

EU energy and climate policy – two years on

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Foreword

By Hans Martens

Climate change has become the main driver for the EU's energy policy, but it goes hand in hand with other considerations.

These include the need to diversify sources of supply to reduce energy dependency, especially from those countries that produce carbon-based fuels. Energy-related issues have also become a more important element of the EU's growth and jobs agenda, with new technologies and energy management becoming boom industries that increasingly provide new jobs.

Focusing on energy and climate change is seen as good political 'spin' these days, and a prime example of how policy-makers can demonstrate the EU's capacity to deliver effective policies to address the public's concerns in an area where citizens believe the Union can – and should – play a strong role.

The EU recently set out a concrete plan to address most of these issues in the longer term, but behind the long-term promises lie a detailed set of components of energy and climate policy that this paper aims to clarify and analyse.

Each of these components has the potential to spark political conflict, and although it is obviously necessary to focus on the merits and deficiencies of each of them in turn, it is also important to bring all these elements together in a comprehensive and cohesive package in order to achieve the real objective of finding solutions to the overall problems of climate change and energy dependency.

It is equally important in this process to break down the long-term objectives into practical steps which can be taken immediately and in the medium term. The future starts now, and all the steps taken now must point in the direction of solving the long-term problems.

This is, of course, not always politically easy. Although there is wide agreement on the benefits of achieving the long-term goals which have been set, the concrete measures required now are bound to divide electorates, given that some will benefit more than others and some will be required to shoulder more of the burden than others.

The European Policy Centre is committed to contributing to the debate on how best to achieve these long-term goals.

To this end, we recently published a Working Paper on *Gain without pain: towards a more rational use of energy*. This was based on the work of the EPC's Task Force on the Rational Use of Energy and set out a number of measures that are relatively easy to enact and which would make a significant contribution to achieving the long-term objectives.

This Issue Paper by Jørgen Henningsen, the EPC's Senior Adviser on energy and environmental issues, aims to provide a good overview of the complexities which lie behind the EU's climate and energy policies, and therefore to provide a stronger foundation for the ongoing debate about political solutions to the problems we face.

Hans Martens is Chief Executive of the European Policy Centre

EU energy and climate policy – two years on

By Jørgen Henningsen

Introduction

EU climate change policy has moved into a higher gear, at least judging by the speeches made by Europe's leaders over the past couple of years.

Media coverage of the issue has also increased dramatically as a number of reports – from internationally recognised organisations such as the Intergovernmental Panel on Climate Change (IPCC) or by internationally recognised personalities such as Sir Nicholas Stern – have highlighted the concerns, the need for urgent action and the potential for such action.

The European Commission's Green Paper on a new climate-oriented energy policy of March 2006, and its endorsement by the Spring European Council later that month, was the launch pad for a continuous process of policy development at the interface between energy and climate policy. These developments culminated in the Commission's January 2008 package of energy and climate policy proposals.

Negotiations on this package in the Council and European Parliament are now at a critical stage, with the French EU Presidency under pressure to conclude a political deal by the end of this year so that the package can be finalised before the Parliament goes into election campaign mode in May 2009. This timetable is designed to ensure that the EU has a sufficiently strong and clear mandate for the planned December 2009 United Nations Climate Change Conference (COP15) in Copenhagen on an international post-2012 climate agreement.

The main elements of the Commission's 2008 package are the proposals for legal instruments to translate the targets for reducing greenhouse gas (GHG) emissions and increasing the use of renewable energy sources agreed at the 2007 Spring European Council – 20% GHG emission reduction and 20% renewable energy, both by 2020 – into legal commitments which will be binding on the Member States.

Part of proposed reduction in emissions will be achieved via a revised and strengthened Emissions Trading Scheme (ETS), drawing on the experience from the 2005-07 trading period. The package also includes proposals for measures to promote carbon capture and storage (CCS), and revised guidelines for state aid for environmental projects.

The package has been recognised as an impressive step towards meeting the objectives agreed at the highest political level within the EU. That said, however, a 'reality check' on the actual state of play is still justified. Are we really doing as well as Environment Commissioner Stavros Dimas would have us believe, and are the Commission's proposals for actions as revolutionary as its President, José Manuel Barroso, claims? These are the key questions this paper aims to address.

EU climate policy has two separate, albeit interlinked, dimensions: an internal dimension dealing with policies designed to implement existing commitments and prepare for new ones; and an external dimension dealing with the international fight against climate change and the EU's approach in relation to the rest of the world. Given that the Union's internal policy is the basis and justification for its external approach, this issue will be addressed first.

I. Internal EU climate change policy

EU leadership on climate change is nothing new. In October 1990, in response to the IPCC's First Assessment Report, the Union's Environment Council agreed to stabilise EU-12 CO₂ emissions at 1990 levels by 2000 (in spite of UK opposition, with the then British Prime Minister Margaret Thatcher arguing that the UK could only stabilise its emissions in 2005).

During the negotiations on the United Nations Framework Convention on Climate Change (UNFCCC) in Rio in 1992, the EU argued (unsuccessfully) that all the industrialised countries should sign up to this commitment. Shortly afterwards, the Commission proposed a 'CO₂/energy tax', equivalent to \$10 per barrel of oil (the euro had not yet been conceived), as the main policy to implement this commitment to stabilisation. Other Commission proposals, such as SAVE and ALTENER, were tabled in order to promote energy efficiency and renewable energy.

However, none of these proposals won the necessary support from Member States for them to become EU legislation. SAVE and ALTENER were turned into funding for 'demonstration' projects designed to show what could be done, and the EU might well have overshoot its stabilisation target by a significant margin had it not been for a number of developments: the industrial collapse in the former Deutsche Demokratische Republik (DDR) after German reunification; the British 'dash for gas' following the coal miners' defeat after bitter and protracted industrial action and the subsequent rapid introduction of cheap North Sea gas into the UK; nuclear energy's increasing share of electricity production; and an economic slowdown in the early 1990s.

None of this could justifiably be claimed to have happened for the purposes of cutting CO₂ emissions, but the EU nevertheless landed close to where it should be in 2000.

However, long before this, the climate policy landscape had changed. A 1995 review of the adequacy of the commitments laid down in the UNFCCC concluded that more was needed, and the negotiations began on what later became the Kyoto Protocol (KP). As before, the EU took the lead, calling for all the industrialised countries to commit themselves to 15% reductions in greenhouse gas (GHG) by 2010 relative to 1990.

The credibility of this position was somewhat undermined by the lack of success in implementing the policies called for in the UNFCCC and the fact that the agreement (reached before Kyoto) on how to share out the burden of meeting the overall target among EU Member States only added up to a 9% reduction for the Union as a whole. However, the principle was the important thing and few bothered to go through the detailed calculations necessary to expose this.

While the rest of the story (the targets agreed, flexible mechanisms etc.) belongs to the chapter on external climate change policy, there is one important aspect that needs to be considered here.

To most, it would appear that the current unilateral EU commitment to reduce GHG emissions by 20% by 2020 is a more ambitious target than the old 15% target. This is, in fact, far from the case.

First, from the very beginning, it has been clear that emissions in industrialised countries would have to be reduced over time in order to stabilise the global climate at a safe level – and 5% over ten years is already too little, as the recent IPCC Assessment Report clearly demonstrated.

Second, and more important, the current commitment applies to the EU-27 and emissions in most of the new Member States are well below their 1990 levels because of the collapse of their industries in the post-Socialist era – a factor easily equivalent to a 'free' 5% reduction in the overall EU level.

Third, the 20% target could be met by a significant use of flexible mechanisms if the Commission's proposal is adopted as drafted – easily another 5% 'sweetener' in the package (not cost-free, but much cheaper than the estimated overall cost per ton of CO₂ reductions).

Without attempting to calculate the comparison down to the last decimal point, it seems clear that even the 30% reduction envisaged by the Commission (if other industrialised countries agree to do the same) is less – rather than more – than the 15% reduction suggested before Kyoto.

Furthermore, ambitious policy targets and negotiating positions are one thing; results on the ground unfortunately all too often another. However, while the practical achievements to date have not been all that impressive, they have generally not been all that bad either, particularly not if compared to what has happened elsewhere in the world.

A number of important initiatives were taken by the Prodi Commission (on renewable energy in electricity generation, energy efficiency in buildings, bio-fuels, energy services and emissions trading). Although in most cases the proposed legislation was watered down by the Council, it nevertheless set things in motion that would not otherwise have happened. (Even the ‘failed’ agreement with the car industry to reduce average CO₂ emissions from new vehicles to 140g per kilometre by 2008 has led to more fuel-efficient cars than would otherwise have been the case.)

However it is equally clear that in spite of obvious successes – such as the lead the EU has taken in developing wind energy – much more has to be done if the Union is to shoulder its share of the global burden necessary to keep climate change within the agreed limits.

So does the recent package of Commission proposals meet that requirement? Unfortunately, a closer examination of the content indicates that it is less solid than its rather glamorous packaging suggests.

It has already been mentioned that the overall reduction targets – whether the unilateral 20% reduction or the international negotiating proposal of 30% – are not as impressive as they might seem. But the specific proposals might also be less ambitious or effective than has been claimed.

Emissions Trading Scheme

The Emissions Trading Scheme (ETS), adopted in 2003, is undoubtedly the most visible policy development to date within the overall range of EU climate policies. Some claim that it is also the most successful, but – like many important new policy developments – it is also controversial.

As early as mid-2001, it was already triggering passionate discussions during the internal ‘inter-service consultation’ on the proposal between different Commission Directorates-General (DGs), particularly between the DG responsible for environment policy (from where the proposal originated) and the DG for industrial policy.

It should not be forgotten that DG Environment explicitly stressed that the first trading period, from 2005 to 2007, was intended to be a learning period, both in relation to the mechanics of the system (setting up an electronic exchange for emission allowances) and to the more fundamental concept itself.

This learning period has been essential and indeed, with the second phase of the scheme now underway (covering 2008-12, corresponding to the Kyoto Protocol commitment period), it could be argued that there are still important lessons to be learned.

The ETS in practice

Before turning to an analysis of the current situation and of the Commission’s proposal for a post-2012 regime, it is useful to recapitulate a few essentials of the existing scheme.

The ETS is the biggest-ever example of using a market-based instrument to address an environmental problem. It could well be seen as an alternative to the Commission’s failed proposal in the early 1990s to introduce a CO₂/energy tax as a means to stabilise CO₂ emissions by 2000.

The ETS at a glance

The EU's Emissions Trading Scheme (ETS) is a policy instrument that allows large emitters of CO₂ to reduce their emissions taking into consideration the costs of reducing emissions for individual operators. The current system covers coal-, oil- and gas-fired power plants, big heat and steam generators, and a number of energy-intensive industries (such as cement, steel, pulp and paper). In response to a Commission proposal to extend the scheme to the aviation sector, the Council and European Parliament have agreed to do so by 2012.

Limits on the amount of CO₂ that operators covered by the scheme can emit are set by national authorities. If these operators then emit less CO₂ than permitted, they can sell their surplus 'allowances' to another operator whose installation has exceeded its emission limits. These allowances can either be granted to the emitters for free, on the basis of expected or permitted emissions, or they can be auctioned. In both cases, allowances are freely tradable between operators – or between any agent operating in the financial markets.

Through this trading, CO₂ emissions acquire a price tag. Operators with limited low-cost emission reduction potential will prefer to buy allowances (as a cheaper alternative to paying for the technology needed to achieve the required reductions), presumably from operators with more potential for low-cost reductions, who can thus make an extra profit.

Extending the possibility of trading in emission allowances to the financial markets has brought CO₂ trading in line with trading in commodities, opening up the possibility for a more global CO₂ market. However, as with commodities, this also makes the market subject to speculation.

The main argument for the ETS is its expected ability to promote cost-effectiveness.

This proposal never made it through the Council because of resistance (primarily from the UK) to ceding national competence on any taxation issue, and the requirement for unanimity in Council on tax issues continues to make regulation of CO₂ emissions through taxation an unattractive option.

Both the CO₂/energy tax proposal and the ETS drew their justification from the fact that it is very difficult to control CO₂ emissions from the vast range and number of sources producing them (virtually any installation burning coal, oil or gas) through conventional 'command and control' legislation in a reasonably cost-effective way. The ETS is meant to make up for this.

It is often claimed that the scheme was derived from the emissions trading provision in the Kyoto Protocol. This is not the case. The relevant provision in the Kyoto Protocol (Article 17) allows parties to the accord to trade part of their commitments between each other, something which does not require the creation of a national ETS. Furthermore, the EU's ETS, which allows trading between *industries* within a single Member State or in other EU countries, can operate perfectly well without the KP provision, as demonstrated in the Commission's recent proposal for a post-2012 scheme.

The ambitions of the EU's ETS go beyond what would be required to ensure a cost-effective CO₂ emission-reduction policy. That could be achieved simply by allowing those from whom emission reductions are required to trade their obligations with each other.

Instead, the Commission's DG Environment has opted for a genuine financial instrument by allowing trading to be based on freely-tradable allowances, thus creating an open CO₂ market like any commodity market, including trading in futures and possibilities for unrestricted speculative trading. As a result, CO₂ emissions are now listed in the *Financial Times* on a daily basis along prices for crude oil, natural gas,

diesel etc., and trading volumes greatly exceed the quantities of emissions physically being transferred between the enterprises covered by the scheme.

In a system where emission allowances can be traded freely, the process of allocating these allowances to enterprises obviously becomes important. Two questions have been at the forefront of the debate on this issue: who decides on the quantities of allowances to be issued (the Commission or national governments)?; and what method should be used (auctioning, free allocations based on historical emissions – known as ‘grandfathering’ – or benchmarking)?

The 2005-07 period has clearly demonstrated that letting national governments decide on the allocation of allowances to individual companies when they are basically allocated for free is a recipe for over-allocation. This should not have come as a surprise, but nevertheless it did.

A report from the German *Umweltbundesamt* in autumn 2005 clearly identified this over-allocation, but CO₂ prices remained at a totally unrealistic €20-30 per ton until the Commission’s report in May 2006 on actual 2005 emissions revealed the scale of the problem. Even then, it took some time for the market to fully grasp the reality of the situation and CO₂ emission allowances were virtually valueless in the second half of 2006 and all of 2007.

This was perfectly foreseeable, but was not acknowledged until it was too late to modify the Directive before governments began the allocation exercise for the 2008-12 period.

The Commission has, however, tried to impose more discipline on those Member States that persisted in proposing generous allocations of allowances to enterprises with much lower emissions in the past. A number of (new) Member States have gone to the European Court of Justice to try to get Commission decisions overturned – a step which, if supported by the Court, could have a significant negative impact on the remaining part of the trading period. Against this backdrop, the Commission is clearly justified in proposing that the level of allowances to be allocated should be established at EU level for the post-2012 period.

The method of allocation is a more tricky issue. Originally, DG Environment intended to leave it to Member States to decide to what extent they would allocate allowances via auctioning or for free (presumably via ‘grandfathering’). Realising that competition in the internal market would be seriously distorted if individual governments took different approaches – a particularly critical issue for the electricity sector, which was far from fully liberalised in 2001 – the Commission proposed that allocations should, until otherwise decided, be granted for free (with the possibility of auctioning a few per cent of the overall total), and governments agreed.

It was only after the system became operational in 2005 that it became more widely recognised that even though power producers had received their allowances for free – and in sufficient quantities to avoid having to invest in CO₂ reductions – electricity prices went up as if the price of allowances reflected a real cost.

This should not have come as a surprise either. It is a simple consequence of the interaction of three factors:

- the liberalisation of the electricity market;
- a lack of external competition;
- the fact that electricity cannot be stored.

As long as emission allowances have a monetary value, it does not pay for power producers to generate electricity unless the price covers not only their production costs but also the value of the emission allowance that could otherwise be sold. This is independent of whether the allowances have been bought or allocated for free.

It is therefore true that the system has provided power producers with a ‘windfall’ profit, not because they were able to sell their allowances (after all, they had to use most of them to cover their emissions and could only sell a small proportion of them), but because the mere existence of a CO₂ price caused an increase in power prices.

The level of windfall profits is basically proportional to the price of emission allowances. At a cost of €20 per ton, electricity prices would be expected to increase by €20 per Megawatt Hour (MWh) if coal is the marginal fuel used to generate the electricity and by €6 per MWh if (more expensive) natural gas is the marginal fuel, given that coal emits far more CO₂ than natural gas – assuming, of course, that the market works as an ideally liberalised market with unlimited exchange capacity.

The Commission therefore has good reason to propose that this windfall profit be reduced through auctioning the allowances for the power sector in a post-2012 ETS. However, it has less justification for arguing that this will eliminate the windfall profit altogether.

Only some 50% of EU electricity generation is actually covered by the ETS (coal, natural gas and oil), but the remaining 50% (nuclear, hydro, wind, biomass and a bit of solar energy) benefits equally from the increase in prices. This may explain why the European electricity sector has not objected to paying some €30-40 billion a year after 2012 for something it used to receive for free (something never seen before in the history of environment policy).

Future scenarios

During the current 2008-12 trading period, power producers are likely to cash in to the tune of an extra €40-50 billion annually (on the basis of current fuel and CO₂ prices) if they are allowed to pass the price of allowances onto consumers.

Auctioning after 2013 will reduce the ‘profit margin’, but depending on the extent to which CO₂ prices increase (which is to be expected in a tighter emission regime), the residual potential ‘windfall’ profit is likely to stay well above €20 billion a year and could well remain at 2008-12 levels if the EU ends up with a 30% reduction target. Continued price controls in some Member States might reduce the overall cost, but at the expense of a level playing field within the internal market.

Given the deliberate intention to let the market set the prices, all calculations of the impact will of course retain a significant element of uncertainty. What is certain, however, is that windfall profits – transferring tens of billions of euro a year from electricity consumers to utilities companies – are not likely to disappear through the introduction of auctioning.

One might well argue that this is not the ‘fault’ of the ETS, but rather a consequence of electricity market liberalisation, in exactly the same way that liberalisation itself will create huge windfall profits through higher prices than would result from increased production costs alone. But the question of whether the (probably rather marginal) overall cost-effectiveness benefit justifies the significant cost increase for ‘normal’ consumers and energy-intensive industries should nevertheless be part of the political debate on the ETS.

The above analysis leads to another conclusion that some might find surprising: namely, that electricity producers will see a collective economic advantage in the strongest possible emissions reduction target and, consequently, the highest possible price for CO₂ allowances at auction.

This may not be what a first-year economic textbook would suggest, but it follows very simply from the lack of external competition that allows power producers to pass on whatever additional costs they incur to their customers (demand being relatively insensitive to prices) and make a corresponding profit on their CO₂-free production. This helps explain why the electricity sector has been supportive of the Commission’s proposals for revising the ETS.

Energy-intensive industries

Most of the political capital invested in the discussions on the Commission's proposed changes to the ETS has focused on the question of whether the combination of a more progressive EU climate policy and a requirement for companies to buy their emission allowances through auctioning would damage the competitiveness of EU energy-intensive industries such as steel, cement and chemicals to the point that they would relocate to parts of the world with less stringent requirements – and assumed higher emissions per unit produced – thus causing 'carbon leakage'.

The Commission has apparently decided to await the outcome of the ongoing climate negotiations before deciding whether the risk of 'carbon leakage' requires special measures such as special import duties on products coming from countries with less stringent emission requirements.

There are more dimensions to the problems arising from the particular situation of energy-intensive industries in the ETS than have so far been raised in the public debate.

First, it is worth noting that energy-intensive industries operate in a completely different business environment from the power sector. They are subject to international competition, with prices decided by the global market, not by production costs. Secondly, unlike electricity, their products can be stored.

The first questionable assumption in the recent debate is about 'carbon leakage'. Whether explicitly stated or not, the discussion appears to be based on a belief that steel, cement, petrochemicals etc. produced in China (in particular) or other rapidly developing economies such as Brazil or Saudi Arabia will give rise to higher CO₂ emissions per unit than equivalent EU production. This is unsubstantiated in relation to future production. Power plants, oil refineries, fertiliser-manufacturing or steel-production plants recently built in countries where energy-intensive industries are most likely to relocate are probably more energy efficient than older facilities within the EU.

The main attraction of the 'carbon leakage' argument is its moral strength: concern for the global climate rather than for company profit. But if 'carbon leakage' is the concern, this argument does not stand up to close scrutiny.

The much more important (but less noble) concern is plainly cost. Emissions trading may well offer cost-effectiveness at the macro-economic level, but certainly not for the individual enterprise if based on full auctioning.

If a company is required to reduce emissions in the range of 20-30%, the cost of buying allowances to cover the remaining 70-80% of emissions from production which will still be necessary may easily exceed the cost of the cuts themselves by a factor of five or more. Producers of steel or cement may understandably fail to see the merit of a climate policy driven by cost-effectiveness that results in production costs several times higher than they would have faced if they had only been requested to achieve the reduction, as usually required in environment policy.

Within the ETS, producers may benefit from doing more if their reduction costs are *lower* than those of others (making it possible for them to sell surplus allowances at a higher price than their actual costs) or by buying part of the allowances they need (if their reduction costs turn out to be *higher* than those of others). The potential benefit of such operations, however, is much smaller than the significant extra cost of full auctioning.

It may have come as a surprise to some that European industry is unhappy with a market-based system launched under a cost-effectiveness headline. However, the above example demonstrates that this is, in fact, not at all surprising.

It is also important to stress that the potential loss of competitiveness has less to do with whether other parts of the world will be subject to comparable emission reductions than whether their governments will want to let their industries get away with just paying the cost of the reductions or will insist on a policy that may well impose five to ten times higher costs on those sectors.

From this perspective, proposals to protect EU industries against imports through special duties on energy-intensive products do not appear convincing. It is easy to imagine a lawyer arguing successfully in front of a World Trade Organization panel that deliberately shooting yourself in the foot is not a justification for import duties on feet!

The current discussion on energy-intensive industries in the ETS appears to be following a traditional pattern in environmental policy. All too often, different industries have argued against justified environmental policies on the basis of hugely exaggerated cost estimates, such as in the case of sulphur emissions from power plants and conventional car emissions. But the fact that industry has been wrong in the past does not mean that it always is. A proper impact assessment should have clarified this beforehand.

The industry's suggestion that sufficient allowances should be allocated for free to cover the level of emissions corresponding to 'best available technology' (benchmarking) makes sense. It would preserve the cost-effectiveness aspect of the ETS and could be gradually tightened as more efficient technologies are developed. It would also be consistent with the 'polluter pays principle' which, contrary to a widely-shared perception, calls for the cost of emission reductions – not emissions *per se* – to be met by those from whom they are requested.

It is evident that the strong arguments in favour of the full auctioning of allowances in the electricity sector and the equally strong arguments against full auctioning in energy-intensive industries spoil part of the 'beauty' of the system – maybe even the dream of a global carbon price, which many economists see as the necessary over-arching response to the climate change challenge.

The question of whether a 'one size fits all' ETS is appropriate will be addressed later in this paper, as part of the overall assessment of the scheme.

Aviation

Including the aviation sector in the ETS is unlikely to have a major impact on the industry's CO₂ emissions. This was never the EU's preferred option for reducing aviation emissions, but the barriers within the International Civil Aviation Organisation (ICAO) agreement to jet-fuel taxation and resistance to other measures has left the EU with few options.

When Sir Rod Eddington, then CEO of British Airways, went public with his suggestion that aviation should be included in the ETS, it was against the backdrop of justified expectations of a CO₂ allowance price of around €20 per ton and free allocation of at least 90% of the allowances required. This would translate into a cost of €0.25 per seat for a 1,000 km flight – certainly a price worth paying for avoiding more radical steps in the next decade. At €30 per ton of CO₂ and full auctioning, the cost goes up to around €3.50 per seat per 1,000 km – still not an amount likely to affect the demand for air transport significantly. (At \$1,300/€800 per ton of jet fuel, fuel costs are currently in the range of €30 per seat per 1,000 km. This is more than double the price three years ago, but has not had a serious impact on the volume of air traffic).

In a system with full auctioning, it is possible to limit the number of allowances auctioned to the level deemed consistent with emission reduction needs, but, given the aviation sector's low price sensitivity, the effect of this will rather be increased pressure (higher prices) for additional reductions in non-aviation sectors – a consequence likely to be welcomed by the electricity sector and opposed by energy-intensive industries.

The political sustainability of such a situation is questionable, even though it is perfectly defensible from a narrow economic point of view. If the aviation sector is less sensitive to CO₂ prices than the electricity

generation sector or heavy industry, this reflects either consumer preferences or the possibility of cheaper technologies for reducing emissions in these sectors.

There appears to be scope for fuel-efficiency improvements in air transport. The expectation of continued high oil prices, with the 'market' appearing to doubt the International Energy Agency's predictions of a long-term oil price in the range of \$60 per barrel, is likely to ensure that more attention will be paid to this in future aircraft development. However, CO₂ prices do not seem likely to be a particularly strong driver in aircraft technology or a significant brake on future air transport demand over the next 10-15 years. Alternative policies should not be discarded.

Overall assessment

The ETS has been widely praised from many different corners as the most innovative example of environment legislation in recent times. To what extent is this justified and are the changes to the scheme recently proposed by the Commission likely to turn it into a successful instrument for delivering significant CO₂ emission reductions in a cost-effective way?

It is important to stress that cost-effective reductions are the only valid criterion for measuring success. Neither the multi-billion-euro business generated during the 2005-07 trading period, nor the March 2008 CO₂ trading price of €20-25 per ton, should be used to judge the success of the scheme.

At best, the 2005-07 trading period has been a conditional failure: a failure because it did not deliver any reductions (apart from some limitations on unrestricted coal use during the first half of the period – a result that could easily have been achieved through conventional policies); conditional because 2005-07 was deliberately seen as a learning period.

So are there reasons to expect the current 2008-12 period to deliver the (hopefully cost-effective) reductions necessary to allow the EU to meet its current Kyoto commitments and put it on track to meet the future targets? The answer remains very uncertain.

A basic idea behind the ETS is that those enterprises which have the potential to reduce their emissions relatively cheaply will benefit from this by investing in achieving greater reductions than are required by the number of allowances received.

However, whether such investments will be profitable or not depends on the future CO₂ price, which is clouded in uncertainty at the moment. Furthermore, any investment decided upon today would only deliver real reductions after three years or more – the time needed to complete the company's internal decision-making process, regulatory procedures and construction. This implies that any return on investment in the present trading period will be very limited (and the post-2012 situation is as yet unknown, as far as both the international and the EU regime are concerned).

In view of the importance of medium- to long-term predictability, it is particularly worrying that the Commission has decided to postpone making a proposal on the conditions under which the allocation of allowances to energy-intensive industries will take place. As suggested above, the Council and Parliament should fill this policy vacuum on the basis of the free allocation of allowances according to strict benchmarking.

Clean Development Mechanism

The other major risk to the functioning of the current trading period is the uncertain role that Clean Development Mechanism (CDM) credits may play.

The CDM was established by the Kyoto Protocol (Article 12) and aims to promote cooperation between industrialised and developing countries in combating climate change.

Projects in developing countries that contribute to a lower level of CO₂ emissions than otherwise expected (by using renewable energy or making energy-efficiency improvements) can, if certified by a special United Nations body, sell reduction 'credits' to industrialised countries, which can use them to meet their commitments under the Kyoto Protocol. This possibility has been extended to companies in the ETS.

The final volume of CDM credits for the 2008-12 period remains uncertain, but 5% of overall EU-15 emissions appears to be a realistic estimate. This would reduce the need for 'domestic' EU reductions from 8% to approximately 3% for the period.

The proposal to allow CDM projects initiated during the current period to deliver reduction allowances in the post-2012 trading period might well lead to a rush towards cheaper CDM – generated allowances towards the end of the 2008-12 period – a generous gesture towards developing countries, but not necessarily of benefit to the global climate.

It is already obvious that many CDM projects have failed to deliver the additional reductions in developing countries that were cited as the justification for the scheme. Instead, they have provided external financing for projects that would have been launched anyway. (A number of Chinese investors in renewable energy have, for example, insisted that their wind farms or biomass-fuelled power plants would have been built even without CDM support, but that this was a very welcome source of financing.)

The problem is not support for renewable energy in developing countries *per se*, but rather the fact that the CDM does not deliver the additional reductions in developing countries necessary to justify the reduction in the commitment of the country which co-financed the project. There is, however, an easy way out of this.

Industrialised countries must stick to the principle of supporting developing countries in pursuing climate-friendly policies, financially as well as technologically.

In the EU's case, assuming that ten percentage points of the overall reduction commitment envisaged for 2020 (30% relative to 1990 emissions in the event of an appropriate international agreement) would be delivered via CDM projects, the total CDM transfer would amount to around 400 million tons of CO₂ equivalent. This corresponds to a transfer of €4 billion annually – a relatively insignificant amount compared to the €60 billion estimated by the Commission for an overall 20% reduction, or the estimated €30-50 billion in annual revenue which would be generated by auctioning allowances under the ETS.

The system would be much more transparent (and honest) if the industrialised countries' reduction commitments and financial support for developing countries were separated. After all, the CDM in the Kyoto Protocol is based on a US proposal that the EU only reluctantly accepted in order to keep the US in the process. There is no need for the Union to defend this particular mechanism after it has been demonstrated that it is of questionable value, when there are much better ways of supporting developing countries in their efforts to develop in a more sustainable way.

A final element that could greatly enhance the environmental efficiency of the ETS would be to establish a 'floor' price, adding a paragraph to the current Commission proposal stipulating that the Commission would not sell any allowances for less than, for example, €30 per ton and that it would buy back allowances if the market price fell below that level.

This would be simple, would not cost the Commission anything and would be a major step towards creating the level of predictability often mentioned as a virtue of emission taxes. It is also hard to imagine that there would be a sufficient economic incentive to achieve the medium- to long-term reduction targets if the price was below €30 per ton of CO₂.

It is still far from clear that the 'one size fits all' philosophy is the best way to proceed in the ETS. However, in any case, the following three amendments to the current proposal would greatly enhance its chances of fulfilling its original objectives:

- decide now on a benchmarking-based system for allocating allowances to energy-intensive industries for free;
- detach support for developing countries from internal EU commitment reductions;
- establish a floor price for allowances.

Time is of the essence. The current Kyoto commitments are not going to deliver much more in terms of global emission reductions than would have been the case without the Protocol (and less than would have resulted from proper implementation of the commitments in the Climate Convention). The Fourth IPCC Assessment Report and other studies have highlighted that Europe cannot afford to continue losing time as it has done over the last 20 years if it wants to avoid serious negative impacts on the global climate. Current EU policy must be reinforced to meet that challenge.

Renewable energy sources

In 1997, the year the Kyoto Protocol was agreed, the Commission published a Communication suggesting that the EU should take steps to increase its share of renewable energy from approximately 6% of gross energy consumption to 12% by 2010.

The Commission's ideas were well received by the then 15 EU Member States and were later accepted as a guideline for subsequent legislation, such as the 2001 'Directive on the Promotion of electricity produced from renewable sources' and the 2003 'Directive on the Promotion of bio-fuels in transport'. However, the 12% target itself was never turned into binding legislation. The fact that 12% happened to be twice as much as 6% led some Member States with low shares of renewable energy sources to be satisfied with doubling their low share (Germany, for example, adopted a national target of 4%, up from 2%, in 2000) and Member States which already had RES shares above 12% felt that they were 'off the hook'.

Against this backdrop, it is no surprise that progress towards the 12% target has been modest. In 2006, the RES share stood at around 6.5% for the EU-27 (corresponding to around 7% for the EU-15, since the new Member States generally have lower RES shares than the 'old' ones), and this is unlikely to rise significantly above 8% by 2010, if at all.

Measured against the proposed increase from 6 to 12%, this is less than half of the performance aimed for. It reflects disappointing progress in increasing the use of biomass, although wind energy – foreseen as the other main contributor to increasing RES shares – has actually over-performed relative to expectations in 1997.

It must be noted that the conventional method of calculating contributions from different renewable energy sources to the overall energy balance underestimates the value of wind energy (and hydropower) by only giving 'credit' for the energy content of the electricity produced, whereas electricity generated by biomass combustion gets 'credit' for the energy content of the biomass used, which is usually 2.5 times the energy content of the electricity generated (and is therefore credited for the 60% of the energy lost in the generation process).

Overall results under the 'RES in electricity' Directive have been better, as would be expected from the above, since wind energy automatically gets full credit for its value when measured as a share of the total electricity generated. It is therefore likely that 70% of the eight percentage point increase originally aimed for (14-22% for the EU-15 when adopted in 2001, modified to 21% after enlargement) can be achieved by 2010 – roughly the same 'success ratio' as expected for the bio-fuels directive (with its target of 5.75% in 2010).

The new policy

At their Spring 2006 European Council, EU Heads of State and Government took the relatively unusual step of responding to the Commission's Green Paper on Energy Policy by proposing that the Commission should "consider" an overall renewable target for 2015 of 15% and an 8% target for bio-fuels in transport.

In view of the relatively slow progress achieved so far and the lack of a proper impact assessment, this was a fairly courageous step and the Commission's response, in its January 2007 Energy Policy Package, was no less wise: a binding 20% overall RES target and 10% for bio-fuels in transport by 2020. Given the 'backlog' in achieving the 2010 targets and the time it takes to get new EU legislation in place and implemented at national level, ambitious 2015 targets would have stood little chance of being met and targets for post-2020 would have lacked the necessary urgency.

More regrettable is the lack of a sufficient impact assessment, which should have shed light on the impact of dropping the separate target for RES in electricity – a sector in the process of becoming increasingly transnational and the strongest EU driver for RES development to date. A proper impact assessment could also have provided a better basis for the very important discussion on the implications of a greater use of bio-fuels.

Not surprisingly, the Spring 2007 European Council endorsed the Commission's proposal, including the plan to make the targets binding. To do this, it was clear that the Commission would have to go back to the drawing board and prepare the necessary proposals for legally binding decisions, spelling out who would be bound to do what to meet the collectively agreed targets.

This is basically what the Commission's proposal of January 2008 does. However, the debate which followed the Spring 2007 European Council demonstrated that getting agreement on this would be more demanding than many had assumed when German Chancellor Angela Merkel declared 'victory' at the 2007 Summit.

The price paid for the Spring Council consensus on *binding* targets was that many Member States were promised that the subsequent proposals on 'burden sharing' would take account of their special circumstances. However, this was not matched by any Member States offering to achieve more than the average 13 percentage point increase necessary to get from the (estimated) 7% in 2007 to 20% in 2020.

In addition to the difficulties in making the burden-sharing ends meet, the question of the methods used to calculate RES credits has become important. Continuing to use the traditional methodology would have provided big incentives to use biomass rather than wind for RES electricity, even if this would result in less CO₂ emission reductions or fossil-fuel substitution. In addition, from almost any other point of view (the general economy, resource availability, etc.), wind is the most attractive RES for electricity.

The Commission has responded to criticism of the existing methodology by switching to measuring RES contributions against final energy consumption. This is an unconditionally positive step and must be maintained in the ongoing negotiations. However, achieving the 20% RES target is a different task depending on which methodology is used.

Since 2007, this change in methodology has meant that estimates of the share of RES in 2005 have gone up from 6.5 to 8.5%, and what was declared to imply a tripling of 'current' RES levels at the Spring 2007 European Council is now down to little more than a doubling. In fact, recalculating the 'new' 20% target using the traditional methodology would most likely point to an increase to just 15-16%.

This should by no means suggest going back to the old methodology, and the Commission (and Council) can still claim that they are pursuing an ambitious strategy. The targets cannot be met without increasing the rate of RES penetration over the next decade by a factor of four compared to the present decade (the 'old' 20% target would have required a factor of close to six) and the value of a certain percentage point increase would be higher under the new methodology if this leads to an increase in wind energy's share of the overall mix.

Burden sharing

It is difficult to imagine a burden-sharing methodology that would not prompt claims from several Member States that they have been treated unfairly.

The approach chosen by the Commission – to share out half of the required 11.5% increase (the 20% target minus 8.5% currently) on a ‘flat rate’ basis and the remaining half on a ‘GDP *per capita* graduated’ basis – with a modest rebate for Member States with a good record of early action – appears to be a very good choice.

Unfortunately, there is reason to fear that the Council’s deliberations will be dominated by efforts by individual Member States to get their proposed percentages reduced. The EU Presidencies tasked with carrying the proposals through to a Council decision would be well advised to postpone any discussion of national requests for lower targets until the Working Group reviewing the EU’s ETS has come to an agreement on which targets could be increased if others are reduced. The Commission could also well be asked to shed some light on how the different numbers were arrived at, given that the commitments for Belgium, Finland and particularly Luxembourg seem low when judged against the criteria outlined above.

One must hope that the European Parliament will support a fair distribution of the required effort. This is clearly an opportunity for the Parliament to demonstrate that it can contribute to the debate from the European perspective rather than along national lines.

Trading certificates of origin

If it is true that the Commission was originally planning to introduce a compulsory trading system for ‘green certificates’, one can only welcome its decision to abandon the idea.

Insisting that Member States take responsibility for ensuring the implementation of measures to achieve high shares of RES with considerable cost implications, while at the same time allowing full trading in different types of renewables supported by different schemes, would have been a high-risk experiment.

The lesson from the ETS – where no significant emission reductions have been observed in the industries included within its scope in the six years or so since the Commission first proposed the scheme – should not be ignored. This is not to deny that a great deal of trading has taken place, but, as has already been pointed out, that should hardly be the criterion for measuring success.

That said, the distribution of RES throughout the EU follows a quite different pattern from the distribution of commitments between Member States. A mechanism that allows Member States to trade their commitments easily will make the overall exercise more cost-effective, as well as providing development opportunities for less wealthy Member States more generously endowed with RES. The negotiations should clarify whether the present proposal allows for this or whether a specific Member State-to-Member State trading system should be introduced.

Bio-fuels

The quasi-agreement between the Council and Commission to increase the share of bio-fuels in motor fuels for road transport up from around 2% now to 10% by 2020 is likely to be the most controversial part of the Commission’s RES proposal – or at least it should be.

When the Commission proposed pushing for a certain percentage of motor fuels to be composed of bio-fuels in 2001, it did so against the backdrop of an increase in oil prices during 2000 and the fact that around 10% of Europe’s agricultural land had been taken out of use to combat food over-production.

The target of 5.75% by 2010 was estimated to be well below the quantity of fuel that could be generated by crops being cultivated on set-aside land. Furthermore, although it was recognised that bio-fuels were often inefficient in reducing CO₂ emissions – and were certainly not cost-effective in an overall climate strategy – it was estimated that, with oil prices in the range of \$70-90 per barrel, they would break even economically.

Without strong pressure on national governments from the agricultural sector, the proposal would probably not have been adopted. However, much has changed since 2001 – or indeed 2003, when it was agreed.

In particular, oil prices have increased to a level where at least some bio-fuels should have become competitive without subsidies. This has not happened. Increased production costs, particularly the price of raw materials, have moved the goal posts for competitive production almost as fast as the price of oil has increased.

Bio-fuels have been blamed for increases in corn, wheat, soybeans or palm oil prices. However, factors other than the relatively modest increase in global bio-fuel production currently seem to be equally important, although many studies appear to agree that future global demand for food will leave little room for significant withdrawals of food crops for motor fuel without significant upward pressure on food prices and/or serious environmental impacts from increased demand for land and water.

Furthermore, processes that convert cellulosic (non-food) material such as straw or wood into bio-ethanol or bio-diesel may be close to commercialisation. Enzymatic fermentation of straw or wood yields so-called 'second-generation' bio-ethanol, and gasification of biomass and subsequent catalytic conversion of the gas into hydrocarbons delivers a high-quality, second-generation bio-diesel. There is no doubt that these processes are technically possible, but their cost, yield and energy efficiency are currently either unsatisfactory or uncertain.

Finally, the environmental impact of bio-fuel production (particularly of the associated land-use changes in some developing countries) is now causing more concern than in 2001. It seems clear today that little of the EU land which was previously set aside has been used, or will be used in future, for growing bio-fuels. Land presently covered by tropical forests – whether in South America or South-east Asia – may well end up providing the additional bio-fuels for the EU, with a subsequent loss of biodiversity and, in some cases, high initial CO₂ emissions, outweighing the value of the substitution for decades to come.

With an increasing number of red lights flashing and insufficient impact assessments behind the proposal, the bio-fuel target should not be adopted as proposed at this time.

The Commission's proposed certification scheme does not solve the problem. There is sufficient sugar cane or palm oil being grown in existing plantations to allow apparently 'sustainable' bio-fuels to enter the EU market (assuming no fraud in the system – a somewhat optimistic assumption, judging from experiences in the tropical timber certification scheme).

However, this will only lead to new land being cultivated for uses previously covered by existing production. For example, Brazil has pointed out that increased sugar cane production will not be on land presently covered by tropical forests. But if it is on land currently used for soybeans, and tropical forests are burnt down to provide land for new soybean production to compensate for the land used for sugar cane, where is the difference?

Any certification scheme that only looks at direct effects provides an illusionary comfort. This is worse than nothing. As a minimum, no bio-fuels should be imported from countries that do not practice sustainable land-use management. If such a policy is not consistent with World Trade Organization rules, there would be scope for WTO to take a second look at those rules.

This should not be taken to suggest that bio-fuels as such are a mistake. It just means that care must be exercised and up-to-date knowledge taken into account in implementing an EU bio-fuels policy.

The concerns over future oil supply constraints make transport fuel savings and substitution essential in EU energy policy. However, four conditions have to be met in order for bio-fuels to meet acceptability and efficiency criteria:

- they must deliver at least a 50% CO₂ emissions' reduction compared to conventional motor fuels on the basis of a life-cycle analysis;
- whether EU-produced or imported, they must be produced sustainably and sustainability assessments must include direct as well as indirect effects, including the need for sustainable overall land management;
- they should not be derived from raw materials used for food unless a significant impact on global food prices can reasonably be excluded;
- their production must respect the usual energy efficiency criteria in order to ensure a responsible use of biomass resources, a criterion that will become increasingly important in a world moving towards less fossil fuel and more renewable energy.

These criteria do not exclude future development of bio-fuels, but they do restrict the options.

If the current forecasts from UN's Food and Agriculture Organization (FAO) are to be believed, first-generation bio-fuels do not perform well, in terms of either reducing CO₂ emissions or their impact on food prices. The current plans for importing bio-fuels (bio-ethanol from Brazil or palm oil derivatives from South-east Asia) are far from convincing candidates.

Furthermore, some second-generation bio-fuels (such as synthetic bio-diesel) may represent a waste of precious biomass if they only provide a 50% energy yield. Using biomass to replace gas oil or natural gas currently used for heating and, subsequently, the gas oil or natural gas used for road transport, would result in more CO₂ reductions, more oil substitution and lower costs per unit of biomass used.

Which bio-fuels are therefore still attractive? Waste material that can be turned into motor fuels with acceptable energy efficiency qualifies. Two good candidates for bio-diesel are slaughterhouses that burn large quantities of waste animal fat and the food industry, including restaurants, which generates significant quantities of waste cooking oil.

Bio-gas can also be used as a bio-fuel, as already demonstrated in Sweden, and if combined with a policy to promote greater use of natural gas as a motor fuel – a policy that makes sense from a climate as well as from an oil security policy point of view – could deliver a solid contribution to a bio-fuels target.

Second-generation bio-ethanol or bio-diesel may be produced efficiently enough if combined with waste-heat utilisation or produced in 'bio refineries' which ensure 'intelligent' use of the total biomass.

Finally, EU renewable energy policy should give equal credit to the use of renewable electricity in transport. In recent years, plug-in hybrid and even electric-only vehicles appear to have developed into more realistic alternatives to conventional vehicles – and certainly no less attractive possibilities than bio-fuels.

In conclusion, the right bio-fuels strategy should take priority over one that prematurely fixes a medium-term target with uncertain, if not unwanted, consequences. Taking a few more years to better assess the results of the current strategy, and developing a framework for the possible use of gaseous bio-fuels or electricity, will not prevent the EU from achieving 10% renewables in transport by 2020 and will not affect the overall 20% target for renewables by 2020.

A binding target of 5.5% bio-fuels by 2014 would still allow a 10% target to be reached in 2020, with annual increases of 0.75% during the 2014-20 period – the rate of increase originally foreseen in the 2001 proposal.

Within such a modest 2014 target (the current legislation calls for 5.75% by 2010), a certain share could be imported from developing countries on condition that they demonstrate sustainable land and forest

management in the near future – a condition not currently being met in potential bio-fuel exporters such as Brazil, Indonesia or Malaysia. The slower expansion of bio-fuel penetration would also give other, less-advanced developing countries (in, for example, sub-Saharan Africa) an opportunity to develop a sustainable bio-fuel industry.

The certification of countries rather than of individual plantations or batches of bio-fuel would not only provide a better guarantee of true sustainability, but would also encourage more sustainable forest management in countries where excessive deforestation has been the order of the day for decades. The WTO has a golden opportunity to demonstrate some green credentials in this area.

With modest imports of bio-fuels (for example, up to 20% of total EU bio-fuel consumption), an accelerated use of waste animal fat and cooking oil, a modest contribution from demonstration projects for second-generation bio-fuels, a more aggressive policy on using bio-gas and, hopefully, some electricity in transport, the required quantity of first-generation bio-fuels would not have to exceed a few per cent of total motor fuel consumption, keeping it at a level where any serious impact on world food prices would be avoided.

All the uncertainties surrounding the future potential for – and the impact of – different types of bio-fuels call for more trial-and-error oriented development at the political level. Picking winners is obviously not possible today, but promoting losers should be avoided. This is a challenge for which there is no quick fix.

Energy savings and efficiency

It has long been recognised that energy savings and improved energy efficiency offer the biggest short-term potential for cost-effective reductions in greenhouse gas emissions, while at the same time offering a valuable contribution to improved security of energy supply.

A string of EU actions over the years has demonstrated that the political determination to act has gone beyond mere rhetoric in after-dinner speeches. These include the SAVE programme, the Intelligent Energy Europe programme, the fuel-efficiency agreement with car manufacturers and importers, energy efficiency labelling requirements, directives on energy services and on energy efficiency in buildings and, during this Commission, an energy efficiency action plan. However, regrettably little has actually been achieved.

In this connection, a trap must be avoided. It is increasingly common to highlight national reductions in energy intensity (i.e. energy consumption per unit of GDP) as a measure of energy efficiency. Clearly, energy savings or efficiency improvements lead to lower energy intensity, but lower energy intensity is often (most often, in fact) explained by factors other than improved energy efficiency.

Most economies in the world develop faster in less energy-intensive sectors (such as IT and services) than in traditional manufacturing sectors and, generally, technological developments provide solutions which require less energy (due, for example, to the use of new materials) – not necessarily the result of determined policies.

A recent EPC Task Force on the 'Rational Use of Energy', which reported its findings in a publication in March 2008 on *Gain without pain: towards a more rational use of energy*, looked at four sectors – buildings, appliances, transport and industry. In all four, the same pattern could be observed: to increase the take-up of energy-efficient technologies and equipment, a pay-back period of two, or three years at most, appears to be necessary.

Home-owners, buyers of cars or appliances, and operators of industrial processes seem unwilling to invest in energy efficiency unless they can reasonably expect a return on their investment of well above 20% per year.

Many explanations have been offered for this 'irrational' behaviour. Some economists have even tried to explain it as rational in that it reflects the higher value economic operators attach to money 'here and now' rather than to money (hopefully) in the future.

It is beyond the scope of this paper to prescribe the medicines to combat this malaise. Evidently, different approaches are required in different sectors. But there is an obvious contradiction between opinion polls suggesting that the public sees climate change as the biggest challenge facing the world today and the fact that most people are still only ready to take action to combat it if they can make a comfortable annual gain of 20% or more.

Where would we be now in terms of reducing SO₂ emissions from power plants and NO_x emissions from cars, or on the treatment of domestic or industrial waste water, if comparable economic thinking had been applied?

The recent focus on market-based mechanisms – to the extent of marginalising other policy instruments – may be a problem. It is noteworthy that Denmark's remarkably good performance in combining managed energy consumption with 70% economic growth over a 25-year period was largely due to conventional 'demand-and-control' policies, often with a good dose of economic incentives added.

The current Commission has not performed well on energy efficiency. Energy Commissioner Andris Piebalgs was right in identifying energy efficiency as his priority in the context of the publication of the Green Paper on Energy Efficiency in 2005, but this no longer seems to be the priority it was then. The 2006 Energy Efficiency Action Plan did not deliver a convincing follow-up to the Green Paper, sufficient resources have not been allocated to this in the relevant Directorate-General and the whole issue appears to have been submerged in the more 'glamorous' flow of climate change policy during the last year.

Energy efficiency was absent, both in the Commission and in the European Council, when 'binding' targets were discussed and 'agreed'.

It would be unfair to put the blame for missed energy efficiency opportunities primarily on the Commission. In fact, historically, the Commission has been more progressive than virtually all the EU's Member States, and the recent reports from Member States on their energy efficiency policies (required under the energy services directive) confirm this judgement.

But the Commission can justifiably be criticised for failing to maintain the momentum, without which any expectation of a radical – and necessary – shift in overall EU energy efficiency policy can be written off, at least for a good number of years.

II. The external dimension

The EU took the lead in pressing for strong commitments in the negotiations on the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and on the 1997 Kyoto Protocol (KP). The EU is also, without doubt, the main – in fact, the only major – driver behind the push for post-2012 commitments, whether in the form of new commitments within the KP framework or a new instrument.

The currently agreed EU position of a 30% reduction of greenhouse gas (GHG) emissions from industrialised countries by 2020 relative to their 1990 emissions is not immediately consistent with the 'Kyoto architecture', which would have called for commitments for five-year periods following the current 2008-12 period; that is 2013-17, 2018-22 etc.

It would, of course, be possible to agree that any 2020 target would effectively be an 2018-22 average target, recognising that the inability to make progress in the negotiations in recent years means that the 2013-17 period has been 'lost' in the turmoil.

Whatever the formal framework for future commitments, a number of sizeable barriers will have to be overcome.

First among these is the type and ambition of the commitments to be undertaken by industrialised countries after 2012. Next is the question of what commitments developing countries will have to sign up to. This, and a number of other issues such as technology transfers, financial support, adaptation etc., will have to be dealt with in the (very) limited time available before the United National Climate Change Conference (COP15) in December 2009, where it is hoped that an agreement will be reached.

This group of interconnected problems has one common key: the United States. It is inconceivable that industrialised parties to the UNFCCC will be able to agree collectively on any future commitments which go much beyond what the US is ready to undertake. It is also inconceivable that major developing countries will commit themselves to go beyond their current UNFCCC commitments without clear leadership from industrialised countries, including the US. Finally, significant progress is unlikely with the current US administration.

The timing

In spite of more forthcoming language on climate change from the Bush administration over the past year, there has been no significant movement on substance.

The current US approach is based on the assumption that new technology to be applied voluntarily in the future will deliver the necessary response to the climate challenge. However, embarking on substantive negotiations from this point of departure is useless, maybe even dangerous. Only a new administration offers any hope of US support for a sufficiently ambitious agreement (given that an insufficient agreement is worse than no agreement at all, since any agreement, such as KP, 'locks' the situation for a long period).

Against this backdrop, the real time available to strike an agreement in 2009 is extremely limited.

Under normal circumstances, the key people necessary for the US to engage in substantive negotiations are unlikely to be approved by the Senate until several months after the inauguration of the new President in January 2009. It would also be naïve to believe that climate change – although undoubtedly a priority for George W. Bush's successor – will be given priority over issues such as the economy or the Iraq conflict.

Furthermore, US negotiations will be framed by what a new Congress is likely to be ready to endorse – and it may take some time for the answer to this question to become clear.

The future US negotiating position will not only be about reducing emissions by a certain percentage. The base year, currently 1990, will also certainly be up for discussion, and this is an issue for other industrialised countries as well. Against the backdrop of a strong increase in GHG emissions since 1990, the US, Canada and Australia are certain to call for a more recent base year, whereas Russia and other countries with high 1990 emissions compared to the present levels are likely to insist that it remains unchanged. Different base years might solve this problem, but unfortunately this would leave significant loopholes in the final result, as was seen in the KP.

On top of this (or rather, after this) come the negotiations with developing countries. Certain issues can be negotiated in parallel, but it is unlikely that developing countries will move significantly before they see clear commitments from the industrialised countries, and experience shows that developing countries take a long time to come to an agreement.

In view of the diversity among developing countries, this should not come as a surprise or be held against them. However, the greater the time pressure, the higher the risk of a 'lowest common denominator' agreement, which, in climate negotiations, is usually the one promoted by Organization of the Petroleum Exporting Countries (OPEC) members.

The biggest risk in the upcoming negotiations is that too much prestige will be attached to reaching an agreement at a time when the situation does not make it possible to arrive at the right agreement. There is no doubt that any accord will be sold as a success – if not with better arguments, then with the argument that it was the best agreement possible.

Industrialised parties' commitments

"Common, but differentiated responsibilities" has been the formula that has kept industrialised and developing countries together within the UNFCCC and KP.

The 'historic' agreement that industrialised countries must take the lead in reducing GHG emissions is clearly justified and hardly needs any explanation. However, in recent years, industrialised countries appear to have taken this commitment more lightly, whereas major developing countries have stubbornly – and with justification – insisted that without clear commitments from industrialised countries (not least the US), commitments from developing countries that go beyond the UNFCCC are not on the agenda. In this perspective, the importance of industrialised countries' commitments goes beyond their direct impact on emissions.

The ongoing debate on post-2012 commitments has focused on 2020 emission reduction targets – an approach similar to that applied in the KP, but different from the UNFCCC, where the concrete commitments are framed as a commitment to "adopt policies and take measures" to mitigate future emissions. Far too little attention has so far been paid to how best to phrase future commitments.

Unfortunately, the experience to date with target-based agreements is unconvincing. Few of the parties to the KP have taken the steps necessary to comply with their targets and the only way to achieve compliance may be through excessive use of the 'flexibility mechanisms' in the Protocol – something that has become very easy given the generous ceilings some parties (Russia, Ukraine, new EU Member States) negotiated in Kyoto. Similarly, within the EU, several Member States have ignored the targets they agreed within the "burden-sharing agreement" linked to the ratification of the KP.

So far, too little attention has been paid to the potential merit of phrasing the commitments in the form of specific policies and measures.

The EU, US, Japan and other industrialised countries have a long history of successful environment policies based on imposing specific requirements on enterprises, equipment and materials. An agreement that focused commitments on 'policies and measures' might look less ambitious than the

EU's current approach, but it might have a better chance of delivering valuable results. It would also allow for continuous updating (adding new or strengthening existing measures) – unlike medium-term targets, where it only becomes possible to judge the outcome after more than a decade.

Many such 'policies and measures' can be envisaged. A ban on new coal-fired power plants without carbon capture and storage (CCS) is an obvious case; improved energy efficiency in cars and alternative motor fuels is another. CO₂-free energy is definitely a candidate (different parties might have different opinions on nuclear energy, but all should be able to agree quantitative targets for renewables). Measures to improve the energy performance of new and existing buildings are also unavoidable if long-term climate objectives are to be met.

Benchmarking in certain industries (such as steel, cement, pulp and paper) could support ambitious emission reductions in energy-intensive industries, while at the same time contributing to reducing suspicions of anti-competitive behaviour by companies.

Phrasing the binding commitments in the form of 'policies and measures' should not imply that the necessary reduction levels should be ignored. They must set the overall objective within which – and consistent with which – the commitments will have to be negotiated.

There are convincing arguments that targets are much less efficient than is often assumed: for example, in spite of a European Council decision in 2007 on an unconditional, binding 20% emission reductions by 2020, several EU Member States are pressing ahead with plans to build new coal-fired power plants without CCS over the next 10-12 years.

Targets without policies are about as efficient as you want them to be, but policies by themselves usually come much closer to delivering what they promise.

Developing countries' commitments

The concept of 'developing countries' has changed dramatically since the 1990s, when the UNFCCC and KP were negotiated.

However, the UN system still reflects the situation decades ago, with countries such as Singapore and the United Arab Emirates – whose GDP *per capita* is now well above that of many 'industrialised countries' – still considered as developing countries. In addition, the economies of many major cities or regions in developing countries (such as Sao Paulo or Shanghai) have developed to Organisation for Economic Cooperation and Development (OECD) levels. It is broadly recognised that a post-2012 climate regime must, one way or the other, reflect this development.

Framing industrialised countries' commitments in the form of reduction targets does not facilitate the inclusion of major developing economies in a post-2012 regime. Developing countries with average GDP *per capita* well below that of the US, Japan or the 'old' EU Member States are clearly not ready to accept commitments to reduce or limit emissions that would tie them into a situation where they would be required to consume less energy than industrialised countries. It would certainly facilitate progress towards a global agreement if industrialised countries, in spite of whatever good arguments they might provide, recognised this.

An agreement based on policies and measures would therefore stand a much better chance of engaging major developing countries constructively in the process.

China probably offers the most convincing example: Beijing would not be prepared to stop building new coal-fired power plants next year, not least given that its *per capita* coal consumption is well below that in many OECD countries (including several EU Member States). However, the Chinese authorities are well aware that they cannot go on expanding coal consumption as they have done in recent years.

If OECD countries committed themselves to an ambitious coal policy, there is reason to believe that China would follow suit after some years.

Similarly, China is as concerned as others about future oil supply and would certainly see transport energy efficiency as a national priority.

Renewable energy is another area where China, entirely for national reasons, adopted a more progressive medium-term policy in 2007 than many OECD countries, and where there would certainly be scope for more. Many Chinese experts believe, for instance, that the Chinese 2020 wind energy target of 30 GW-installed capacity can be achieved much earlier, opening up possibilities for significantly raising the target. Developments in CCS in China also suggest that we might soon see a 'reverse' transfer of technology from a developing country to OECD countries.

Technology transfers and financial resources

Technological and financial support for developing countries in their efforts to develop economically with the lowest possible level of GHG emissions was key in reaching agreement on the UNFCCC and KP.

The Clean Development Mechanism (CDM) in the Kyoto Protocol has offered a particularly attractive instrument in this respect. Unfortunately, it was driven by cost-minimisation objectives rather than by development goals and a real desire to achieve additional emission reductions in developing countries.

The section in this paper on emissions trading has addressed the risk that the CDM will prevent the development of sufficiently strong price signals within the ETS and that the host country's emissions' reduction will not offer the additionality necessary to justify the emission credits.

Questions can also be raised from a development policy point of view. Roughly half of the investment in CDM projects today has taken place in China – not necessarily the strongest candidate for financial support.

It is essential that financial support to developing countries be increased in the future. If the Commission's estimate of the cost of the entire range of EU climate change policies – €60 billion a year for a 20% reduction by 2020 – is accurate, the €2-4 billion annually that can be expected to go into CDM projects would be much better spent on direct support for energy or forest projects in developing countries without the opaque emission credits and in a way that would better reflect development priorities.

A comparable contribution from other OECD (and similarly wealthy) countries could raise an amount in the order of €10 billion annually to support climate policy in developing countries. This amount would demonstrate that industrialised countries are serious, which in turn should encourage developing countries to engage seriously and allow the so-far rather sterile debate about 'technology transfers' to die away quietly.

Implications

The combination of too little time available for substantive negotiations and a problematic approach overall does not augur well for the outcome of the United Nations Climate Change Conference (COP15) in Copenhagen 2009.

These difficulties will certainly play into the hands of those who would be happy with an unambitious agreement. Past experience shows that, when such negotiations reach their end game, the best result achievable is normally preferred to a postponement. Such an outcome could imply an unacceptably high cost for the climate.

A post-2012 climate regime that focuses on commitments to take a number of specific actions – designed to recognise "the common but differentiated responsibilities" of industrialised and developing countries, and be consistent with medium-term needs as spelt out by the IPCC – appears to offer a better chance of

a global agreement able to deliver what is required. As well as allowing much more efficient monitoring and development than is possible with medium-term targets, it would also offer greater flexibility in terms of adding new measures, or tightening existing ones.

In principle, all this is possible within the existing Bali Road Map. All it would require is a much greater public and political emphasis on the sectoral approach, a part of the Road Map which currently appears to be largely neglected.

III. Conclusions

Climate change has become the main driver of EU energy policy, and EU energy policy holds the key to meeting the climate policy objectives. Developments over the last two years have moved recognition of this to the top of the political agenda. However, there is still some way to go to translate it into efficient policy responses.

This paper has identified a number of key points to be addressed if the ambition of a 20% or 30% reduction in greenhouse gas emissions by 2020 is to be achieved, particularly if this is to be done efficiently and without significant negative environmental or social impacts. The most important are:

1. The EU's Emissions Trading Scheme (ETS) must be designed to offer the long-term predictability, particularly on CO₂ prices, necessary to provide the basis for investment decisions. A floor price of, for example, €30 per ton of CO₂ in auctioning could deliver this.
2. The unhealthy linking of CDM to the ETS should be abandoned after 2013 and replaced with direct support for investment in climate-friendly technology in developing countries of at least €2 billion per year. Auctioning revenue or windfall profits in the electricity sector could provide the necessary funding.
3. The very different situations of the different participants in the ETS must be recognised and energy-intensive industries dealt with in a way that does not prompt justified complaints from the sector. Free allocation on the basis of benchmarking offers an opportunity to do this.
4. The insufficient progress to date on energy savings and efficiency requires greater efforts in this area. Existing buildings and industries must be required to undertake investments in energy improvements, if necessary supported by mechanisms for providing third-party financing.
5. New coal-fired installations without carbon capture and storage must be banned, as they are incompatible with both shorter- and longer-term CO₂ targets.
6. Setting a separate target for bio-fuels should be postponed for three to four years to allow for a proper analysis of impacts based on the new developments and a better analysis of other alternative fuels such as electricity and bio-gas/compressed natural gas.
7. Sustainability criteria for bio-fuels must include their impact on land use beyond the particular area where the crops are grown and criteria on the efficient use of biomass.
8. International negotiations on a post-2012 climate agreement must put much more emphasis on policies and measures, rather than focusing almost exclusively on reduction targets, both in order to avoid the risk of ending up with a weak agreement that closes off further opportunities for the next 12 years and to allow developing countries to participate more actively in the global effort to combat climate change.