CENTRE FOR EUROPEAN REFORM

HOW TO MAKE EU EMISSIONS TRADING A SUCCESS

Simon Tilford

CENTRE FOR EUROPEAN REFORM

about the CER

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How to make EU emissions trading a success

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Any remaining errors are the author's own. The views expressed within do not necessarily reflect those of Centrica and Merrill Lynch, whose support the CER is grateful for.

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Foreword

Centrica has been a long-standing and active supporter of the European emissions trading scheme. We believe that it is already having a positive impact on investment decisions, and is helping to deliver carbon emission cuts both in the UK, and across Europe.

The current Commission review of the scheme in advance of the start of Phase three in 2013 opens up a window of opportunity to significantly improve the scheme. We believe that this CER report will make a valuable contribution to the debate, and are pleased to sponsor its publication.

The first phase of the scheme has provided valuable insight into how the European trading system must be improved in the future. Going forward, Centrica believes that the most important issue to put right is the end of the free allocation of allowances, which will eliminate generators' windfall profits. Maintaining tight national allocation plans is also crucial. Harmonisation across Europe on the use of project credits, and on the scope of the scheme, is equally important.

Transition to a low-carbon economy, whilst maintaining security of supply and competitiveness, and combating fuel poverty, is a central strategic aim for Centrica. We already enjoy the lowest carbon intensity of any major supplier and intend to maintain that position in the future. We believe that a properly functioning emissions trading system is crucial to bring forward the low-carbon investment necessary to further reduce carbon emissions and meet national climate change targets.

For more information about Centrica please see our website www.centrica.com/environment . Alternatively, please contact:

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Foreword

At Merrill Lynch, a long-standing commitment to the fundamental principles of corporate citizenship underpins our firm belief that protecting our global ecosystem is of vital importance.

As a financial institution, operating in the global capital markets, we are proud of our ability to develop innovative solutions for our clients. This innovation is an important way by which we can positively impact the environment. Others include our roles as provider of capital to new and established firms in both the public and private sectors, as an investor committed to exploring new venture capital and market opportunities in clean technology, as an employer, recruiter and retainer of talent, and as a provider of guidance and advice to institutional clients and of leading-edge research to institutional and individual clients. Whilst the capital markets are cyclical in nature, as a responsible corporate citizen, we cannot allow our commitment to the environment to follow such economic cycles.

We are pleased to be associated with the CER in this thought-provoking paper. As is highlighted in the paper, it is governments that must set standards. But it is up to business and the capital markets to develop and provide cost-effective solutions to help deliver these standards. At Merrill Lynch, we believe that having a robust emissions trading market is an important part of the suite of policy options to be used to address climate change. That is where we hope our expertise in both capital markets and innovation can make a strong contribution.

For further information on our environmental policy please visit www.ml.com.

Abyd Karmali

Managing Director, Global Head of Carbon Emissions

1 Introduction

Global emissions of greenhouse gases must be cut significantly to avoid irreversible and catastrophic environmental damage. But an impasse exists over how to implement such cuts and who should bear the costs. There is disagreement between developed and developing economies, but also between the US and most other rich nations. Nothing will happen unless the EU and the US work closely together and put in place policies to deliver big cuts in their emissions. Failure to do so would show a gross lack of leadership.

The spectre of massive rises in Chinese and Indian emissions of greenhouse gases must not be used as an excuse to delay action in developed countries. Unless the EU and US, along with other large developed economies like Japan, work together and agree long-term targets stretching to 2050, it will not be possible to stabilise emissions. Poorer countries are right to argue that the rich countries must take the lead. Chinese emissions per head are still only a quarter of US levels, and India's just one twentieth. The major developed economies have to provide leadership, and use the leverage of their markets and technology to get the developing countries on board.

In March 2007, European leaders agreed to cut EU emissions of greenhouse gases by 20 per cent by 2020, and to increase this to 30 per cent if other countries also step up to the challenge. In January 2008, the European Commission finally published its proposals for meeting these targets. But the US's refusal to take steps to cut its emissions until emerging economies take similar steps has been a big obstacle to a global agreement. Economies such as China and India will not take action unless the US does. Fortunately, there are now strong signs that whoever wins the forthcoming US presidential election will set targets for reductions in US emissions. This would be a big step towards the kind of concerted international action that

is needed to address the problem, regardless of whether the US signs up to a successor to the Kyoto protocol.

However, setting targets is relatively easy. The hard part is putting in place the policies needed to ensure that the reductions are actually made. Also, in the case of the EU, there is the difficult issue of distributing the EU's overall emissions target among its member-states. There is no single way to reduce emissions. Regulation, such as the setting of ambitious energy efficiency standards for buildings and emissions standards for cars, will play a big part. There will also need to be concerted state support to facilitate the commercialisation of more efficient methods of generating energy, such as carbon capture and storage (CCS), and low emissions transport.[1]

[1] CCS is a technology that could make highly polluting coal-fired power plants much greener by capturing carbon that is released from burning coal and burying it underground.

This pamphlet focuses on the principal market-based mechanism to curb greenhouse gases – emissions trading. The trading of emissions allowances is a key element of the EU's attempt to cut emissions and will be central to any US policy to do so. Emissions trading is not a new idea. It has been used very successfully to reduce pollution caused by sulphur dioxide in the US, for example. It works by setting a limit on the annual emissions of a gas, and then distributing emissions allowances to polluters. If a company emits more than its allowance it has to buy additional ones; unused allowances can be sold. As a result, companies can no longer emit the gas without incurring a cost. This means that they have an incentive to reduce the amount they produce.

One objective of emissions trading is to ensure that goods prices reflect the 'external' costs of their production, in terms of the damage done to the environment. For example, if a television is made in a plant that uses energy inefficiently, the company operating the factory would have to buy more carbon allowances, driving up the price of the product. By contrast, a television produced in a low emissions factory would require fewer allowances, and would

therefore be cheaper. Consumers, of course, would opt for the television from the low-emission factory, and all factories would have an incentive to lower emissions.

The EU's emissions trading scheme (ETS) is a very ambitious project and the EU deserves much credit for establishing it in 2005. So far, the ETS has been a qualified success, but it requires substantial reform if it is to make a big contribution to meeting the EU's emissions targets. The European Commission's recommendations for reform of the ETS, published in January 2008, address many of, but by no means all, the flaws in the system. There is a great opportunity to link the European ETS with a future US scheme and thus to establish the basis of a global carbon market. But this opportunity will be missed if the EU fails to address the institutional flaws holding back its carbon market, and if the EU and the US fail to work more closely together.

Chapter one will look at why a successful attempt to tackle global warming depends on the EU and US taking the lead. Chapter two will demonstrate why emissions trading must form a key part of any strategy to reduce emissions, and argue that the establishment of the EU ETS has been invaluable. Chapter three will make recommendations for reform of the EU's carbon market and consider whether the Commission's recommendations go far enough. Chapter four will discuss how the political landscape in the US has shifted in favour of limits on emissions of greenhouse gases, while the final chapter will argue that concerns over competitiveness should not be used as a reason to postpone unilateral action by developed economies.

2 The developed world will have to lead

The global economy is not on a sustainable environmental path. If we continue using resources in the same way as we do now, we will do irreparable damage to the planet and to human well-being. The aggregate concentration of carbon in the atmosphere is now up to 380 parts per million, having risen by 1.9 parts per million annually over the past ten years. There is no certainty over the absolute level of concentration at which irreversible changes to the climate will occur. However, scientific judgments put the 'safe' level at between 450 and 550 parts per million, with the consensus shifting towards the lower end of this range. In any event, on current trends we have no chance of stabilising carbon dioxide concentrations at a 'safe' level.[2]

[2] *United Nations Framework Convention on Climate Change (UNFCC), 'The Nairobi work p rogramme: On impacts, vulnerability and adaption to climate change', May 2007.*

According to the UN median population forecasts, the world's population will rise by 2.5 billion, or around 40 per cent, by 2050. Barring disasters, income per head will rise four-fold over this period, resulting in a six-fold expansion of global GDP. The expected increase in economic activity over the next 40 or so years would lead to environmental catastrophe if we continued to rely on existing technologies. Indeed, expanding global economic activity by six times using existing technologies is probably impossible – we would face environmental disaster first. Our window of opportunity to prevent irreversible climate change is therefore limited. We have no choice but to break the link between economic growth and emissions of greenhouse gases.

Thankfully, climate change has moved right up the political agenda. Unusual weather conditions worldwide and a growing awareness of

the economic and security costs of climate change have changed the terms of the debate. There has been a watershed in climate policy, as people around the world have become more alarmed about the impending threats. The EU and its member countries, especially Germany and the UK, deserve much of the credit for this development.[3] But accepting that the global economy is on an unsustainable path is one thing; reaching agreement on what to do about it is a much bigger challenge.

[3] *HM Treasury, 'The Stern review on the economics of climate change', October 2006.*

There is a broad consensus that average global temperature increases in excess of 2 degrees, compared to pre-industrial levels, will trigger accelerated climate change. However, to prevent temperatures from rising by more than 2 degrees, global emissions of greenhouse gases will have to peak by 2020 and then decline to a maximum of 50 per cent of 1990 levels by 2050.[4] This will only be possible if the US gets serious about cutting its own emissions and emerging economies accept limits at a much earlier stage in their development than was the case with the developed countries.

[4] *International Panel on Climate Change, 'Climate change 2007 – impacts, adaptation and vulnerability: Working group II contribution to the fourth assessment report of the IPCC', April 2007.*

The failure of the US to set an example by capping its emissions has been a big problem. But the defeatism that is prevalent among many policy-makers and analysts about the feasibility of tackling climate change is misplaced. The technology is there, business is demanding a coherent approach, and popular opinion is supportive. Crucially, there is now a real chance that the next US administration will get serious about cutting emissions (see chapter five). This will open the way for a partnership between the EU and the US. Of course, major developing economies will also need to accept that their current economic growth paths are unsustainable.

The success of Kyoto

International efforts to combat the rise in greenhouse gas emissions have centred on the Kyoto protocol. Signed in 1997 as an amendment to the UN's 1992 Framework Convention on Climate Change, the Kyoto protocol is the first legally binding international treaty on the environment. It sets greenhouse gas emissions targets for the developed countries that ratified the agreement, and now covers 178 countries and around 90 per cent of global greenhouse gas emissions. In the first round or 'commitment period', running from 2008-12, the agreement foresees only relatively modest cuts in the emissions of developed countries – for example, the EU is committed to a cut of 8 per cent compared with 1990 – and no caps for developing countries. The US has consistently refused to ratify the protocol, claiming that national carbon constraints would damage its economy unless they applied to fast industrialising countries such as China and India.

Kyoto establishes emissions trading as a key mechanism for reducing emissions. The clean development mechanism (CDM) allows industrialised countries to earn emissions credits by investing in emissions-reducing projects in developing countries, whereas the joint initiative (JI) allows them to do the same thing in other developed economies. Credits from JI projects are known as emission reduction units (ERUs), while those from CDM projects are called certified emissions reductions (CERs). By including the possibility to generate carbon allowances by investing abroad, Kyoto ensures that the price of carbon will influence investment decisions all over the world, and provide less developed countries with access to technology and capital. Of course, it is crucial that investment abroad under these 'offset markets' supplements rather than supplants cuts in domestic emissions (see chapter three).

Since 2001, the US has persistently rejected calls for emissions caps. In place of mandatory cuts, it targets carbon intensity – that is, the volume of carbon emitted per unit of GDP – and stresses the importance of research into new technologies. The US is on course to fulfil its pledge to reduce its carbon intensity by 18 per cent by 2012 (from 1990 levels), but its emissions of greenhouse gases rose

by 16 per cent between 1990 and 2005 and are on course to rise by a fifth between 1990 and 2012.[5] By contrast, the EU stabilised emissions between 1990 and 2005. Stronger economic growth and a faster rising population partly explain the poor US performance, but this merely highlights the urgent need for the country to decouple emissions growth from economic growth. If the US, with its unrivalled financial and technological resources cannot do so, how can the rich countries demand it from the developing world?

[5] *US Environmental Protection Agency.*

US criticism of the Kyoto protocol for doing too little about the emissions of emerging economies is self-serving. The authors of the Kyoto protocol always assumed that the 2008-12 period was a first step, that subsequent targets would be more stringent, and that they would eventually include developing countries. Parties to the protocol are obliged to negotiate targets for the subsequent commitment periods. The developed world must take the lead because preventing climate change is about combining technology, finance and public policy intelligently. At present the developed economies are best placed to do this. If they commit to long-term emissions caps, involving big cuts in per capita emissions, and the major industrialising countries still refuse to impose caps on their emissions, then the developed economies like the EU and US will need to explore other policy options (see chapter six).

The table opposite illustrates clearly why the developed economies, and in particular the US, will have to move first if countries like China and India are to be persuaded to play their part. Per capita emissions in the developed world are still five times those of the developing world. Stripping out the ex-communist Eastern European and post-Soviet economies, where emissions fell sharply in the 1990s with the closure of inefficient heavy industry, per capita emissions in the developed economies were largely unchanged between 1990 and 2005.

Annual per capita emissions of carbon dioxide
(metric tonnes, per person)

	1990	2000	2005
Developed countries	12.0	11.0	11.0
France	6.5	6.1	6.2
Germany	12.2	10.2	9.9
Italy	6.7	7.4	7.8
Japan	8.8	9.6	9.5
The Netherlands	10.5	10.9	11.2
Russian Federation	14.5	10.4	10.8
Spain	5.4	7.0	7.9
Sweden	6.1	5.6	5.6
Switzerland	6.2	5.6	6.0
Ukraine	12.1	6.3	6.3
UK	10.0	9.3	8.8
USA	19.0	20.1	19.6
Developing countries	1.5	1.9	2.3
Bangladesh	0.1	0.2	0.3
Brazil	1.4	1.8	1.8
China	2.2	2.6	3.9
India	0.7	1.0	1.1
Indonesia	0.8	1.3	1.6
Nigeria	0.4	0.4	0.4
Thailand	1.5	2.6	3.3
Turkey	2.4	3.0	3.0

Source: International Energy Agency

Per capita emissions in industrialised and industrialising economies must converge at a level that is consistent with a 2.5 degree rise in global temperatures. This would imply a 85-90 per cent cut in per capita US emissions, and a 60-65 per cent cut in European ones. The task is formidable, but there are examples of highly developed economies with low per capita emissions. For example, emissions in Sweden and Switzerland, two of the world's wealthiest and most competitive economies, are just 30 per cent of US levels and less than 60 per cent of the EU average. Natural endowments play a part, of course – both Sweden and Switzerland have ideal terrain for hydroelectric power – but a major reason for their low emissions is that their governments have shown a real determination to reduce their dependence on fossil fuels and believe that doing so will bolster their competitiveness.

Developing countries cannot afford to follow the same development path as the EU or US, either environmentally or economically. The current Chinese position – that the country will not impose emissions caps for the forseeable future – is unrealistic and counter to China's long-term interests. If China doubles or even trebles its per capita emissions from their current levels, it will make action by other countries to cut their emissions irrelevant. At current rates of increase, China will be emitting twice as much CO_2 as the world's 26 richest countries combined within 25 years. The link between economic growth and emissions will have to be broken at an earlier stage than in the developed world, and at a much earlier stage than the Chinese government imagines (see chapter five).

Given that developing countries like China and India will suffer most from the impact of climate change, they have a powerful incentive to achieve this decoupling. According to the UN's Intergovernmental Panel on Climate Change, Africa will be hardest hit by global warming, but Asia will also suffer considerably. The IPCC projects that crop yields will decline by 20 per cent in East Asia and by 30 per cent in South Asia by 2050; that glacier melt in the Himalayas will lead to dramatically increased flooding and soil erosion across Asia; and that a billion Asians will suffer from shortages of fresh water. The region's heavily populated delta regions are at greatest risk. Moreover, the actual impact could be much more severe than envisaged by the UN, which assumes relatively modest increases in global temperatures.[6]

[6] *International Panel on Climate Change, 'Climate change 2007 – impacts, adaptation and vulnerability: Working group II contribution to the fourth assessment report of the IPCC', April 2007.*

A post-2012 agreement

The US boycott of the Kyoto protocol has severely constrained the agreement's potency. But the US is wrong to dismiss Kyoto. The agreement represents an enormous amount of political, institutional and intellectual effort, and should serve as the foundation for a lasting post-2012 international agreement. Kyoto's critics are right to say that the time horizons are too short and the enforcement insufficiently robust. But the agreement has achieved a lot despite the US staying outside. It has created expectations of more stringent future limitations; established emissions trading as a way of addressing climate change; and through CDM and JI, created mechanisms to cut emissions at the lowest cost. The last thing that advocates of international action to combat climate change should do is jettison the Kyoto architecture post-2012.

The EU should not make concessions to the US administration, as this would leave the world saddled with an agreement that is too weak to have an impact. At the same time, it would be a mistake for the EU and other supporters of a successor to Kyoto to wait until a new administration comes to power. Given the timing of the negotiations on a post-2012 agreement and the urgency of the issue, delay would be unacceptable. A failure to start negotiations promptly would create uncertainty among businesses and other participants in carbon markets. By far the best option is to negotiate a post-2012 agreement that builds on the core Kyoto architecture, even if the US declines to engage.

Indeed, the best way for the EU to draw the US into an effective global agreement would be a clear statement of intent to implement existing Kyoto commitments and to continue this approach after 2012. If the EU pushed on regardless, domestic pressure on the US administration to participate would intensify. The EU's role is pivotal. It has already taken steps to provide some certainty beyond 2012, by setting a target of a 20 per cent cut in emissions by 2020 (from 1990 levels), rising to 30 per cent if other major emitters also commit to significant reductions. But the Union needs to ensure it has policies in place to meet its target. The next chapter will focus on Europe's experience with carbon trading.

3 Emissions trading is one answer

Under an emissions trading scheme, a target is set for the required reduction in emissions of a particular gas, leaving it up to the market to determine what price will be needed to bring about this reduction. For example, carbon trading involves setting a cap on emissions of carbon dioxide, which results in a price for carbon. Emission allowances are allocated to businesses and other emitters of the gas or pollutant, either free of charge or by auctioning them to the highest bidder. The aim is to spur innovation and the use of low emissions technologies. Emissions trading schemes can be either 'upstream' (the producers and suppliers of the gas face emissions caps) or 'downstream' (the end-users of energy, usually large industrial consumers, face caps on their emissions).

The strength of emissions trading is its efficiency. The costs of reducing emissions of carbon dioxide differ hugely between sectors and across countries. The trading of allowances enables emissions to be cut where it is cheapest to do so and hence at the least cost to competitiveness. The broader the scope of a cap and trade scheme, the greater the resources available for reducing emissions and the less the impact on competitiveness. For example, much greater reductions can be achieved by the EU and the US working together. Emissions trading has the added advantage that it does not require governments to choose between technologies.

However, for many, carbon trading seems a long way removed from the robust action needed to address the problem of global warming. Popular scepticism is hardly allayed by the fact that many firms view emissions trading as the most efficient policy to bring about reductions in greenhouse gases. There is a suspicion that if companies support emissions trading, it must be because it

will not require them to change the way they go about doing business. The fact that firms based in developed countries can earn emissions credits by investing in developing countries feeds the perception that carbon trading is a way of allowing rich countries to avoid making cuts.

As argued in the previous chapter, rich countries must drastically reduce their per capita emissions if the build-up of greenhouse gases in the atmosphere is to be reversed. If developed economies fail to slash emissions, it will be impossible to persuade developing countries to take steps to stabilise the rise in their emissions. Of course, a balance must be struck between the need to channel investment into emerging markets and the provision of incentives to bring about large reductions in the emissions of industrialised economies. But international emissions trading will only be politically viable if it provides companies in the developed world with incentives to invest in new technologies at home. It will not be enough to simply rely on deploying existing technologies in developing countries through the CDM. This problem is far from being insurmountable. After all, it is governments not firms that decide what proportion of emissions reductions should be achieved though investment in developing economies.

Indeed, most misconceptions about emissions trading stem from the idea that markets function independently of government. There exists a widely-held view that by embracing emissions trading, governments would effectively be transferring responsibility for climate change policy to the private sector. This is not the case. First, emissions trading will only ever be one of a package of policies to address climate change. Regulation, for example the setting of efficiency standards, together with active policies to encourage research into new technologies, is also crucial. Second, public policy should be about establishing markets in such a way that objectives are met in the most efficient fashion. Environmental policy is no different to policy in any other area. Emissions trading is only as effective as the

institutions that govern the market in those emissions. The carbon market requires a robust institutional framework. Governments must set stringent targets and ensure accurate monitoring, reporting and enforcement.

The EU emissions trading scheme

The EU ETS is the first international emissions trading scheme, the world's largest permit trading system for carbon dioxide, and the cornerstone of the EU's strategy to meet its Kyoto emissions target. It is a downstream system, covering the following industrial sectors: iron and steel, cement, glass, ceramics, pulp and paper, as well as the power generators. These account for around 50 per cent of EU emissions of carbon dioxide and slightly over 40 per cent of the EU's overall greenhouse gases. The ETS does not include road transport, which is one of the fastest growing sources of carbon emissions, although air transport will be brought into the system by 2012 and possibly marine transport shortly thereafter.

The first phase of the programme ran from January 2005 to December 2007. The second phase began in January 2008 and runs to the end of 2012, coinciding with the Kyoto commitment period. Although it is unclear what the post-2012 international framework will look like, the EU ETS directive provides for the continuation of the scheme beyond 2012.[7] The directive also allows the EU to link its ETS to similar markets in other signatories to the Kyoto protocol, and to consider linking to programmes in countries that have opted against signing, such as the US.

[7] *'Directive 2003/87/EC of the European Parliament and the Council establishing a scheme for greenhouse gas emission allowance trading within the Community', October 2003.*

In the first phase, EU governments were responsible for setting their own emissions caps with EU oversight. These so-called national allocation plans (NAPs) had to demonstrate three things: how much of a country's Kyoto target would be met by the sectors

participating in the trading system; how much of the cap was assigned to each sector – determining how much of the burden and costs would fall on particular industries; and how the allocation for each sector would be divided among individual companies. EU governments were allowed to auction up to 5 per cent of the allowances, with the rest being distributed freely on the basis of past emissions, a practice called 'grand-fathering.'

The way the EU ETS has worked in practice highlights both the pitfalls and the potential of emissions trading. A market price in carbon was quickly established, as was a market in carbon futures, providing a longer-term price signal. The market has impressive liquidity too: more than 1.6 billion tonnes were traded in 2007, with a value of $41 billion, over twice the total in 2006.[8] The infrastructure for international emissions trading is in place and functioning, with London having quickly established itself as the centre of this nascent global carbon market. Crucially, the EU now has verified emissions data for over 10,000 major users of energy across 25 countries. Moreover, by mid-2007 EU countries had also committed to investing €7.5 billion by 2012 under the clean development mechanism (CDM) and joint initiative (JI), providing reductions totalling more than 2 billion tonnes of carbon dioxide.[9]

[8] Point Carbon, 'Point Carbon Special Report: 2007 Carbon Market Review', January 2008.

[9] John Llewellyn, 'The business of climate change: Challenges and opportunities', Lehman Brothers, February 2007.

But there have also been serious problems. The first phase was undermined by insufficiently ambitious NAPs and excessive price volatility, with carbon prices falling below €1 per tonne in 2007. If companies are to invest in lower carbon technologies, there has to be a measure of price security. Prices below €20 per tonne are much too low to drive investment in new technology, and are unlikely to have much impact on energy efficiency outside the most energy intensive sectors.[10]

[10] Carbon Trust, 'EU ETS phase II allocation: Implications and lessons', May 2007.

The EU's failure to set sufficiently tight emissions caps was partly due to the lack of consistent, historical data when the first phase caps were agreed. As a result, the Commission was poorly placed to demand cuts in proposed NAPs. But lax caps were also the result of the burden-sharing agreement of 1998. Under this agreement, EU countries' Kyoto emissions targets range from a reduction of 21 per cent in Denmark and Germany to a rise of 25 per cent in Greece and 27 per cent in Portugal. It is right that national caps should take into account levels of economic development, as well as exceptional circumstances (such as the closure of heavy industry in East Germany). But the generosity of the targets awarded to some member-states undermined incentives to ensure that new industrial capacity is environmentally sustainable.

As the table on page 19 shows, all the less developed EU-15 countries have increased their emissions rapidly since 1990. This is a very poor model for the challenge the world faces: namely to stabilise emissions in emerging economies at a low level by decoupling emissions from economic growth. For example, Spanish emissions of greenhouse gases rose by over half between 1990 and 2005, closing much of the gap in per capita emissions between Spain and the more developed EU countries. Spain might still meet its Kyoto target, but only because of very extensive use of the CDM and JI; its domestic emissions are actually set to rise by at least 50 per cent between 1990 and 2012.

Emissions of carbon dioxide under the EU ETS
(millions of tonnes, per centage change)

Member-state	1st period cap 2005-2007	2005 verified emissions	Proposed cap 2008-2012	Cap allowed 2008-2012	CDM/JI limit 2008-2012 in %*
Austria	33.0	33.4	32.8	30.7	10.0
Belgium	62.1	55.6	63.3	58.5	8.4
Cyprus	5.7	5.1	7.1	5.5	10.0
Czech Republic	97.6	82.5	101.9	86.8	10.0
Denmark	33.5	26.5	24.5	24.5	17.0
Estonia	19.0	12.6	24.4	12.7	0.0
Finland	45.5	33.1	39.6	37.6	10.0
France	156.5	131.3	132.8	132.8	13.5
Hungary	31.3	26.0	30.7	26.9	10.0
Germany	499.0	474.0	482.0	453.1	12.0
Greece	74.4	71.3	75.5	69.1	9.0
Ireland	22.3	22.4	22.6	21.2	21.9
Italy	223.1	225.5	209.0	195.8	15.0
Latvia	4.6	2.9	7.7	3.3	5.0
Lithuania	12.3	6.6	16.6	8.8	8.9
Luxembourg	3.4	2.6	4.0	2.7	10.0
Malta	2.9	2.0	3.0	2.1	n/a
The Netherlands	95.3	80.4	90.4	85.8	10.0
Poland	239.1	203.1	284.6	208.5	10.0
Slovakia	30.5	25.2	41.3	30.9	7.0
Slovenia	8.8	8.7	8.3	8.3	15.8
Spain	174.4	182.9	152.7	152.3	20.0
Sweden	22.9	19.3	25.2	22.8	10.0
UK	245.3	242.4	246.2	246.2	8.0
TOTAL	2109.0	1947.9	2101.6	1903.4	-

**The CDM and the joint initiative (JI) limit is expressed as a percentage of the member-state's cap and indicates the maximum extent to which companies may rely on JI or CDM credits instead of EU ETS allowances to cover their emissions. Source: European Commission*

Emissions of greenhouse gases
(percentage change)

Member-state	Target 1990-2012 (including use of CDM/JI)	Growth in emissions 1990-2005
Austria	-13.0	18.1
Belgium	-7.5	-2.3
Czech Republic	-8.0	-25.8
Denmark	-21.0	-7.8
Estonia	-8.0	-52.0
Finland	0.0	-2.6
France	0.0	-1.9
Hungary	-6.0	-34.5
Germany	-21.0	-18.7
Greece	25.0	25.4
Ireland	13.0	25.4
Italy	-6.5	12.1
Latvia	-8.0	-58.0
Lithuania	-8.0	-53.1
The Netherlands	-6.0	-1.1
Poland	-6.0	-32.0
Slovakia	-8.0	-33.6
Slovenia	-8.0	0.4
Spain	15.0	52.3
Sweden	4.0	-7.4
UK	-12.5	-15.7
EU-15	-8.0	-2.0
EU-27	n/a	-7.9

Source: European Commission

However, the wide variation in the stringency of the NAPs was not just the result of an excessively generous deal for the less developed members of the EU. It also reflected varying degrees of commitment on the part of EU member-states. Many were determined to give their industries an advantage at the expense of others by manipulating the rules so that they could carry on with business as usual or even profit financially from the system. The absence of uniformly stringent NAPs created competitive distortions. Countries that imposed relatively demanding caps – notably the UK – effectively subsidised firms elsewhere in the EU. For example, UK firms that emitted more carbon dioxide than their allocation had to purchase allowances from companies in other member-states that faced undemanding caps, and thus had a surplus of allowances. This provided a windfall gain for companies based in countries with high caps, but undermined incentives for companies to curb their emissions.

Two further drawbacks in the first phase were the lack of long-term price certainty and the method of allocating allowances. The knowledge that prices will remain high over a relatively short time horizon is enough to sway a decision in favour of gas and away from coal, or to justify investment in greater energy efficiency. But it is not sufficient to persuade companies to invest in new technologies, such as CCS. The time horizons for such investments are very long – they may stretch as far as 30 years – so companies need to be confident that carbon will remain expensive throughout the term of the investment. It is more important to reduce emissions substantially in the longer term than to reduce them marginally in the short-term.

The allocation of allowances has also turned out to be problematic. In the first phase, only five countries chose to auction any allowances, and only one – Denmark – auctioned the maximum permitted 5 per cent. This created some perverse results. For example, although power generators received the vast majority of their allowances free of charge, they raised electricity

prices as if they had paid for their allowances, reaping hefty windfall profits in the process. Moreover, whereas coal-fired power stations were allocated all of their permits for free in nearly all member-states, operators of nuclear, hydro and wind power plants – all of which are largely carbon neutral – received no allowances. This has arguably discouraged investment in clean power generation and could even have encouraged utilities to continue using polluting technologies.

What about the second phase? Some, but by no means all, of these concerns have been addressed. Despite commonly agreed criteria, EU governments submitted NAPs for 2008-12 that varied widely in stringency. Together, they proposed national emissions caps 5 per cent in excess of the verified EU emissions total for 2005. This time, however, the availability of this verified data enabled the Commission to take a much tougher line, ruling that nearly all the submitted plans violated its interpretation of the EU ETS directive. It clarified the directive:

★ each member-state's emissions cap must not exceed the level of its 2005 emissions, adjusted for economic growth and trends in energy efficiency; and

★ NAPs must be consistent with Kyoto targets, after taking account of other policies to curb emissions (such as energy efficiency standards) and the purchase of imported allowances through the Kyoto offset mechanisms.

The Commission should be applauded for sticking to its guns. As a result, the combined NAPs for phase two of the system represent a 5 per cent reduction compared with 2005.

The market suggests that the caps will be tight enough to ensure a meaningful price for carbon during the second phase. After falling to under €1 in 2007 (the final year of the first phase of the ETS), carbon prices stood at €25 per tonne in May 2008. One

reason for the optimism over prices is that the firms will be able to 'bank' allowances allocated in phase two for use in phase three of the scheme, which will run from 2013 to 2020 (see below). With prices expected to be high in the 2013-20 period due to the proposed stringency of the third phase caps, this has pushed up prices in phase two. According to Deutsche Bank, a 20 per cent reduction in emissions by 2020 would be enough to drive up carbon prices to an average of €35 per tonne in 2008-20; that is, in phases two and three.

However, in the second phase of the scheme, only half of the members intend to auction any allowances and only one – Denmark – is expected to auction the maximum 10 per cent allowed. As a result, competitive distortions will persist, with firms in some countries being required to pay for their allowances but not in others. Unfortunately, there is little incentive for one member-state to auction more allowances if others do not. Unilateral action would boost carbon prices for energy users in the country doing the auctioning, placing companies in that country at a competitive disadvantage compared with firms in other members of the Union.

In the absence of auctions, power generators in most EU countries will continue to earn windfall profits in 2008-12. They will see their allowances cut more sharply than other sectors, but will continue to get most of them for free and will be able to pass the cost on to their customers. As a result, energy users (and ultimately customers) will continue to subsidise energy producers. (Centrica, a UK-based power utility, estimates that power companies will make €110 billion between 2008 and 2012 in this way). Moreover, in over half the member-states, newly built power plants will continue to be awarded allowances according to their needs. Thus, a company investing in a power plant fuelled by coal will receive twice as many allowances as one investing in a gas-fired plant, which would produce half as much carbon dioxide.

Moreover, there is a risk that members of the EU will be able to meet most – if not all – of the reductions in their emissions by investing in projects abroad. Although the Commission requested that a number of EU countries reduce their dependence on imported credits before approving their NAPs, the fact that the overall emissions caps are still relatively loose means that a large majority of the required reductions in the second phase could theoretically take place outside the EU. According to the World Wildlife Fund, in only two countries – Sweden and the UK – will most of the cuts have to be made at home. Emissions could rise in many EU countries, but they would still meet their respective caps.[11] That may not ultimately be the case – much will depend on the availability of imported credits – but it highlights a potential flaw in the system.

[11] *WWF-UK, 'Emission impossible: Access to CDM/JI credits in phase II of the EU emissions trading scheme', June 2007.*

Economically, it makes sense for emissions to be cut where it is cheapest to do so. Moreover, the CDM facilitates the transfer of technology and provides developed economies with a source of leverage over the developing ones, who do not want to lose this valuable source of capital. But there is a conflict between what economic theory tells us is optimal and what is politically viable. Stronger incentives are needed to reduce per capita carbon emissions in the EU, and to spur the development of new technologies.

There are also concerns over the regulation of the CDM market, which is administered by the UN's CDM Executive. Both the country where the investment is made and the investors' home country must approve the project; and there must be independent approval and continuing verification of projects. Nevertheless, there is considerable evidence that not all the projects that the UN has validated will lead to cuts in emissions. To secure approval, CDM projects have to meet a range of criteria, but the two most important are: projects must be additional (they must not just subsidise investments that would have gone ahead in any case); and they should encourage sustainable economic development (that is, they should not encourage investment

in energy-intensive facilities by subsidising that investment). Ensuring that these criteria are met is crucial to maintaining the environmental integrity of the whole system.[12]

[12] *See http://cdmpipeline.org/publications/CDMpipeline.xls.*

The dependence of the UN CDM Executive on specialist private companies to validate schemes and verify compliance has led to some conflicts of interest. In some cases these specialist companies had a vested interest in validating a project as they were also working for the business setting up the scheme. Moreover, the CDM Executive was initially reluctant to refuse validation (it did not reject a single project until July 2006), and has now admitted that some approved projects would have gone ahead even in the absence of the CDM. In these examples, the CDM will actually have increased emissions. The project would have gone ahead anyway so greenhouse gases emitted in the developing country will not have been reduced because of the CDM investment, but carbon credits will have been earned by the investor in the developed economy, enabling them to emit more.

However, the fact that some bogus projects have received carbon credits should not be used to discredit CDM as a whole. The CDM is at an early stage of development – it was perhaps inevitable that some abuse of the system would take place. There is no reason to doubt that the overwhelming majority of the projects are credible. Moreover, the CDM Executive has tightened its assessment of proposed projects in an attempt to prevent abuse of the system. It is now using a new team of experts to check the work of the specialist companies, and bogus projects are now being spotted. Between July 2006 and the end of 2007, the CDM Executive has rejected 54 proposed projects. The challenge is to further tighten monitoring without making the whole process unnecessarily bureaucratic and hence deterring investment.

In summary, the current set-up of the EU ETS is biased towards short-term investment. For the market to make a significant

contribution to meeting the EU target of cutting overall emissions by 20 per cent by 2020, let alone its more ambitious 30 per cent, a number of things need to happen:

★ **Much greater centralisation.** The lack of a strong central authority is a fundamental flaw in the European system. Governments should not have discretion over the level of national allocations, or over the distribution of the required cuts in emissions between the sectors of the economy covered by the system and those that are not. Instead of EU governments calculating and proposing emissions caps for their industries, the EU needs an EU-wide cap that is consistent with its long-term targets for emissions reductions. If companies in a particular industry in one member-state face tighter caps than comparable companies in another member-state, it will distort competition and undermine political support for the scheme. To guarantee a level playing field within the EU and give clear signals to particular markets, there should be EU-wide industry-specific caps, determined on the basis of benchmarks and forecast economic growth. This would be relatively straightforward. Just a few sectors – fossil-fuel power plants, cement, refineries, and iron and steel – currently account for 83 per cent of total emissions under the ETS.

★ **Much longer timeframes.** These have to be compatible with the investment cycle of the main industries covered by the programme, in order to provide a strong signal that investment in clean technology will be rewarded over time. A cap stretching to 2050 would mean that firms could plan ahead. More regular disclosure of emissions, probably on a bi-annual basis, would help to prevent excessive price fluctuations. There should also be a mechanism to amend the cap within the compliance period in light of emissions trends, and to provide for additional allowances during periods of temporary shortage.

★ **A move to full auctioning.** Allowances in the energy sector should be fully auctioned, and auctioning should be introduced progressively for the remaining sectors. In the case of internationally exposed energy-intensive sectors, such as the iron, steel and aluminium industries, the EU should strive for globally binding sectoral agreements, which include not just developed but also developing economies. If this proves impossible, it should explore placing requirements on importers and consider restricting investment through the CDM (see below). Auctions could be held at member-state level, assuming there is a high level of harmonisation of auction methodology, including the frequency of auctions.[13] However, a preferable solution would be to establish an EU auction platform, run by the newly created European environmental board (EEB), through which all allowances would be sold (see below). This would reduce transaction costs and maximise transparency, while preventing member-state governments from colluding with industry to manipulate prices by auctioning too many allowances at any one time.

[13] European Commission Directorate General for the Environment/Ecofys, 'Auctioning of CO_2 emission allowances in the EU ETS', October 2006.

★ **Cuts in domestic EU emissions.** As has been argued already, the industrialised economies have to cut their own per capita emissions if they want to persuade emerging economies to do likewise. Assuming other developed countries, such as the US and Japan, establish emissions trading systems with similarly ambitious goals to the EU ETS, the EU should not place tighter restictions on the use of CDM. This would reduce access to low-cost opportunities to cut emissions and lessen the EU's leverage over developing countries. However, if other developed countries opt against emissions trading, the EU will need to place tighter limits on the use of the CDM. If the EU were the only market for imported emissions credits, it would lower carbon prices in the EU system significantly, undermining its effectiveness.

★ **Coverage should remain concentrated on industrial sectors.** Emissions trading will never capture an economy's entire emissions – it will only ever form part of an overall strategy to combat climate change. The coverage of Europe's ETS could be expanded to include other greenhouse gases, but it is designed as a downstream system and should remain so. Emissions trading works best when the focus is on big industrial energy users who make economic calculations on the basis of the carbon price. It would not be practical to involve all smaller consumers of energy, most notably households or car users, in the scheme. For example, bringing road transport into the system would increase the price of fuel, but have limited impact on car usage or fuel economy. Taxes on petrol are already exceptionally high across the EU, but few consumers have switched to more fuel efficient cars, and both car usage and overall emissions from cars have kept rising. The issue of rising transport emissions will have to be addressed by imposing ambitious emissions standards for cars and by other regulatory means, such as road pricing.

★ **Encourage carbon capture.** The EU is very unlikely to be able to cut emissions by 50 per cent (let alone the 60-70 per cent that many scientists believe necessary) by 2050 if it relies only on promoting energy efficiency and the use of renewables such as wind power. Carbon capture and storage (CCS), as well as nuclear energy, will have to play a big part in the shift to a less carbon-intensive economy. The introduction of full auctioning for the power sector would increase the commercial viability of nuclear generation, compared with conventional fossil-fired power stations. The technology could be deployed on a mass scale, but is currently very expensive. A variety of policies will be needed to facilitate the use of CCS, including subsidies and tax breaks (see the following chapter).

The next chapter argues that the European Commission's recommendations for reform of the EU ETS address many of the

system's flaws. However, in a number of important respects they fall short of what is required. Crucially, the Commission says too little about institutions. The EU needs independent institutions to allocate national emissions caps and to oversee the carbon market.

4 Reforming the EU ETS

The Commission's recommendations

In January 2008, the European Commission finally published its Green Energy Plan.[14] The package fleshes out how the EU will meet its environmental targets agreed by EU leaders in March 2007. These include a reduction in greenhouse gases by at least 20 per cent by 2020 (from 1990 levels) and an increase to 20 per cent in the share of renewables in energy consumption over this period. The Commission expects the sectors covered by the ETS (which represent around half of total EU emissions) to account for around two-thirds of the reduced emissions. The Commission's recommendations for reform of the ETS include:

[14] European Commission, '20 20 by 2020: Europe's climate change opportunity', January 2008.

★ National caps should be be replaced by an EU-wide cap that is consistent with the Union's overall target of a 20 per cent cut in emissions by 2020 (from 1990 levels). In order to iron out discrepancies across countries, caps will be set by industrial sector, not by country.

★ The volume of allowances issued under the ETS should be cut by 1.74 per cent a year, to 1.7 billion in 2020 – a 21 per cent reduction compared with 2005. In order to provide price security, the EU cap will continue to decline by 1.74 per cent a year from 2020 to 2025, when it will be reviewed. Companies in sectors covered by the ETS will be able to retain allowances issued in 2008-12 for use in the third phase from 2013 to 2020.

★ Power utilities should pay for all their allowances from 2013. Auctioning for the remaining sectors should be increased progressively to 100 per cent by 2020. There could be exemptions for some especially energy-intensive industries, such as cement and steel production, if they were able demonstrate that having to pay for their allowances would force them to move production out of the EU.

★ The EU's overall emissions target and the target for use of renewables should be distributed among the member-states with reference to existing energy mixes, topography and GDP per capita. Industries covered by the ETS that are based in poorer member-states should receive relatively more permits under the ETS than those based in wealthier countries. Poorer members should not have to increase their dependence on renewable energy sources as rapidly as wealthier ones.

★ Auctions should be carried out by the member-states, with 20 per cent of the revenues earmarked for combating climate change, promoting renewable energy and compensating hard-hit social groups. There should be greater harmonisation of monitoring, reporting and verification rules.

★ Any carbon dioxide that is captured and stored using CCS technology should not be counted as emitted. The legislative barriers to CCS should be removed. At present the landfill directive prohibits storage of carbon dioxide in underground acquifiers, whereas the landfill directive bans underground storage of liquid waste.

★ The coverage of the system should be extended to include the petrochemicals, ammonia and aluminium sectors, as well as nitrogen oxide emissions from the production of various chemicals. However, coverage will be limited to industrial emitters and not be extended to include road transport or sectors such as agriculture.

★ There should be stricter controls on the use of imported credits under the CDM, especially in the absence of an international agreement to curb emissions of greenhouse gases.

★ There should be no intervention in the market to address excessively weak or strong carbon prices. Intervention in the market and changes to the overall emissions caps could only be made if the successor to the Kyoto agreement includes other developed economies and the major developing states. In this case, the EU's emission caps under the ETS would be tightened to make them consistent with a 30 per cent reduction in total EU emissions.

★ The EU ETS should be linked with others to form a global carbon market, so long as this does not undermine the integrity of the European market. At present, only allowances from signatories to Kyoto can be used for compliance under the EU ETS scheme, which would rule out linking the European system with a US one.[15]

[15] *Directive 2004/101/EC of the European Parliament and the Council, amending Directive 2003/87/EC, October 2004.*

To become law, the recommendations must be approved by both the Council of the EU and the European Parliament, which should be possible by the first half of 2009. If adopted, they would improve the functioning of the ETS considerably, and make it easier to link the European scheme with a future US one. As argued earlier, replacing national caps with an EU one comprising Europe-wide sectoral limits distributed to the individual member-states would be a big step forward. If companies in a particular industry in one member-state face tighter caps than comparable companies in another member-state, this will distort competition and undermine political support for the system. Moving progressively to full auctioning is the right way to proceed, as auctioning best complies with the polluter pays principle. Forcing power utilities to pay for all their allowances from 2013 will put an end to the windfall profits they have been making by passing on the notional costs of carbon permits that they receive for free.

The Commission is right to restrict the system to heavy industrial emitters, and to resist pressure from a number of EU countries, including France, the Netherlands and Poland, to include agriculture in the ETS. For emissions trading to work effectively, there needs to be well verified data and clear potential for reductions in emissions. Agriculture comprises a very large number of small businesses, whose emissions are hard to verify. Monitoring costs would therefore be very high and it would be difficult to determine the level of savings achieved. Moreover, for emissions trading to be effective, the costs of trading need to be significantly less than the benefits. The allocation of allowances to individual farmers would not generate sufficiently strong incentives; they would only have a few permits and would not find it worthwhile to trade them.

In the event of a failure to agree a successor to the Kyoto regime, there would be tight limits on the volume of CDM allowances member-states could use to meet their targets. In the absence of such an agreement, the EU would be the only home for such credits, with obvious consequences for carbon prices. Indeed, the Commission estimates that carbon prices within the EU ETS could fall to as low as €4 per tonne in 2013-08 if there were no successor to Kyoto and the EU maintained its current stance towards imported credits.[16]

[16] *European Commission, '20 20 by 2020: Europe's climate change opportunity', January 2008.*

The Commission is also right to raise the possibility of concessions to energy-intensive industries covered by the ETS, such as the steel and cement sectors. The UK's Carbon Trust estimates that even in the absence of special concessions to energy-intensive sectors just 1 per cent of total EU emissions will be offshored by 2020 as a result of the EU ETS, and that this so-called carbon leakage (the impact of industries moving to countries with less stringent environmental rules) will be highly concentrated in a few sectors.[17] For example, in the cement industry a carbon price of €30 a tonne could easily outweigh the costs of transporting cement into the EU. Similarly, the steel industry could also be hit by carbon pricing. Steel is less

[17] *Carbon Trust, 'EU ETS impact on profitability and trade: A sector by sector analysis', January 2008.*

energy-intensive than cement, but the transport costs of shipping steel are much lower. In addition to paying for emission allowances, these sectors will have to pay more for their electricity because the price of carbon will be factored into electricity prices.

The Commission's two proposals for addressing this problem will need to be pursued with caution, however. The first is to moderate the pace at which allocation of free allowances is phased out for these sectors, until specific international agreements are in place. Companies would only be allocated allowances for free if they met particular sectoral benchmarks. For example, the Commission would set a maximum limit for the amount of carbon dioxide emitted per tonne of steel produced. This could make sense, but the Commission will have to assess objectively the risk of carbon leakage in these sectors, and resist what will be fierce lobbying.

The second, and much more controversial proposal, is to require importers of goods from countries that refuse to cap their carbon emissions to purchase the same number of allowances as companies producing in the EU. If emissions from domestic and foreign producers were treated identically, then products that are more emissions-intensive, whether domestic or imported, would require more allowances and thus be more expensive. The emissions caused by the manufacture of a particular product can be calculated, although it is not straightforward. For example, the US imposes such import surcharges on hundreds of chemicals under the Superfund Toxic Chemical Excise Tax. Assuming that emissions allowances were fully auctioned, such surcharges would be compatible with WTO rules (see chapter six).[18]

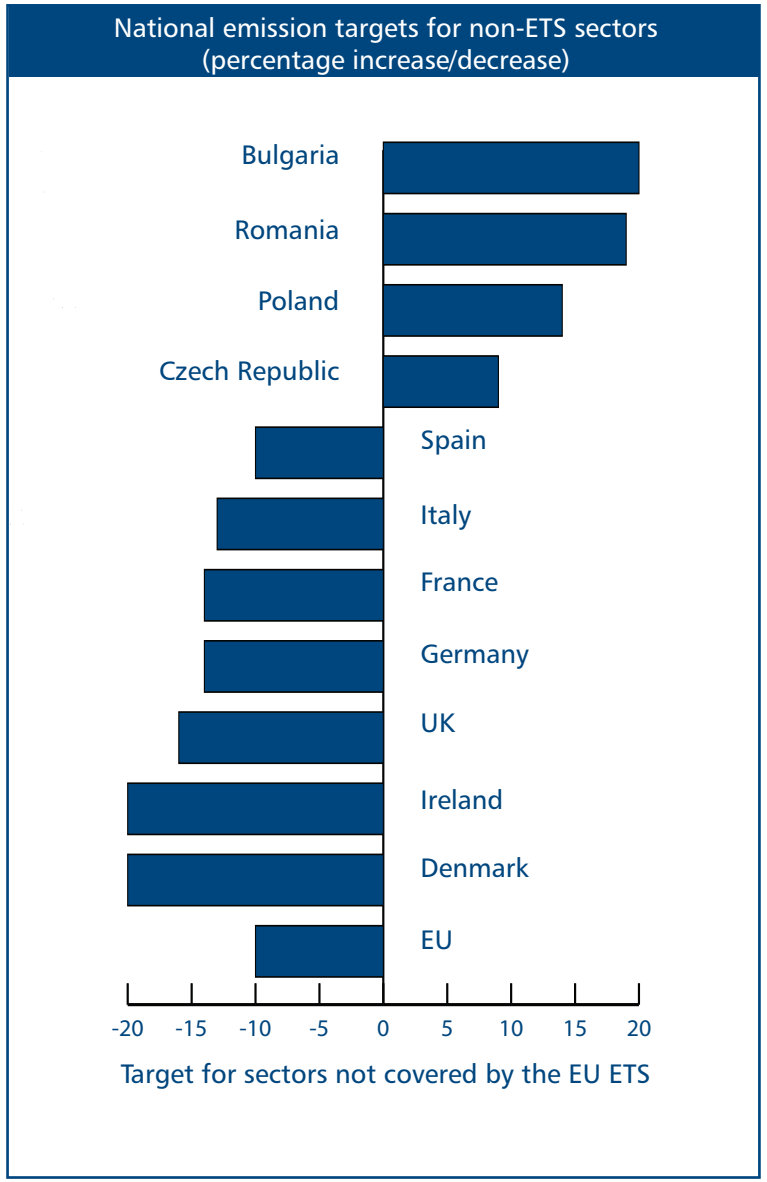
[18] *Karsten Neuhoff, 'Border tax adjustment: A feasible way to address non-participation in emissions trading', Cambridge working papers in economics, January 2004.*

More radical reform is needed

The Commission's recommendations address many of the flaws identified in the ETS. However, in a number of areas they are

insufficient. One weakness is the proposed burden-sharing agreement. The redistribution of the right to auction allowances under the ETS makes sense. A poorer member-state will be permitted to auction off more allowances and a richer one correspondingly less. This would not lessen pressure on companies based in poorer member-states to reduce emissions, but provide some compensation to their governments. It also adjusts for the fact that in most of the poorer Eastern European countries, the sectors covered by the ETS account for a relatively higher proportion of total emissions than across the EU as a whole. However, the distribution of the emissions cap for the non-ETS sectors is more problematic. Poorer states will be permitted to expand their emissions in non-ETS sectors by up to 20 per cent, while richer ones will have to cut theirs by up to 20 per cent. For example, despite the Czech Republic already having the highest per capita emissions of carbon dioxide in the EU, and being far wealthier than emerging economies such as China and India, the Czechs will be allowed to increase their emissions by 9 per cent between 2005 and 2020 in sectors not covered by the ETS (see graph opposite).

This is a poor model for the challenge the world faces: to stabilise emissions in emerging economies at a low level by breaking the link between economic growth and emissions. Irrespective of the future success of the ETS, the proposed burden-sharing agreement for the non-ETS sectors could undermine the EU's credibility in its dealings with emerging markets such as China and India. It will be harder for the EU to persuade these countries that it is in their interests to curb their emissions when the EU is partially exempting relatively wealthy countries such as the Czech Republic or Poland from having to do so. Moreover, it is not in the environmental interests of the Czechs or the Poles to be permitted to increase emissions, as this will leave them at a competitive disadvantage after 2020 when they will not receive such a generous settlement under any subsequent burden-sharing agreement. A far better solution would be to use EU budget funds or some of the revenues from auctioning allowances to subsidise the costs of energy efficiency measures in the poorer member-states.



Source: European Commission, 2008

EU support for carbon capture and storage

However, there is a far bigger problem than the proposed burden-sharing agreement: the absence of a European programme to accelerate the adoption of new technologies, such as CCS. As it stands, the emissions target for the sectors covered by the ETS may to a large extent be met by a shift from coal to gas. Such fuel-switching will lead to a one-off reduction in emissions, but not the investment in low- or zero-emissions technologies such as CCS that is needed to bring about a sustained reduction in emissions. Also, a further rise in Europe's dependence on imported natural gas carries significant economic and geopolitical risks. First, supplies of natural gas could become increasingly scarce as big producers divert production to domestic consumption, and competition from China and India for the available gas supplies intensifies. Second, nearly all the principal supplies of natural gas are in unstable or undemocratic countries.

CCS is expensive and capital intensive, but the EU will not achieve its emissions targets without widespread adoption of this technology. It has been shown to work, but not yet as part of an integrated programme or at reasonable cost. CCS cleanly produces hydrogen which could be burnt to generate electricity or to power fuel-cells in cars. If deployed to its full potential, it could reduce carbon dioxide emissions in the EU by half by 2050. The use of CCS technologies would also help improve Europe's energy security by providing an environmentally sustainable way of using its plentiful reserves of coal.

The Commission's proposed changes to the current regulatory framework for CCS will not lead to its implementation on an industrial scale. Much more will need to be done. For example, firms will only invest in CCS if the price per tonne of carbon dioxide avoided by CCS is lower than the carbon price. Unfortunately, at present the gap between the cost of electricity with and without CCS is too high to ensure that firms invest in the technology. Ironically, one obstacle to the widespread adoption of CCS could turn out to be the EU's renewables target. If the drive to

increase renewables is successful, it will depress carbon prices and hence the incentive for power companies and industrial plants to adopt new technologies. Indeed, the Commission recognises that if the 20 per cent target for renewables were met, carbon prices would be just €39 per tonne compared with €49 per tonne in 2020 in the absence of the target.

There are a number of CCS projects underway in the EU, but they are all small-scale and a long way from the co-ordinated action that is needed. The European technology platform on zero emission fossil fuel power plants (ETP-ZEP), an industrial association, has identified 15 full-scale demonstration projects that could go ahead once the necessary economic framework is in place. The association estimates that it would require public support of €6-10 billion over the next 3-8 years to ensure that these investments are made. The EU should provide this support.

However, a centralised EU body is needed to decide on suitable carbon dioxide sites across Europe and to plan the construction of infrastructure to transport carbon dioxide. It will not be enough to rely on the individual member-states. First, member-states will not subsidise the roll-out of CCS, as they fear they will end up paying for demonstration projects from which others will benefit. There will need to be a Europe-wide network of storage facilities and a pipeline network linking them, if all power plants and major industrial installations that rely on burning fossil fuels are to be converted to CCS. Such a network of pipelines would also make possible the mass use of hydrogen fuel-cell powered cars, which offer the best hope of a new generation of zero emission vehicles.[19]

[19] Fuel-cell technology in cars is close to commercial viability, but makes little sense environmentally if the energy used to produce the hydrogen is generated in ways that emit carbon dioxide.

A European programme such as outlined here would build confidence, knowledge and capability in CCS and raise the prospect of it being commercially viable for all fossil fuel power

plants by 2020. Crucially, it would demonstrate Europe's know-how and strengthen its bargaining position vis-à-vis emerging markets such as China and India. China has the world's second-largest reserves of coal, estimated at over 185 billion tonnes, and 70 per cent of its greenhouse gas emissions can be traced to burning coal. The country is building two coal-fired power stations a week, adding generating capacity equivalent to that of the UK every year. India is similarly dependent on domestic supplies of coal for energy. Both countries know they have to incorporate CCS as soon as possible, but are unwilling to adopt untried and prohibitively expensive technology. If Europe were to develop the technology and reduce its cost, European companies would be well-placed to play a big part in the shift to a low-carbon economy in China and India. Crucially, the EU could subsidise the transfer of this technology to them in return for action to curb emissions.

Finally, the Commission says too little about the functioning of the market itself. The carbon market could potentially be huge, and as such it needs robust regulatory oversight. Although the Commission proposes that auctions should be open to all, it says little about how manipulation of the market will be prevented. For example, emitters could collude with governments over the timing of auctions and the volumes of allowances auctioned. There must be no dilution of the longer term targets, but the Commission should consider the case for targeted intervention in the market to lessen short-term peaks and troughs. Moreover, if carbon prices are persistently weak because emissions turn out to be lower than anticipated, there needs to be a mechanism to reduce the number of allowances available.

The case for European institutions

All of these criticisms highlight the essential weakness of the Commission recommendations for reform of the ETS and for meeting Europe's emissions targets: the proposed institutional

reforms do not go far enough. There needs to be a stronger supranational component. The allocation of emissions caps under the ETS and the distribution of the EU's overall target for emissions among the members of the Union will generate fierce political lobbying. The institution charged with doing this must have a very high degree of independence. This is especially so against a backdrop of weakening economic growth, when the institution will have to resist pressure for special treatment as well as attempts to use auction revenues in ways that are inconsistent with the emissions target or single market rules.

There is an interesting analogy with monetary policy. The case for independent central banks is that governments face contradictory pressures: the markets (rightly) do not trust finance ministries to maintain price stability, because short-term growth and employment objectives are almost always more important for politicians. Although in the long term, price stability is a prerequisite for growth and employment, in the short term there is often a trade-off between price stability on the one hand and growth and employment on the other. That is why nearly all central banks now have just one key aim, to control inflation, and why they tend to enjoy a high degree of independence from political interference.

Faced with a number of conflicting pressures – such as the need to cut CO_2 emissions while ensuring the support of industry, as well as compensating companies for lost profits – EU countries could learn from the establishment of the European Central Bank (ECB). There are differences, of course. The ECB inherited the credibility of a number of very well established central banks, with hard fought reputations for maintaining price stability. Nevertheless, a fully independent institution would be the best way to ensure that the division of the EU's overall emissions targets, and the allocation of emissions allowances under the ETS, are made on a scientific basis rather than as the product of political horse-trading.

The EU should establish two fully independent institutions. These could be models for the kinds of global bodies that will one day be needed to manage global emissions trading and the allocation of emissions caps internationally.[20]

[20] *John Brown and Nick Butler, 'We need an International Carbon Fund', Financial Times, May 15th 2007.*

A European environmental board

The first institution should be a European environmental board (EEB). This body could be completely new or based on a much expanded European Environmental Agency. It would:

★ distribute national emissions caps to the 27 members on the basis of an overall EU target stretching out to 2050;

★ financially support the development and adoption of new technologies, such as carbon capture and storage;

★ monitor and verify emissions;

★ specify annual aggregate emissions quotas for the EU ETS for each four-year period to 2050;

★ allocate emissions allowances under the ETS;

★ carry out the auctioning of emission allowances; and

★ enforce strict guidelines for the use of auction revenues.

The EEB would allocate 20 per cent of the auction proceeds to the European Commission, which would use them to finance international global climate relief measures. The remainder of the proceeds would be distributed to EU governments, although the EEB would stipulate how these are to be used. The proportions could differ between members, depending on their energy resources and vulnerability to the effects of climate change, but auction proceeds would have to be split between three areas:

★ public-private partnerships to commercialise low- or zero-emission energy generation technologies and carbon capture and storage;

★ the commercialisation of low- and zero-emissions transport, and

★ efforts to mitigate the impact of global warming on vulnerable and economically disadvantaged communities.

A European carbon market authority

The second institution should be a fully independent EU-wide regulatory body to oversee the carbon market – a European carbon market authority (ECMA). The ECMA would ensure that the market functions efficiently and transparently, and prevent excessive market volatility. To this end, it would release additional allowances to alleviate shortages and prevent excessive price rises, although such interventions would need to be offset by cuts in subsequent years so that the long-term reductions in emissions were unchanged.

The establishment of new supranational bodies has obvious institutional implications. A new EU treaty would be needed to upgrade some aspects of environmental policy. For example, the management of the ETS and the allocation of emission targets would need to be a sole competence of the EU, similar to international trade, or monetary policy for those member-states that share the euro. The new treaty would have to provide for the establishment of the EEB and ECMA and lay down the procedures for appointing personnel to these institutions. The status of the new bodies relative to the EU's other institutions, as well as national governments and environment ministries, would also have to be clearly defined. Member-states would be able to bring cases against the EEB before

the European Court of Justice if they felt penalties imposed for non-compliance with their national caps were unfair.

Can the EU ETS act as a catalyst for the construction of a global emissions trading scheme? The obstacles are formidable, but the next chapter will argue that a consensus between the EU and US is possible, and that this would make it relatively easy to bring the rest of the developed world into the loop. It will not be possible to agree on a single system, but the obstacles to linking cap and trade schemes are surmountable. Enlisting the developing world will be harder. But if the developed economies established a global emissions trading network with ambitious emissions caps, they would at least have a powerful source of leverage.

5 International action?

The United States: a hibernating giant

The US has unrivalled expertise in using markets to meet public policy objectives, and considerable experience with emissions trading. The idea of creating a market for trading air pollution rights originated in the US. Legislation passed in 1990 and implemented in 1995 established an acid rain programme, which capped sulphur dioxide emissions and let companies trade their allowances. After a shaky start, sulphur dioxide emissions have fallen dramatically.

Fortunately, there are now real grounds for optimism that the US will establish a federal emissions trading scheme within the next three years, even if there is still doubt over the likelihood of it participating in a successor to Kyoto. In addition to a federal ETS, the US will provide incentives to accelerate the development and deployment of key technologies. The crucial issues will be to ensure that this system is compatible with Europe's ETS; and whether or not it will be stringent enough to convince developing countries that the US will carry a fair share of the burden in the fight against climate change.

Although the Bush administration has largely ignored concerns over climate change, state-based trading initiatives, public opinion, the US Supreme Court and, crucially, corporate America are intensifying pressure for federal action to cut emissions of greenhouse gases. Although George Bush could still veto any climate bill that calls for mandatory cuts in US greenhouse gases, Congress is currently working on various cap-and-trade bills, and all three remaining candidates in the 2008 presidential election are supporters of climate legislation.

The states: In the absence of federal action, individual states have taken the initiative. California has passed legislation to return greenhouse gas emissions to 1990 levels by 2020, while New York plans cuts of 30 per cent from 2007 levels by 2030. Both states intend to bring about these reductions through the adoption of emissions trading schemes similar to the EU ETS. The government of Florida, the fourth most populous US state, has announced plans to lower emissions to 2000 levels by 2017, and to just 20 per cent of their 1990 level by 2050. Moreover, ten north-eastern US states – Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont – are now members of the regional greenhouse gas initiative (RGGI). The RGGI sets caps for electricity generators from 2009, with emissions to be cut by 10 per cent by 2019 from 2000 levels. The RGGI is small-scale compared with Europe's ETS and the targets are far from stringent, but it has at least established a precedent.

The Supreme Court: In a landmark judgment, the US Supreme Court ruled in April 2007 that the US environmental protection agency (EPA) had violated the country's Clean Air Act by refusing to regulate emissions of greenhouse gases. The ruling, the response to a lawsuit filed by 12 states and 13 environmental groups, also called into question the legality of the EPA's refusal to impose controls on emissions from other sources. The Supreme Court is currently considering a similar lawsuit questioning the EPA's decision not to regulate the greenhouse emissions of power plants. Supreme Court decisions are no substitute for a legislative response to global warming, but they will reinforce the arguments of those pushing for a comprehensive solution.

Popular pressure: Public opinion in the US has been slower to register concern about climate change than in most EU countries, which has made it easier for the Bush administration to drag its feet. But recently there has been a sea-change in US public awareness of the scale of the problem. According to a 2007 poll by the Yale Center for Environmental Law and Policy, nearly two-thirds of

Americans believe the US "is in as much danger from environmental hazards such as air pollution and global warming as it is from terrorists". Also, the percentage of Americans who say global warming is a serious problem has risen from 70 per cent in 2004 to 83 per cent today.[21] Pressure from civil society groups, such as the influential evangelical churches, is also growing. These churches are increasingly concerned about the impact climate change will have on the world's poor, as well as on subsequent generations of Americans.

[21] Yale University office of public affairs, 'Sea-change in public attitudes toward global warming emerge; climate change seen as big a challenge as terrorism', July 2007.

The business community: The US may have refused to ratify the Kyoto protocol and been dismissive of international attempts to arrest global warming. But Kyoto – and the seriousness with which the EU has gone about meeting its obligations under the agreement – has had a big impact on the US. Many US multinationals are already complying with Kyoto's emissions targets because they are subject to the agreement in key markets such as the EU, Canada and Japan. For example, a substantial number of the 10,000-odd industrial facilities covered by the EU ETS are owned by US firms. US companies have over $1 trillion in direct investment in the EU. They face the choice of pursuing different policies in the US and EU, which is inefficient and expensive, or swallowing the costs of making their US operations greener.

Contrary to fears that the EU would hand the US an unfair competitive advantage by unilaterally moving to put a price on carbon emissions, it is US companies that fear for their competitiveness, at least in future growth industries. A powerful coalition of US firms has joined forces with US environmental groups to form the United States Climate Action Group. The group comprises such household names as General Electric, DuPont, Caterpillar and Alcoa, together with non-governmental organisations including the Pew Center on Global Climate Change and the World Resources Institute. It is demanding mandatory cuts of emissions of greenhouse gases and the establishment of a federal

cap-and-trade system.[22] The benefits for business of a federal system are obvious: the patchwork of local and regional markets currently under development, each with its own particular compliance rules, would impose greater costs on business than a national system.

[22] *United States Climate Action Partnership, 'A call for action', March 2007.*

US businesses fear that the Bush administration's refusal to act now to cut emissions will disadvantage them in new growth markets, and threaten them with more costly adjustments in the future. Some US companies worry that they will cede new markets for clean technologies to foreign competitors. Moreover, firms are coming under increasing pressure to provide data on the expected emissions of their operations when assessing investment risks. The Carbon Disclosure Project, a coalition of 143 institutional investors with $20 trillion in assets, is collecting information on climate-related policies from the world's top 500 companies. Eventually, the financial markets will start to factor the costs of complying with emissions targets into the price of corporate debt and equities. The governments of New York and Chicago are also worried that in the absence of federal US action, London will consolidate its position at the centre of the nascent global market in carbon trading.

Federal government: Opinion in the Senate has moved a long way since 1997, when senators voted overwhelmingly to reject any measures to cut emissions of greenhouse gases unless accompanied by significant commitments to action on the part of developing countries. In June 2005, the Senate adopted a resolution calling for "mandatory, market-based limits" on greenhouse gas emissions, modifying the 1997 Byrd-Hagel resolution. The new resolution calls for mandatory climate change regulation that, in contrast to the Byrd-Hagel resolution, requires only developing country "engagement" and the avoidance of "significant" costs to the economy.

At the time of writing, in May 2008, there are multiple climate change bills before Congress. Most contain similar emissions reduction strategies, relying on emissions regulations and emissions trading. The most ambitious bills are the Jeffords-Boxer and Kerry-Snowe bills, both of which would require cuts in greenhouse gas emissions to just 20 per cent of 1990 levels by 2050. The highest profile bill, however, is the Lieberman-Warner bill (titled America's Climate Security Act of 2007). This builds on a previous bill submitted by Senator Lieberman and the Republican nominee for the presidency, John McCain, but it also incorporates elements of other bills. The co-sponsorship of the Lieberman-Warner bill by the Republican John Warner was a big breakthrough for supporters of climate change legislation, although the Republicans as a whole remain far more reticent about the need for action to curb emissions than the Democrats (see below).

Lieberman-Warner calls for the lowering of greenhouse gases emissions by 60 per cent from 1990 levels by 2050, a federal cap-and-trade system covering around 80 per cent of the US economy, and the establishment of a number of independent institutions charged with managing the scheme and preventing price volatility. Crucially, it includes provisions to allow companies to bank unused emission credits and to use these in future years as well as to borrow emission credits against future allowances. A market regulator would be established to oversee the carbon market. It would be allowed to release additional allowances in order to prevent temporary shortages of permits that might lead to excessive increases in prices.

Some important emissions trading bills before Congress

Title and sponsors	Reduction target and time-frame	Attributes
Climate Stewardship and Innovation Act: Senators Lieberman (I-CT) and McCain (R-AZ)	Bring emissions to 2004 levels by 2020, to 22 per cent below 1990 levels by 2030, and to 60 per cent below 1990 levels in 2050.	Caps electric power, industrial, commercial and transport sectors; imported offsets may account for 15 per cent of the cap, domestic offsets for a further 15 per cent.
Climate Stewardship Act: House of Representatives, Olver (D-DE) and Feinstein (D-CA)	Bring emissions to 2004 levels by 2012, to 1990 levels by 2020, to 22 per cent below 1990 levels by 2030, and to 60 per cent below 1990 levels in 2050.	Same as McCain-Lieberman, except offset credits may account for only 15 per cent of emissions reductions.
Global Warming Reduction Act: Senators Kerry (D-MA) and Snowe (R-ME)	Reduce emissions to 60 per cent below 1990 levels by 2050, with annual reductions increasing progressively.	Besides economy-wide caps, bill includes nationwide renewable fuels standards, and national renewable quota of 20 per cent by 2020. Domestic offsets permitted, but the level not set.
Safe Climate Act: House of Representatives, Henry Waxman (D-CA)	Emissions freeze at 2009 level in 2010. Beginning in 2011, emissions cut – 2 per cent per year – falling to 1990 levels by 2020. Beginning in 2021, annual cuts of 5 per cent, falling to 80 per cent of 1990 levels by 2050.	EPA authorised to make additional reductions. National renewable standard: 20 per cent by 2020. Tight energy efficiency targets. Not specified whether offsets would be permitted.
Global Warming Pollution Reduction Act: Senators Boxer (D-CA) and Jeffords (I-VT)	Same as Safe Climate Act.	Same as Safe Climate Act.
America's Climate Security Act of 2007: Senators Lieberman (I-CT) and Warner (R-VA)	Greenhouse gas emissions will be capped at 2004 levels in 2012 and lowered to 40 per cent of their 1990 levels by 2050.	Same as McCain-Lieberman, aside from less stringent caps and stronger measures to prevent price volatility. Also, companies would be entitled to borrow emission allowances for future years.

Source: Point Carbon, 'Carbon Market North America', April 2008

Crucially, with control of both houses of Congress having fallen to the Democrats in November 2006, all the most powerful positions in the House of Representatives and the Senate are now controlled by supporters of climate change legislation. Senator Barbara Boxer, who co-drafted the Jeffords-Boxer bill, is now chair of the powerful environment and public works committee. She replaced the Republican Senator James Inhofe, who repeatedly labelled climate change "a hoax". Senator Jeff Bingaman, a supporter of climate change legislation, is chair of the Senate energy committee, while Harry Reid, the Senate majority leader, is a keen supporter of the McCain-Lieberman bill. Finally, Nancy Pelosi, speaker of the House of Representatives, a co-sponsor of the Waxman bill, has made climate change a top priority. Unlike its predecessor, the 110th Congress has climate policy high on its agenda.

How far is the Senate from actually passing climate legislation? In December 2007, the powerful Senate environment and public work committee approved the Lieberman-Warner bill, allowing it to go before the Senate in June 2008. However, despite the Democrats holding a majority in the Senate, and despite the likelihood of a number of Republicans voting in favour of the bill, it is far from certain that it will win Senate approval, at least before the Congressional elections in November. The Senate imposes no pre-set limit on the amount of time any particular matter can be debated. It requires a so-called supermajority of 60 per cent to end a debate and move to a vote. This rule enables 40 senators to speak at great length (or 'filibuster') in order permanently to delay (and thus defeat) a bill that has narrow majority support (less than 60 senators).

If a bill did manage to win the support of 60 senators, President Bush could still opt to exercise his presidential veto, although it would be highly controversial for him to veto a bill sponsored by the Republican's choice for the presidency.

However, the Democrats are almost certain to increase their Senate majority substantially at the Congressional elections in November.

They are unlikely to increase their majority to 60 seats, but with the support of a number of Republicans, they should be able to overcome a Republican filibuster. The bill also needs to make it through the House of Representatives, whose energy commerce committee has yet to take action on climate legislation. Only once the differences between the House and Senate versions of the bill have been ironed out can it become law.

Once the bill has cleared the various legislative hurdles it could still be derailed by a presidential veto. However, this is extremely unlikely, irrespective of the outcome of the presidential election. The two remaining Democratic candidates, Hilary Clinton and Barack Obama, are sponsors of the Lieberman-Warner bill, while John McCain has done more than any other US politician to advance the cause of climate legislation in the US. A US carbon market could emerge as early as 2009, but 2010 is much more likely.

Linking to a US ETS

The EU should, of course, work hard to persuade the US to sign up to a post-2012 Kyoto agreement. It is good news that President Bush agreed at the G8 summit in Germany in June 2007 to work within the UN framework towards an international agreement to combat climate change. US determination to influence the post-Kyoto framework might ensure that it adheres to that commitment. US participation would strengthen such an agreement immeasurably. However, even if Bush's successor as president does commit to big reductions in domestic emissions, it is far from inevitable that the US will ratify a successor to the current Kyoto protocol. The US has a strong aversion to binding international agreements that place constraints on domestic policy.

If the US failed to sign up to a successor to Kyoto, Europe's ETS could still be linked with a federal US system. Linking the two markets would allow companies covered by the EU scheme to purchase allowances from US companies covered by the US

programme and vice versa. As discussed earlier, the Commission has proposed amending the EU's ETS directive to allow links with other emissions trading systems, so long as this does not undermine the integrity of the EU ETS.

Bilateral links would boost liquidity, increase the scope for low-cost reductions in emissions and maximise economic efficiency. A failure to link the two markets would increase the cost of cutting emissions and set back the drive to establish a global carbon market. The governor of California, Arnold Schwarzenegger, has told his officials to ensure that the Californian ETS is compatible with the EU system. The Californian system is scheduled to begin in 2012, the last year of the EU ETS's second phase. But the federal US bills have been developed without much reference to what is happening in Europe or the international regime. This would make the linking of a federal ETS with the EU's system difficult, but far from impossible.

A number of factors influence the compatibility between emissions trading schemes. An important political consideration is the stringency of the targets, which determines the scarcity of carbon and hence its price. For example, it would make little sense to link Europe's system to one that generated substantially lower carbon prices – as this would lower prices in the EU and hence weaken the incentive to cut emissions. The Kerry-Snowe and Jeffords-Boxer bills set stringent emissions targets and would establish the strong, long-term price signals needed to plan large-scale capital investments. The emissions targets under the Lieberman-Warner bill are less challenging, but would still deliver very substantial reductions, and linking with the EU ETS would make sense, at least in terms of the overall emission reduction targets.

In addition to the overall target, the treatment of offset allowances also influences the compatibility of different systems. The scope for companies to purchase offset credits from domestic agricultural and forestry activities, as well as the volume of

imported credits from industrialising countries, will affect carbon prices. The EU programme does not allow for domestic offsets as a means of compliance with emissions targets, and despite pressure from France, the Netherlands and Poland, is not expected to do so in the post-2012 period. By contrast, nearly all of the US bills provide for agricultural and forestry offsets. For example, the Lieberman-Warner bill allows for up to 15 per cent of the cap to be met by domestic offsets and a further 15 per cent from international emissions allowances. With offset credits potentially accounting for 30 per cent of the cap, there is a risk that carbon prices under the Lieberman-Warner bill will be weak. The Kerry-Snowe and Jeffords-Boxer bills are more restrictive in the treatment of offsets, and would hence be more compatible with Europe's carbon market.

Trading and compliance regimes are crucial. The compliance framework and penalties would have to be consistent, as would monitoring, reporting and verification. For example, linking Europe's cap-and-trade scheme with one that sets upper limits on carbon prices would compromise the integrity of the European market by lowering carbon prices in the EU. The Lieberman-Warner, Kerry-Snowe and Boxer-Jeffords bills do not include any provision for price caps. The provisions contained in the Lieberman-Warner bill aimed at alleviating temporary shortages of allowances are unlikely to reduce incentives to invest in environmentally sustainable technologies, so long as there is no dilution of the long-term emissions target. Compliance and monitoring should be straightforward, although the US opposes using private companies to verify emissions, preferring a public body to be responsible for this. At present, the EU relies on private companies for this task.

Completely equivalent coverage across different systems is unlikely, as countries will want to include different sectors in their respective markets. The EU scheme focuses on downstream emissions, that is on the emissions of factories and power stations,

and covers around half of total EU emissions of carbon dioxide. The Lieberman-Warner bill covers downstream emissions of all the principal greenhouse gases (not just carbon dioxide) including aviation and maritime shipping. But in order to bring emissions from the transport sector into the system, it also includes the upstream suppliers of transport fuels such as oil refineries. As a result, it covers a higher proportion of the economy than the EU ETS – at around 80 per cent of US GDP – making the Lieberman-Warner ETS potentially twice the size of the EU ETS.

However, differences in coverage between two cap-and-trade schemes do not undermine the environmental case for linking. Nor do they make the two systems incompatible institutionally. Rather, as already argued, the issues raised by differing coverage relate to competition and the political support for linking. For example, if a company is included in one scheme but not the other because of different sector coverage, this could be a source of competitive distortion, and could lead to political opposition to the link. However, it needs to be recognised that the potential for competitive distortion would exist whether or not the two markets are linked.[23] The inclusion of transport in the Lieberman-Warner bill would not be a significant obstacle to linking. Air transport will be included in the EU system from 2011 in any case, and probably marine transport soon after that. As for road transport, average fuel prices paid in the EU are three times those of the US, and, in any case, the sector is not exposed to international competition.

[23] *German federal ministry of education and research, 'Joint emissions trading as a socio-ecological transformation', working paper I/06, 2006.*

The EU's experience with its ETS makes a strong case for harmonising allocation methods. For example, a firm that has to purchase allowances in one market could be placed at a competitive disadvantage compared with a firm operating in the same sector but in a market that allocates allowances for free. In order to prevent competitive distortions undermining the political support for linking different systems, there would need to be agreement on the

proportions of allowances to be auctioned. Fortunately, most of the US bills foresee auctioning for the power sector and some auctioning for the remaining sectors.

The developing world

The setting of long-term binding caps and aggressive cuts in per capita emissions would put the developed world in a strong position to demand action from China, and eventually India. In June 2007, the Chinese authorities unveiled a climate change plan that rules out quantitative targets for emissions. In the report, they argued that emissions caps would weaken economic growth and do more damage to the Chinese economy than global warming itself. The Chinese government is targeting an 80 per cent reduction in the carbon intensity of GDP by 2050, but believes emissions per capita are likely to rise to developed countries levels before they start falling. In the absence of determined action by the US it is hard to argue against the Chinese position. However, the Chinese stance would be less tenable if both the EU and US committed to the ambitious targets advocated in this pamphlet.

The sheer size of China and India means that they cannot follow the same growth path as the developed economies. This would be environmentally unsustainable and economically very damaging. If Chinese emissions converge or even exceed developed country levels before falling, there will be a huge accumulation of greenhouse gases in the atmosphere, guaranteeing accelerated climate change. These countries do not face a choice between economic growth or arresting the rise in emissions. China's economic growth path in particular is very unbalanced. Because of the domestic under-pricing of energy, water and other natural resources, the country is already experiencing environmental degradation, including acute water shortages, on an unprecedented scale. For example, according to the Chinese government, ground water levels across the most populated areas of the country are falling by 1-3 metres a year. Climate change will exacerbate these problems: rising sea levels will contaminate

groundwater supplies and threaten the country's populous coastal areas with flooding. Unless China changes direction, the economic costs of environmental damage in the country are likely to negate much of the gain from economic growth.

Moreover, although China's per capita GDP will remain well below that of the developed world for a long time, the country already possesses enormous financial and, increasingly, technological resources. There could be a role for subsidised technology transfer from the West to China; there is certainly a big role for Kyoto mechanisms such as the CDM. But China also needs the political will to curb emissions. Its economy overtook Germany to become the third biggest in the world in 2007 (at market exchange rates), and is on course to unseat Germany as the world's biggest exporter in 2008. The country is running massive trade surpluses with the EU and US, and its stock of foreign reserves reached almost $1.7 trillion in March 2008. Meanwhile, the Chinese government and Chinese companies are busy snapping up assets abroad. Even now, China's claim that it cannot afford to arrest the rise in emissions is starting to lack credibility. In ten years' time it will be simply implausible.

As large populous countries, China and India have particular responsibilities. Inaction on their part could seriously undermine the efforts of others. This, in turn, will make it much harder to maintain political support for tight curbs in developed economies. After all, most developed economies are relatively well-placed to adjust to higher temperatures.[24] It is developing countries, including China, but especially India, that will bear the brunt of global warming.

[24] *Unions for jobs and the environment, 'Economic costs of global warming', June 2002.*

What should the Chinese do? As a matter of urgency, the country needs to use resources much more efficiently and shift its economy away from an excessive dependency on heavy industry. It should ensure that energy and other natural resources, such as water, are

being priced properly. Such steps would be much more significant at this point than any Chinese commitment to short-term emissions caps, because China does not have the institutions needed to ensure compliance with such targets. Market-based policies such as emissions trading are not the answer for China, at least not yet. Even if the Chinese authorities did sign up to such a system in good faith, it is hard to see how they could properly verify emissions. Emissions trading requires very robust institutions to allocate allowances, measure emissions and to verify compliance. China is some way from having these prerequisites. However, the Chinese (like the Indians) will still have to commit to reducing their per capita emissions to the levels envisaged in any long-term caps set by the EU and US, and to design policies to ensure they meet these targets. Once they have overcome their institutional deficits, they may well adopt market-based policies.

What if the Chinese and the Indians refuse to accept a limit on their greenhouse gas emissions? The next chapter will argue that the EU and US can afford to take unilateral action irrespective of whether the developing countries follow suit. But a refusal by these countries could justify the imposition of surcharges on imports of energy intensive products such as cement and steel, and the placing of restrictions on investment through the CDM.

6 Developed economies can afford to take action

Can developed countries afford to take action to cut their emissions if the major developing countries refuse to do so? Is there not a risk that industries will simply migrate to locations where energy prices are lower and environmental standards weaker? There are some legitimate concerns, but the threat to the EU's overall competitiveness should not be exaggerated.

The EU, like other wealthy economies, does all kinds of things that impair the price competitiveness of certain industries. For example, developed countries impose extensive pollution standards and rigorous health and safety regulations, as well as comprehensive regulations governing working hours and quality standards. Some of these measures arguably boost the competitiveness of developed economies by forcing companies to apply the most up-to-date technology, and by encouraging them to make the most efficient use of labour. Developed economies remain highly competitive – and rich – despite (or perhaps partly because of) these public policies.

Policies aimed at curbing emissions of greenhouse gases should be seen in the same light. It is important to assess the impact of such policies on the competitiveness of whole economies rather than particular sectors. It needs to be remembered that for all but a handful of industries, carbon costs would be very small compared to differences in labour, energy and other input costs between EU and non-EU countries.

Moreover, the energy market policies of individual EU countries are almost certainly a bigger threat to the competitiveness of energy-intensive industries than carbon pricing. Electricity prices vary massively across the EU, partly as a result of differences in generating capacity such as (the balance between fossil-powered capacity, nuclear energy and renewables such as hydroelectric power) and partly because of differences in levels of excise taxes. Nevertheless, even comparing countries with similar generating capacity and taking varying rates of excise taxes into account, differences in the prices paid by industry are huge. Prices tend to be lower in countries with competitive energy markets and higher in markets dominated by vertically integrated domestic suppliers, such as Germany and Italy. France is an anomaly; there is little competition in the French electricity market, but the dependence on nuclear energy means that France has been insulated from the rise in fossil fuel prices in recent years. Prices in the UK are the most volatile, largely because electricity generators in the UK have signed fewer long-term supply deals with suppliers, with the result that electricity prices in the country track the spot price of gas more closely than elsewhere in the EU. In 2007, electricity prices in the UK were among the highest in the EU, because gas prices were high, whereas they were among the lowest in 2004, when gas prices were low.

Indeed, research by the OECD shows that the potential negative effects of carbon pricing, even on energy-intensive industries, is smaller than many people fear and that the overall effect on the economy is, on the whole, positive. The OECD argues that a more climate friendly economic framework can improve cost efficiency.[25] Anything that encourages European businesses to adopt energy efficient technologies will stand them in good stead in a world of increasing energy scarcity, and at the same time strengthen the EU's energy security. Tight emissions caps would enable Europe to consolidate its existing lead in many energy efficient technologies, and help European companies to set global technical standards.

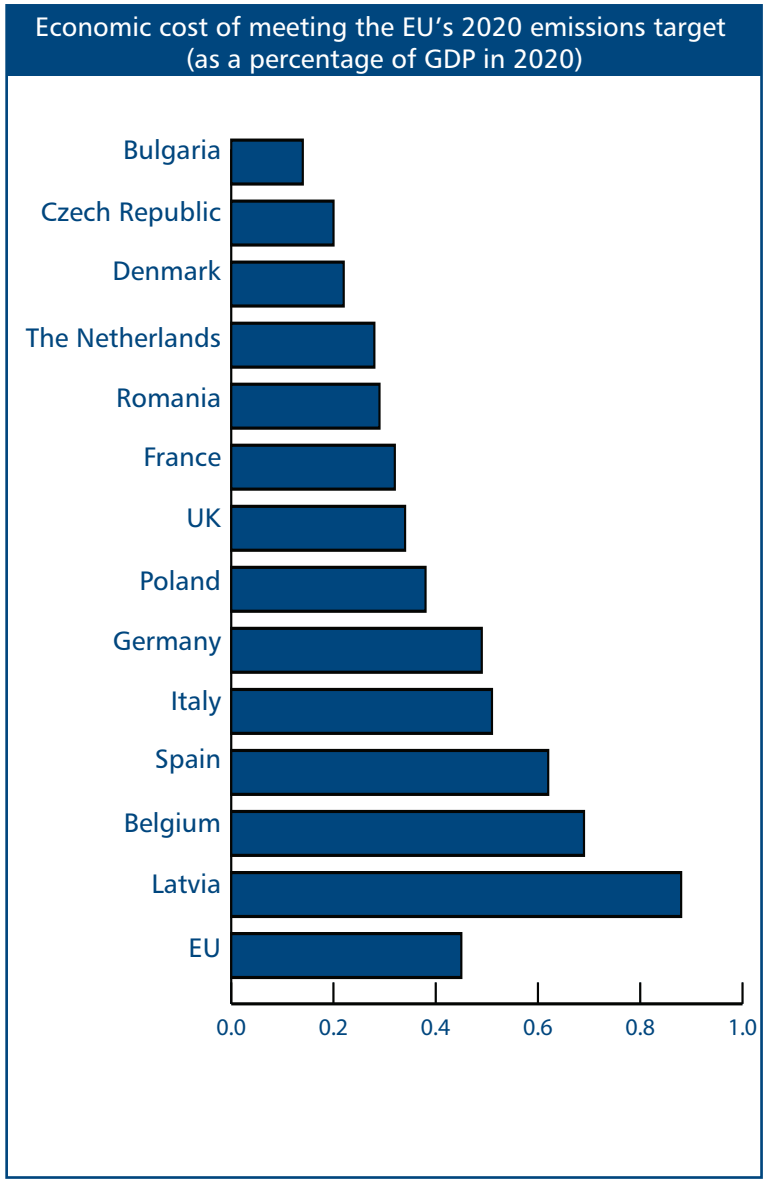
[25] *'OECD, 'The benefits of climate change policies', 2004.*

The European Commission estimates the economic costs of compliance with its 2020 climate objectives at 0.45 per cent of EU GDP by 2020. This assumes redistribution of the targets for the non-ETS sectors among the member-states along with partial redistribution of auction rights under the ETS and continued access to the CDM. However, there will be considerable differences in costs across countries, ranging from just 0.1 per cent of GDP in Bulgaria, to 0.9 per cent in Latvia.

Electricity prices for industry
(current prices in euro per 100 kWh)

Member-state	2000	2004	2007
Austria	7.63	5.53	7.86
Belgium	7.34	7.55	8.80
Finland	3.77	5.43	5.42
France	5.67	5.33	5.41
Germany	6.75	7.40	9.46
Greece	5.71	6.30	6.98
Ireland	6.62	7.87	11.25
Italy	6.93	7.90	10.27
The Netherlands	6.69	n/a	9.20
Portugal	6.43	6.84	8.60
Spain	6.36	5.38	8.16
Sweden	3.75	5.20	6.26
UK	6.64	4.78	9.50
EU-15	6.25	6.34	8.37

Source: Eurostat, 2008



Source: European Commission, 'Package of implementation measures for the EU's objectives on climate change and renewable energy for 2020', January 2008.

The US environmental protection agency (EPA) had previously been alarmist about the economic costs of capping emissions of greenhouse gases. But it has now calculated the cost to the US economy of implementing the Lieberman-Warner plan at just 1.6 per cent of US GDP between now and 2030, rising to 3.2 per cent by 2050. With US GDP estimated to increase by 111 per cent between 2005 and 2030 (assuming annual real GDP growth of 3 per cent), the EPA research has made it much harder for US sceptics of climate change to argue that the country cannot afford to take action. An economic cost of just 1.6 per cent of GDP over a period of time when GDP is expected to double looks like a sensible insurance policy. Moreover, the EPA's estimates, like those from the Commission, do not include an estimate of the potential benefits of lower emissions, such as reduced energy consumption and the growth of industries supplying low-carbon technology.

Energy-intensive sectors

Competitiveness concerns cannot be dismissed altogether, however. As the cost of emitting carbon rises over time, the competitive position of energy-intensive European industries could be impaired if developing countries did nothing to control their emissions. For example, there is a risk that increasing the energy costs for internationally exposed sectors such as steel and aluminium could cause producers to relocate production rather than investing in reducing their emissions in the EU or US.[26]

[26] *Carbon Trust, 'The European emissions trading scheme: Implications for industrial competitiveness', 2004.*

The EU now imports increasing quantities of Chinese steel. Energy prices are lower in China than in the EU and environmental standards much less stringent. But a tonne of steel produced in China results in more carbon dioxide than a tonne of steel produced in the EU, and transporting steel around the world results in further emissions. There is little sense in Europeans striving to improve the environmental efficiency of their buildings if the steel used to construct those buildings is being produced inefficiently. It will only

be possible to sustain support in rich economies for aggressive measures to reduce emissions if people are confident that their efforts will not be undermined by burgeoning Chinese and Indian emissions.

The EU must work hard at reaching a comprehensive agreement with other developed economies, along with sectoral agreements including all major trade partners for vulnerable industries. However, if this proves impossible, Europe would have to take steps to prevent its heavy industries losing competitiveness to firms or subsidiaries based in countries that refuse to take steps to curb emissions. The EU has a number of options:

★ continue distributing allowances to certain industries for free, as recommended by the Commission;

★ use revenues from the auction of emission allowances to help hard-hit sectors through reductions in taxes or by providing other types of compensation;

★ restrict access to investment through CDM projects to developing countries that adopt sectoral or other forms of emissions targets; and

★ finally, and much more controversially, the EU could resort to the Commission's second proposal: the imposition of surcharges on imports of a narrow range of energy-intensive products, such as steel and cement. Importers of products from countries that refuse to take action would have to pay a levy equivalent to the costs incurred by EU producers of these goods.

There is no case for a general tariff on imports from developing countries that refuse to take action to cut their emissions. But if sector specific surcharges helped to retain the incentive for companies operating in energy-intensive sectors to invest in Europe, there could be a case for their use. There is obviously a risk that the imposition of such measures could open the door to

pressure for similar adjustments to take account of differences in labour and social standards. However, the threat of this is slight. Differences in labour and social standards are not considered justification for import surcharges under WTO rules.

The international politics of such a move would be tricky, of course. Although the objective would be to 'level the playing field', it would prompt accusations of protectionism from developing countries. They would no doubt argue that a proportion of their emissions reflect the decision of western companies to shift production offshore, and that it would be unfair to punish them for this.

The EU should only employ such a strategy as a last resort, but should not rule it out entirely. Emerging economies are right to demand that the developed world move first to cut emissions. By the same token, if they refuse to sign sectoral agreements for energy-intensive sectors, they cannot credibly condemn developed countries for taking steps to prevent firms from offshoring production to countries that refuse to take action to curb emissions. If some tensions with industrialising economies are the price to be paid for agreement on ambitious reductions in industrialised countries, then this could be a risk worth taking.

7 Conclusion

The steep rise in emissions of greenhouse gases by China and India does not render action by developed countries to cut emissions irrelevant. It is wrong to argue that there is little point in the rich world doing anything. The US, EU and Japan are losing their economic dominance, but they are still the main drivers of industrial innovation. They therefore need to take the lead in cutting emissions. It is simply not plausible to turn to emerging economies and demand quantitative caps before the developed countries have put in place targets and policies to deliver big reductions in their own per capita emissions.

What needs to happen? Setting emissions targets is all very well, but the hard part is meeting them. This pamphlet has argued that the European Commission is right to put emissions trading at the heart of the EU's strategy to cut emissions. Trading is well suited to curbing greenhouse gas emissions. The second phase of the EU ETS, which runs from 2008-12, will be a significant step forward. If adopted, the Commission's recommendations for reform of the ETS for 2013-20 would improve the functioning of the ETS considerably. For example, the replacement of national caps with an EU cap and a progressive move to full auctioning would address many of the current competitive distortions that have undermined the system. However, in a number of areas the recommendations fall short of what is needed:

★ **The proposed burden-sharing agreement.** It makes sense to redistribute allowances under the EU ETS from wealthier to poorer member-states; poor member-states will be compensated for the costs of reducing their emissions, but they will still have to cut emissions. However, the proposal to allow the new

member-states to increase their emissions from the non-ETS sectors of their economies, in some cases very substantially, is a poor model for the challenge the world faces: to stabilise emissions in emerging economies at a low level by decoupling emissions from economic growth. The burden-sharing agreement could make it harder for the EU to demand action from the Chinese and the Indians.

★ **The lack of a European programme to accelerate the dispersion of new technologies.** As it stands, cuts in emissions by industries covered by the ETS may to a large extent be due to fuel switching from coal to gas rather than investment in low- or zero-emissions technologies such as carbon capture and storage (CCS). Unfortunately, the Commission's proposed changes to the current regulatory framework for CCS will not lead to its implementation on an industrial scale. The EU should help finance the construction of a European network of carbon storage facilities and pipelines linking them. Such a network would make possible the roll-out of hydrogen fuel-cell powered cars, which offer the best hope for a new generation of zero-emission vehicles. It would demonstrate Europe's know-how and strengthen its bargaining position vis-à-vis China and India, as well as reducing Europe's dependence on imported gas.

★ **The lack of market regulation.** The Commission is right to argue that the success of the ETS is dependent on emissions caps being consistent with the EU's emissions targets and on long-term price security. But it says far too little about the functioning of the market itself. The carbon market could potentially be huge and as such it needs robust regulatory oversight.

All these criticisms highlight the fundamental weakness of the Commission's recommendations for reform of the ETS and its strategy for meeting the EU's overall emissions target: the institutional reforms do not go far enough. If the EU's ETS is to provide a model for the kinds of global institutions that one day

will be needed to manage global emissions trading and the allocation of emissions caps internationally, it must be depoliticised. The EU should establish two fully independent institutions:

(i) **A European environmental board.** The EEB would distribute national emissions caps to the 27 members, on the basis of an overall EU target stretching out to 2050 and agreed by the European Council and European Parliament; monitor and verify emissions; specify annual aggregate emissions quotas for the EU ETS for each four-year period to 2050; allocate emission allowances under the ETS; carry out the auctioning of emission permits; and establish strict guidelines for the use of auction revenues. An independent institution would be the best way to ensure that the division of the EU's overall emissions targets, and the allocation of emissions permits under the ETS, are made on a scientific basis. Greater institutional independence is especially important against a backdrop of weakening economic growth, which will lead to increased special pleading.

(ii) **A European carbon market authority.** A market of the potential size and importance of the carbon market also needs an independent regulator to ensure that trading is transparent and that the market operates efficiently. The ECMA would be an independent EU-wide regulatory body responsible for overseeing the carbon market. It would ensure that the market functions efficiently and transparently, and prevent excessive market volatility. The ECMA would release additional allowances to alleviate shortages and prevent excessive price rises, but the long-term reductions in emissions would remain unchanged.

The EU should push on unilaterally with measures to cut emissions. The net effect on Europe's competitiveness is likely to be positive through reducing its dependency on energy and by helping European companies to carve out leadership positions in energy efficient technologies. Concerns over competitiveness are legitimate, but they tend to be exaggerated and it is important to differentiate between the

competitiveness of particular industries and that of whole economies. But EU action alone will not be enough to persuade industrialising countries to take action. The US has ended its collective denial over global warming, but is yet to get serious about cutting emissions. Only joint action by the EU and US can provide the requisite leadership. Together the EU and US could use their markets and technology to persuade the developing world to come on board.

There are real grounds for optimism on this score. Pressure from individual US states, businesses, popular opinion and the Supreme Court have combined to make it possible that a US ETS could be in place by 2010, irrespective of who is the next president. The EU must work hard to link Europe's carbon market with the US system, even if the US balks at signing up to a post-2012 international agreement; together they could form the basis of a global carbon market.

If the EU and the US led determined action by the developed economies to drastically reduce their per capita emissions, they would be in a much strong position to demand action from economies such as China and India. These countries have good environmental and economic reasons to curb emissions. China's current line – that it has a right to increase its per capita emissions to the current levels of the industrialised economies – makes little sense. China's economy is not on an environmentally sustainable path. Accelerated global warming would exacerbate old problems and create new ones, negating much of the benefit of economic growth. India's position is even more precarious. After Africa, South Asia is the region in the world most vulnerable to the impact of global warming. Both China and India have a powerful interest in breaking the link between economic development and emissions at a much earlier stage than did the developed countries.

However, if countries such as China and India refuse to take appropriate action to reduce their green house gas emissions in response to a commitment on the part of the developed countries to reduce theirs, the EU (along with other rich economies such as

the US) will need to exercise leverage. First, they should make the continued availability of investment through mechanisms such as the CDM dependent on countries setting sectoral, intensity-based or other forms of emissions targets. Second, and more controversially, they could impose surcharges on imports of energy-intensive products from countries that refuse to sign sectoral agreements. The imposition of such measures would almost certainly lead to political recriminations, but this could be a price worth paying if it helped to overcome domestic opposition in developed countries to ambitious cuts in emissions.

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Abbreviations

Carbon capture and storage	CCS
Clean development mechanism	CDM
Certified emissions reductions	CERs
European carbon market authority	ECMA
European environmental board	EEB
US environmental protection agency	EPA
Emission reduction units	ERUs
European technology platform on zero emission fossil fuel power plant	ETP-ZEP
Emissions trading scheme	ETS
Joint initiative	JI
National allocation plans	NAPs
Regional greenhouse gas initiative	RGGI

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HOW TO MAKE EU EMISSIONS TRADING A SUCCESS

Simon Tilford

The European Union has set ambitious targets to limit greenhouse gases. But it will not be able to meet these targets without an effective market for trading carbon emissions. Simon Tilford argues that the Commission's proposals for reform of the EU's emissions trading scheme address many of its short-comings, but do not go far enough. He argues that Europe's carbon market needs robust and independent institutions to run and oversee it. Without these, it will fail to act as a model for the international bodies that will be needed to manage global emissions trading.

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