (or actual allowances or CERs) for the next 5 to 8 years can get it.

Incidentally, for the first 10 years the price of an SO₂ allowance fluctuated between \$70 and \$210 - the former is the operating cost to remove a tonne of SO₂ using an existing scrubber while the latter is the capital and operating cost to remove a tonne of SO₂ using a new scrubber. The large price increase for SO₂ allowances beginning in 2004 was largely due to EPA's Clean Air Interstate Rule (CAIR) which proposes to reduce the cap by 50% for 23 eastern states beginning in 2010 and by 75% in 2015. Since allowances have already been issued through 2035, in 2010 one tonne of emissions will require one 2009 (or earlier) allowance or two 2010 allowances. The price increase reflects both the projected increase in the marginal compliance cost due to the lower cap and the fact that current vintages will be worth twice as much as 2010 and later vintage allowances. The price rose from \$216 in December 2003 to \$1,567 in December 2005 and has since fallen to \$660. Prices fluctuate, but information about future prices is available to guide investment decisions.

The inability to bank allowances from Phase I into Phase II is another criticism of the ETS. This, of course, is driven by the provisions of the Kyoto Protocol. Banking is allowed within Phase I and for all years beginning in 2008. One consequence of the restriction on banking Phase I allowances for Phase II is that the surplus allowances due to the relatively lax caps for Phase I will be removed from the scheme. It improves the environmental integrity of the scheme. Almost all trading schemes accumulate a bank of allowances during the early years (if banking is allowed) because the initial cap is not very stringent or because larger and lower cost emission reductions than forecast are implemented. Many schemes have provisions such as an allowance life (say 2 years) to reduce the size of the bank and hence increase the environmental benefits. The inability to bank Phase I allowances into Phase II serves the same purpose.

You criticise the ETS for the absence of allowance borrowing. I disagree. Only one emissions trading scheme (New South Wales GHG Abatement Scheme) allows borrowing and only to a maximum of 10% and only for one year. Borrowing is useful for a source that has a shortage in the current year and expects a surplus for the next year. Such a firm can buy the allowances it needs and arrange a forward contract to sell its surplus allowances. Thus the market can serve the needs of a firm that would find borrowing attractive. The market assesses and bears the risk associated with non delivery of the surplus future allowances. If the scheme's rules allow borrowing and the borrowed allowances are not repaid the environment suffers. A borrowing rule is unnecessary, poses a risk to the environment and represents a subsidy to firms with the weakest credit.

Allowance banking, on the other hand, can benefit the environment and improve economic efficiency so it is permitted in most emissions trading schemes, although often with some restrictions. Ellerman and Montero found that banking permitted an efficient adjustment to the substantially lower (about 50%) emissions cap for Phase 2 of the acid rain programme. Neither banking nor borrowing is possible with a carbon tax. Banking is not needed because a firm can invest surplus funds in many ways and then draw on them for future tax payments. Tax collectors do not allow borrowing; they expect the tax due each year to be paid. A promise to pay more in the future is not acceptable. If you don't have the money to pay the carbon tax you borrow it and repay the loan in the future. The borrower and the lender bear the risk not the tax department.

I think your claim that the allowance market has not provided an incentive to make emission reduction investments is too strong. Participants in the ETS are aware that the scheme is in effect indefinitely. Granted the caps are not yet known for 2008-2012 and are even more uncertain past 2012. Yet as noted above information on allowance prices through 2012 and beyond is available to help evaluate investment decisions. Evidence from the SO₂ programme suggests that it is prices and allowances for the next 5 to 8 years that are important even for facilities with long lives, such as fossil-fired generating units. For those investments, fossil fuel prices are a much larger cost than allowances and fossil fuel prices are no more certain or predictable than allowance prices. Uncertain fuel prices cause firms to invest in less capital intensive options, so they can recover their capital more quickly (natural gas generation rather than coal or nuclear). Uncertain allowance prices cause firms to look for less capital intensive emission reduction options.

Modifying the ETS to provide allowance prices 20 to 30 years into the future would allow better evaluation of capital intensive emission reduction options. There are several ways to provide such allowance prices. Of course if you are a participant in the ETS an allocation of allowances far (15 to 30 years) into the future is highly desirable, especially if compensation must be paid for any discounting of the value of the allowances (which is not done in the SO₂ programme). That restricts the ability of governments to reduce the emissions cap in the future if necessary. Another option is to auction a limited quantity of allowances far into the future to provide a price signal that can be used in the evaluation of investments, but to allocate free allowances only for more limited periods, such as the next five years.

I agree that less price volatility is desirable. The price shock in May was unique for several reasons - it was the first time actual emissions were reported and there is no bank of allowances to absorb fluctuations in demand and hence price. During the early years of an emissions trading scheme many firms focus on internal compliance and are reluctant to sell surplus allowances (they keep them for contingencies) or to depend heavily on purchases due to price uncertainty and uncertainty about availability of the quantity of allowances they might need. This means a less liquid, more volatile market. Over time comfort with the market increases (for example a bank of allowances increases confidence that the quantity of allowances a firm might need will be available) and the market becomes less volatile. However, major developments, such as substantial changes to the emissions cap will still produce price shocks as indicated by SO₂ allowance prices over the past few years. The ETS could be improved by increasing the lead time for national allocation plans from the current 18 months to 3 to 5 years.

I agree there is some short-term uncertainty related to CERs. The ITL is not yet operational and a liquid spot market is not yet available. Those issues should be resolved within the next year. Then CERs will increase the supply of compliance units available for the ETS, which should lower the price but also increase the liquidity of the market and so reduce the price volatility. Expansion of the ETS to Romania and Bulgaria and linking to Norway (Iceland and Liechtenstein) and probably Switzerland will also expand the market. Access to low cost project related emission reductions is not possible with a carbon tax. As a result, an emissions

trading scheme should yield larger emissions reductions for a given marginal cost than a carbon tax or equivalent reductions at a lower cost.

Cheers,

Erik

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Response from Prof Catrinus J. Jepma

Dear Erik,

Thanks for your extensive comment on my latest editorial in which I struck a number of notes on the functioning of the EU-ETS, and questioned whether the supposedly unavoidable allowance price volatility would be conducive to support investment in clean technologies relative to more stable and predictable incentives, likely to be provided by an EU-wide harmonised energy/carbon tax (or even EU-wide carbon tax). I think your comments deserve a thorough reply, so let me comment on your consecutive points (I numbered your paragraphs for that reason).

Paragraph 1:

Your argument: Given the past acceptance of the EU ETS, you need to demonstrate that the EU ETS “is working so poorly that it needs to be replaced.”

My response: The EU ETS will in any case last until 2012, so I was not discussing an instantaneous change, but rather argued in favour of an open, well-informed discussion about whether the EU ETS is the best instrument on the medium to long term. The important point in that discussion is: what instrument is best capable of reaching the ultimate target, *i.e.* mitigation, without at the same time violating other aspects such as maintaining a level playing field, distributive impacts, and transaction costs?

In that respect, your suggestion that one should need to prove that the EU ETS is working “so poorly that it needs to be replaced”, is out of place and rather conservative. Everyone would seem better off if on the medium to long run any better alternative was given a chance.

Paragraph 2:

Your argument: most economists agree that for the same emission sources a carbon tax and an ETS are *similar* except for the fact that emission reductions are uncertain in case of a tax, and cost of reductions in case of an ETS.

My response: Here, I fundamentally disagree. First of all, I do not like the statement ‘most economists agree’. Without any serious polls among economists worldwide or at least representative samples, such a phrase does not mean anything. Besides, isn’t it equally relevant to systematically find out what the true ETS stakeholders think of it?

But, apart from that, I also disagree on the point of similarity. The critical point is that both instruments have in common that they require action from governments, require monitoring, *etc.*, and further rely on the functioning of the market. Having said that, the differences appear to be striking:

- Why is the government’s role different between a tax or an ETS? Taxes can be set uniformly across countries, and can, once set, be left unchanged for as long as preferred. In practice, tax rates seldom change, and, if they do, mostly with modest steps over long-intervals and in one direction only. Therefore, taxes, on average, send a clear, stable and predictable signal to investors. Moreover, the government can use the tax receipts to further support the same goal that inspired the tax.

- In an ETS, however, allowances cannot be allocated uniformly across sources. Allocation, even if one agrees about some common formula, needs to be carried out on an individual basis (which obviously calls for lobbying, and carries the risk of corruption). Since the structure of industries is continuously changing, such allocations need to be updated regularly, so that the whole ‘stalinist allocation circus’, has to be repeated over and over again. Furthermore, depending on the degree of grandfathering or auctioning of allowances, the government is likely to collect fewer resources (than with taxation) to actively support the underlying target, so that in practice much of the response has to come from how supply and demand respond to allowance prices. Due to the fact that this price is the only means to clear the market conditions (which in their turn are regularly reset by the government), it is likely to be a rather volatile if not unpredictable incentive without any clear direction, which in practice is likely to offer limited guidance to investors in the short and in the long run. Much of the evidence from the actual practice of ETS schemes seems to reconfirm these expectations (see also point 7 next).

In short, the role of the government with respect to a tax versus an ETS system is fundamentally different, and the result may well be that, although the ETS secures the mitigation target at short notice, the same instrument may fail to effectively guide investors towards new technology pathways that are crucial for reaching mitigation targets in the longer term.

There also are clear differences with regard to their market functioning. A tax will be passed (at least to a certain degree) onto the end-user and will thus affect relative prices and possible costs. Supply and demand behaviour and technology choices will respond to that. In that regard, there is no market in between the tax and the tax incentives receptors.

Such an in between market exists in an ETS (the allowance market), but since installations will primarily need their allowances for their own purposes, such a market is by nature a residual market and therefore might be relatively volatile. After all, still a minor share of the overall allowances is traded. Moreover, many firms prefer, for various reasons, to exchange allowances bilaterally (the OTC-share in EUA volumes traded is still over 50%). In addition, few firms consider the allowance market a hedging device: a recent survey

among some 100 Dutch ETS companies, carried out by De Wolff (to be published on our website within a couple of weeks), revealed, for instance, that almost 76% of them described their emission trading strategy as a compliance strategy; only 14% of the companies use a hedging strategy. So, allowance markets in practice have remained too thin and too dependent on political allocation and regime decisions to become a transparent, competitive, and suitable vehicle for hedging and for providing a stable price signal.

Paragraph 3:

Your argument: The EU ETS started not very stringent, but so would a new carbon tax scheme probably have started.

My response: Here we do not disagree, but remember that all the factors making the ETS more 'delicate' as mentioned under paragraph 2 will probably be aggravated as the system becomes more stringent.

Paragraph 4:

Your argument: Unlike a tax scheme, an ETS gives a clearer signal to public authorities about any need to tighten the scheme.

My response: I disagree, because fundamentally in the ETS philosophy the governments' prime concern would be to set a collective mitigation target, then allocate allowances to individual installations, and let the market do its job with respect to the credits and credit prices. If, as in your argument, governments instead observed credit prices to see if they have gone too far or not far enough in terms of setting their mitigation targets via ET allocation, they would effectively set themselves another goal next to achieving some mitigation target, namely, to try, through trial and error, to strike a balance between setting environmental targets on the one hand, and public acceptance of the incentives used for this purpose on the other hand. It is fine to consider ETS policies from that dual target perspective, but then there is little that an ETS does better than a tax. After all, in a tax scheme a government can also monitor mitigation results and gradually change tax rates. Even then, the difference remains of course that with a tax scheme governments generally are better able to collect resources they can use to support/promote the mitigation target. [For an illustrative study showing how much difference effective recycling can make in terms of mitigation results per unit of tax, see Kainuma *et al.* (2004).¹]

Paragraph 5:

Your argument: Tax rate adjustments are also unpredictable; "a predictable and slowly changing tax is the exception, not the norm".

My response: On this point, I, again, strongly disagree. Tax rates are usually set for an indefinite time, and will only change if, based on public decisions (the democratic process in most countries), a change is publicly accepted. Rates (and certainly harmonised rates that require international agreement) are therefore commonly stable. If they change, such a change is usually gradual, slow, and into one direction. Comparing tax rate changes with ETS price changes is like comparing the movements of a snail with those of a butterfly.

In the EU ETS, prices have gone up and down between almost nothing and over €30/tCO₂-eq. within just less than two years! A similar trend could be observed for SO₂ prices in the US SO₂ ETS for over a decade (see also 7 next).

Paragraph 6:

Your argument: Firms can get allowance (and CER) price information for 5-8 years ahead via the allowance futures market, which gives them sufficient information for investment.

My response: There are two reasons why I do not agree with this argument. First, I have some doubts about the 5-8 year investment time horizon. The impression I get from industry is rather the reverse: the crucial technology choices, *e.g.*, whether the next set of power plants will be (partly) based on gas technology, oil, coal (whether or not including CCS), nuclear energy or biomass, or whether or not one will start designing different fuel efficiency systems in vehicle production, *etc.*, will be determined, to the extent that these decisions are sensitive to carbon penalties, on the basis of expectations about the

development of CO₂ emission penalties during the next few decades. What typically matters is issues such as: will the price creep upwards to about €20, €50 or >€100 per tCO₂-eq. through 2030. The actual CO₂ allowance prices in the nearer future are less important.

Second, even if a subset of investment decisions were quite sensitive to CO₂ allowance price certainty for the 5-8 year period (in the sense that such increased certainty would drive them towards more environmentally friendly investment than otherwise), then in practice they still would not be able to get such certainty by long-term hedging on the CO₂ allowances futures market, because:

- In the absence of knowledge about future allocations, they do not know whether, what and how to hedge; and
- In practice the allowance futures market is far too thin to enable such hedging on any serious scale at anywhere near acceptable costs; there is no indication that this will change in the future.

Paragraph 7:

Your argument: There is a valid explanation for about 1:3 US-based SO₂ allowance price fluctuations during 1995-2003 and about 1:8 fluctuations during 2003-present.

My response: What matters is not *that* wild fluctuations can be explained *ex-post*, but, instead, the wild fluctuations themselves, because the latter are the incentives on which investment decisions will be based.

Paragraph 8:

Your argument: The EU ETS restriction on banking Phase I allowances for Phase II improves the environmental integrity of the scheme and is therefore perfectly valid.

My response: I agree with your point that there are such arguments in favour of the proposed banking restriction, but I believe that the little mentioned counter-argument, induced price volatility near the end of the relevant period (*i.e.* 2007), is equally valid.

Paragraph 9:

Your arguments:

- Allowing borrowing (as I would have suggested) is not a good idea because "only one (small) ETS allows it" under restrictions;
- Moreover, if borrowed allowances are not repaid, the environment suffers.

My response:

- My point was not to criticise borrowing under the EU ETS as such, but rather to point out that any asymmetry between borrowing and banking creates scope for

¹ Kainuma, M., Y. Matsuoka, T. Masui, and J. Fujino (2004): Carbon Reduction Potential and Economic Impacts in Japan: Application of AIM. Annual Meeting of the International Energy Workshop. International Energy Agency (IEA), Paris, France.

gaming by traders/speculators. Anyhow, I agree with you that borrowing can be seen as weakening compliance, and therefore should not be accepted lightly (however, it creates flexibility and thus reduces compliance costs, something you probably like too). I disagree, however, with your other argument. Since the KP itself accepts borrowing, arguing that borrowing is really the exception rather than the rule seems somewhat overstated.

- To argue that the environment suffers if parties do not comply is a very obvious statement, but the risk of abuse is in itself of course no argument against borrowing.

Paragraph 10:

Your argument (if understood correctly): Banking can add flexibility to an ETS and can only be used indirectly (by literally lending and borrowing) in a tax scheme.

My response: So what? Anyhow, we do not disagree on this one.

Paragraph 11:

Your arguments:

- a) My "claim that the allowance market has not provided an incentive to make emission reduction investments" would be "too strong".
- b) Fossil fuel prices are no more certain or predictable than allowance prices; such energy price uncertainty causes firms to invest in less capital-intensive options. Uncertain allowance prices will have a similar impact on investment decisions.

My response:

- a) I only stated that: "allowance prices have not provided a *clear* incentive for investors."
- b) Fossil fuel price uncertainty can definitely slow down investments in capital involving environmentally benign technologies; no one would dispute that. Yet, because most energy prices run broadly parallel, higher energy prices may typically induce a general energy saving trend, but not necessarily a mitigation trend to the same extent. For the latter, a CO₂ emission penalty seems the most direct and effective incentive for investors to seek for alternative technologies with lower emissions. Moreover, it is impossible to steer short or long term energy prices; CO₂ penalties instead, can, to a certain degree be steered, but most clearly if introduced as a co-ordinated or harmonised tax.

As far as allowance prices are concerned, my key point is not that there is no signal but rather that the signal is so unclear, both in the short and long run, that investors may either postpone decisions to embark on new technologies (first wait and see where allowance prices are roughly going), or, *precisely as you argue*, may go for options from which they can recover their capital more quickly. The crucial point is that both reactions effectively postpone investment decisions typically focussing on the energy transition, and therefore slow down future mitigation.

The fact that you seem to adhere to my central argument, i.e. that (energy price and) allowance price uncertainty may cause firms to invest in less capital intensive options and thus is likely to slow down future mitigation, would basically suggest that we are in agreement on this key point, right?

Paragraph 12:

Your argument: You argue in favour of allocation (possibly through auctioning) of allowances far into the future (15-30 years), in order to create the desired more stable signal for investment.

My response: I doubt whether these 'tricks' to make allowance prices more certain will work. First, the competitive structure of the installations covered by the ETS is changing so rapidly that periodic allocations seem imperative if one wants to prevent a grossly unequal playing field to emerge in the course of time; this calls for much shorter allocation periods than you suggest. Second, such long commitment periods may easily induce installations to postpone action, because one feels that there still is plenty of time, and thus, precisely because of its flexibility in time, long allocation periods will undermine discipline. Third, it will put a very heavy burden on those responsible for the 'allocation circus.'

Erik, thanks again for your comments. I owe you a drink.

Catrinus

Catrinus J. Jepma, Chief editor

The Joint Implementation Quarterly is an independent magazine established to exchange the latest information on the Kyoto mechanisms and emissions trading. *JIQ* is of special interest to policy makers, representatives from business, science and NGOs, and staff of international organisations involved in the operationalisation of the Kyoto mechanisms, including emissions trading.

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