

REPORT

UP IN SMOKE

HOW THE EU'S FALTERING CLIMATE POLICY IS UNDERMINING THE CITY OF LONDON



Will Straw and Reg Platt with
Jimmy Aldridge and Esther Cowdery

November 2013
© IPPR 2013

Institute for Public Policy Research

ABOUT THE AUTHORS

Will Straw is associate director for climate change, energy and transport at IPPR.

Reg Platt is a senior research fellow at IPPR.

Jimmy Aldridge is a research intern at IPPR.

Esther Cowdrey is an economic consultant and a finance lecturer in Lyon, France. She is the founder of Carbon-Politics, an economic thinktank devoted to researching how financial markets can best serve the environment.

ACKNOWLEDGMENTS

The authors would like to thank John Ashton, Graeme Cooke, Richard Folland, Liz Gallagher, Michael Jacobs and Neil Morisetti for their insightful comments on an earlier draft. A number of colleagues at the Department for Energy and Climate Change and Foreign and Commonwealth Office have provided expert advice and guidance throughout the project. We are grateful to them all. All the views contained in the report, of course, remain the authors alone.

The following people attended a roundtable discussion at the City of London Corporation on 3 September 2013: Andrew Ager, Richard Folland, Fan Gao, Richard Gledhill, Anthony Hobley, Jonathan Grant, Tom Jackson, Neil Johnson, Abyd Karmali, Simon Kennedy, Niall Mackenzie, Neil Morisetti, David Peniket and Ingo Ramming. Thanks to all of them for their contribution which formed the basis of the discussion in Chapter 4.

In addition, we owe a debt of gratitude to a number of other people with whom we spoke over the course of the research. This includes Miles Austin, Phil Brown, Rob Elsworth, Sam Johnson-Hill, Mark Lewis, Damien Morris and Raphael Trotignon.

Thanks finally to Adam Maddock and Simon Mills at the City of London Corporation who made this research possible, hosted the roundtable discussion mentioned above, and provided expert advice throughout the course of the project.

ABOUT IPPR

IPPR, the Institute for Public Policy Research, is the UK's leading progressive thinktank. We are an independent charitable organisation with more than 40 staff members, paid interns and visiting fellows. Our main office is in London, with IPPR North, IPPR's dedicated thinktank for the North of England, operating out of offices in Newcastle and Manchester.

The purpose of our work is to assist all those who want to create a society where every citizen lives a decent and fulfilled life, in reciprocal relationships with the people they care about. We believe that a society of this sort cannot be legislated for or guaranteed by the state. And it certainly won't be achieved by markets alone. It requires people to act together and take responsibility for themselves and each other.

IPPR
4th Floor
14 Buckingham Street
London WC2N 6DF
T: +44 (0)20 7470 6100
E: info@ippr.org
www.ippr.org
Registered charity no. 800065

This paper was first published in November 2013. © 2013
The contents and opinions in this paper are the author(s) only.

POSITIVE IDEAS
for CHANGE

CONTENTS

Executive summary	2
1. Introduction	5
2. Europe is not alone: Action on climate change is now global	7
The imperative for international action on climate change.....	7
EU leadership on climate change	8
Action in China and the US and the prospects for a global deal	10
Bottom-up action: clean technology and carbon pricing	12
Conclusion	15
3. A patient worth saving: The EU Emissions Trading Scheme	17
Pioneering carbon trading.....	17
Achievements of the EU scheme.....	18
Problems with the EU scheme	20
Conclusion	23
4. Losing our advantage: The City of London in decline	24
5. Back on track? Reforms to maintain EU momentum on climate change	28
Proposal 1: Agree an ambitious EU 2030 climate package.....	28
Proposal 2: Structural reform	29
Proposal 3: Investigate the introduction of carbon border adjustments	31
References	33
Appendix	37

EXECUTIVE SUMMARY

Climate change is real, manmade, and set to cause catastrophic consequences across the planet. The evidence from the International Panel on Climate Change, released earlier this autumn, is more compelling than ever before. If global emissions continue on their current trajectory, the 'carbon budget' estimated to avoid global temperatures increasing by more than 2°C will be exceeded in 15 to 25 years' time.

As a global problem, climate change can only be tackled globally. Yet, by its nature, the world's largest-ever market failure is subject to severe coordination and sequencing problems. In this context, the European Union (EU) has a proud record of taking the lead in tackling climate change. It was the first major market to put in place binding targets to reduce its greenhouse gas emissions (by 20 per cent against its 1990 baseline by 2020). The EU Emissions Trading Scheme (ETS) was the world's first market-based mechanism for reducing emissions, and aims to do so at the lowest cost.

The EU's 'first mover' strategy on climate action has recently come under fire. Critics argue that by going it alone the EU is engaged in an act of futility, since it is responsible for only 12 per cent of global emissions. They say that this effort is piling costs on business, hammering competitiveness, and driving economic activity overseas (a process known as 'carbon leakage'). These critics have become louder in recent years as energy costs, and domestic debates about them, have increased.

Despite this bluster, the EU is not alone. China (27 per cent of global emissions) and the US (17 per cent) are taking climate change seriously. Both are carrying out concerted actions to reduce emissions and to invest in low-carbon technologies. Carbon reduction is now firmly embedded in China's domestic economic strategy. They are widely expected to announce a binding cap on emissions from 2016, amid growing public concerns about air pollution. US president Barack Obama used his second-term inauguration speech to make clear his personal commitment to tackling climate change. In the absence of federal legislation, cap-and-trade schemes now cover 11 states, including New York and California.

Across the world, investments in clean technology are growing rapidly. Total investments increased five-fold from 2004 to 2013, reaching a peak of nearly \$275 billion in 2011. China and the US are, by a significant margin, the leading investors. In 2013 alone, China aims to install a world-record 10GW of solar photovoltaic generation. In the US in 2012, 49 per cent of new electricity generating capacity came from renewables.

More broadly, the global low-carbon and environmental business market is worth around €4 trillion a year, and is expected to grow at over 4 per cent per year to nearly €5 trillion by 2016. The EU has carved out a 22 per cent share of this market, worth over €900 billion a year, compared with a 19 per cent share for the US and 13 per cent for China.

Meanwhile, carbon-pricing schemes – many based on the EU ETS – are proliferating across the world. Today, countries which have implemented or scheduled carbon-pricing mechanisms emit roughly 21 per cent of the world's carbon dioxide. If China, Brazil, Chile and other emerging economies that are investigating the concept are included, this rises to 48 per cent of global emissions.

The EU's lead on international climate change has had a number of benefits. First, it has given the EU an important diplomatic role, which is far greater than the sum of its parts. Second, it has helped to pump-prime low-carbon growth, with many so-called 'green' sectors growing faster than other parts of the economy during the downturn. For example, a third of the UK's growth in 2011/12 came from green business. Third, it is likely to prove

cheaper than waiting until a later date. According to the International Energy Agency, delaying action until after 2020 could require an extra \$5 trillion of global investments between 2020 and 2035 in order to meet the below-2°C target.

Central to this leadership has been the creation of the EU ETS, which now covers 31 countries and approximately 45 per cent of EU-wide emissions. The ETS has helped the EU to cap its emissions. Already, in 2013, EU production emissions have nearly met the 2020 cap. It has proved that the concept of cap-and-trade can work in practice and put in place a replicable model of monitoring, reporting and verification. Finally, it has exerted influence beyond the EU by bringing countries like Iceland, Liechtenstein and Norway directly into the scheme, by linking with other schemes including those in Switzerland and Australia, and by encouraging cooperation between developed and developing countries through the Clean Development Mechanism.

The City of London has been a major beneficiary of this leadership. London is now home to 93.5 per cent of the market in carbon exchanges. Total annual volumes of emissions contracts have increased every year, with volumes in 2012 nearly 100 times greater than the 2005 level. London is now second only to China as the home of climate-themed bond issuance, with trading in 2012 worth \$50 billion.

In recent years, however, the ETS has faced significant challenges. Emissions fell faster than expected during the global financial crisis, causing a collapse in the carbon price. Oversupply of permits during the second phase of the ETS has been an albatross around the scheme's neck and deterred investors. The initial failure of proposals to address the problem in phase 3, known as 'backloading', has dented confidence in Europe's political commitment and damaged the prospects for schemes elsewhere.

As a result, investment opportunities have been lost, with clean energy investments falling in the EU in 2012. Meanwhile, the City of London's status as the world's capital of carbon trading and finance has been undermined. The collapse in the ETS has been a major contributory factor to the closing or scaling back of London-based carbon trading desks at 10 financial institutions, including UBS, Deutsche Bank, Barclays, JP Morgan and Morgan Stanley. New opportunities are increasingly being exploited by other financial centres such as Sydney and Singapore.

Restoring the EU's momentum on climate change would deliver three critical outcomes. It would get the EU back in front as the global leader on low-carbon investment. It could help to secure the City of London's role as the premier home of carbon trading and finance. And it should help to secure a global deal in 2015 at the crucial United Nations talks in Paris.

The window for reaching a common EU position is closing as European parliamentary elections and the replacement of the European Commission approach. An ambitious deal for an EU 2030 target is needed in early 2014 to ensure the EU can drive global ambitions in the run-up to the 2015 Paris conference. To achieve this, special effort is needed to help Poland, which is heavily reliant on coal, to exploit the opportunities from increasing its energy efficiency and new source of energy. **IPPR recommends the swift agreement at the March 2014 European Council of a 40 per cent reduction in greenhouse gas emissions by 2025 and 50 per cent reduction by 2030.**

To restore its credibility, the ETS requires both one-off reform to get phase 3 back on track and structural reform to ensure that the debacle undermining it at present can never happen again. While it is desirable, in order to provide a stable, long-term price signal for investors, an EU carbon floor price or price management reserve appears to be off the table. Instead, the direction of travel within the EU is towards a reserve system on the supply side, which would respond to future surpluses caused by shocks, such as the global financial crisis, that have hampered the scheme in recent years. An entirely automated, algorithm-based approach, which appears to be favoured by the Commission, could struggle to distinguish between different kinds of surpluses and would lack political accountability. **IPPR recommends the creation of a new Carbon Market Policy Committee, based on the ‘goal-dependence, instrument-independence’ model of the Bank of England’s Monetary Policy Committee. This should have clearly defined goals to reduce emissions at the lowest cost, but be given flexibility to intervene in the supply of allowances in pursuing this goal.**

Decisive and ambitious action by the EU is the best route to achieving a global deal at the UNFCCC talks in Paris in 2015. Nonetheless, businesses have legitimate concerns about competitiveness and carbon leakage if a legally binding global agreement proves elusive or incomplete. If this transpired, ‘border carbon adjustments’, which ensure that the embedded carbon price of imports is treated equally to that of domestically produced goods, could become a legitimate ‘plan B’. Countries would agree to binding domestic legislation to reduce their own carbon emissions and use border carbon adjustments to ensure that countries not willing to enact legislation do not unduly benefit from their inaction. **IPPR recommends that the EU should begin examining the introduction of WTO-compliant border carbon adjustments for certain sectors, including energy-intensive industries. This could become a means of effective enforcement for an informal global agreement negotiated through the UNFCCC.**

1. INTRODUCTION

Scientists now state with a 95 per cent degree of certainty that human activity has been the dominant cause of climate change since the mid-20th century (IPCC 2013). There is a limited window of opportunity for international action to reduce greenhouse gas emissions before global temperatures rise to 2°C above preindustrial levels – a level referred to as ‘dangerous’ by scientists and to which the international community is already committed to avoiding (UNFCCC 2013).

There is a lively debate about how the EU should respond to the challenge of climate change. Historically, the EU has taken a leadership role by taking action unilaterally and seeking to galvanise others to act. This approach has recently come into question. Critics claim EU efforts to reduce emissions are futile since other countries – primarily the world’s two largest emitters, the United States and China – are not following suit. They argue that action by the EU alone will not stop climate change, and so its efforts are as burdensome as they are ineffective.

This report buries the myth that Europe is acting alone in tackling climate change, and shows that a slowdown in our efforts would be counterproductive – not only in reducing emissions but also to Britain’s economic interests, including those of one of our major comparative advantages: the City of London. Indeed, it is vital that EU member states quickly agree an ambitious climate policy package for the period until 2030. This would lift the prospects for agreement of an international climate change deal at the crucial United Nations Framework Convention on Climate Change (UNFCCC) talks in 2015 and ensure that the opportunity to prosper by leading the low-carbon transformation is not squandered.

The report is organised in three parts. After summarising the scientific evidence on climate change, chapter 2 addresses the misconception, commonly held by critics of the EU approach, which underestimates the scale of international activity on climate change. We illustrate the breadth of action gaining pace worldwide, such as low-carbon investments and carbon-pricing schemes, including by the two largest emitters, China and the US.

Chapter 3 looks in detail at the flagship EU climate change policy, the EU Emissions Trading Scheme (EU ETS). This policy is characteristic of the EU approach, whereby unilateral action has been taken to demonstrate a commitment to reducing emissions and the feasibility of particular policies to the international community. We argue that despite having had a turbulent history and currently performing sub-optimally, the scheme is responsible for several important achievements, particularly the proliferation of similar schemes worldwide.

Chapter 4 looks at the positive and negative impacts of international climate policy on one specific sector of the British economy: the City of London. We examine both (i) the risks posed to the UK’s comparative advantage in emissions trading and climate finance from the continued instability of the EU ETS and (ii) the opportunities presented by the development of carbon trading schemes around the world. Drawing on engagement with high-level stakeholders in the City, we conclude that London’s financial sector is well placed to support the development of international carbon trading schemes but faces high levels of competition from financial centres in other countries. These opportunities are put at risk by resistance to the reform of the EU ETS by various parties, including UK Conservative MEPs, and the UK government’s rhetoric relating to both Britain’s continued membership in the EU and our commitment to EU climate policy.

The final chapter sets out proposals for how EU climate policy should move forward, with a particular focus on how the EU ETS could be improved. The reforms proposed should be enacted in order to ensure that Europe continues to influence global developments in climate change policy, benefits from those changes, and can deliver emissions reductions at the lowest cost across the EU. We also propose an initial investigation of 'border carbon adjustments' as a potential means of cementing global action and protecting the competitiveness of EU businesses.

2. EUROPE IS NOT ALONE: ACTION ON CLIMATE CHANGE IS NOW GLOBAL

Climate change is a global problem and its worst impacts can only be mitigated if countries act together to reduce greenhouse gas emissions. No single country can control risks from climate change. Both mitigation of and adaptation to climate change is, by its nature, interconnected.

The EU has been at the head of international efforts to reduce emissions but it is far from alone in taking action. Countries worldwide, including China and the US, have followed the EU's lead and are taking action despite the absence of a global climate deal. The scale of international action is demonstrated by the large levels of investment occurring in low-carbon sectors and the proliferation of carbon-pricing schemes.

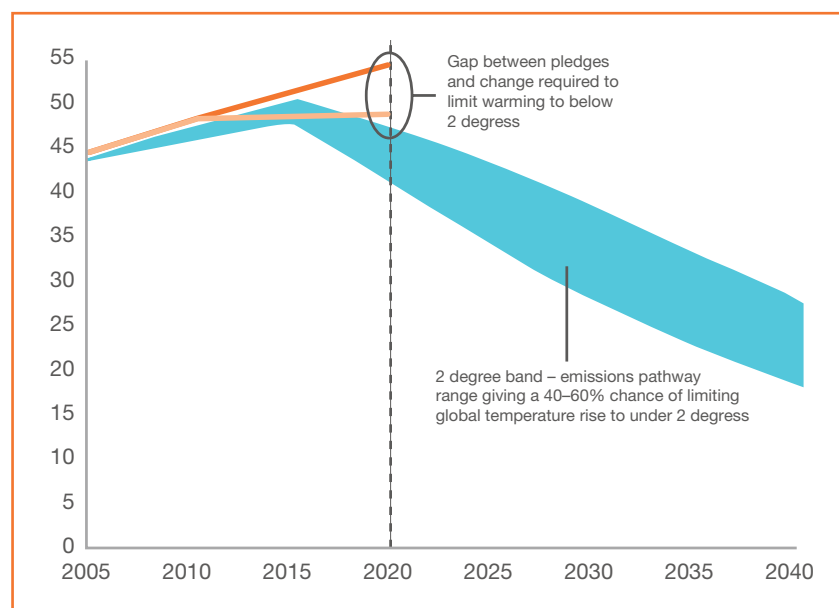
The imperative for international action on climate change

It is undeniable that international efforts to reduce carbon emissions must accelerate if the worst impacts of climate change are to be avoided.

The Intergovernmental Panel on Climate Change (IPCC) recently concluded that scientific evidence shows with a 95 per cent degree of certainty that carbon pollution from mankind's industrial activities has caused the earth to warm (IPCC 2013). The science suggests that human activity has already resulted in emissions of 531 gigatonnes of carbon (GtC) and that this has been the dominant cause of the global temperature increase of approximately 0.85°C ¹ observed since 1880 (ibid).

To avoid the high risk of dangerous consequences, which will occur if global temperature increases exceed 2°C , the IPCC has calculated a total emissions level, or 'carbon budget', of 1,000GtC that should not be exceeded (ibid). Of this, therefore, less than 500GtC remains. If global emissions remain static at their current level then the carbon budget will be exceeded in 15–25 years. However, if the rate of global emissions continues to increase annually, the budget will be exceeded earlier.

Figure 2.1
High and low-end pledges compared with the carbon budget to limit global temperature rise to below 2°C



Source: Australian Government 2013

¹ The temperature increase is within a range of 0.65° – 1.06° , with 0.85° being the middle of this range.

Although countries pledged at the 2009 UNFCCC conference in Copenhagen to limit global increases in temperature to below 2°C, current policy pledges by countries are insufficient to achieve this, as figure 2.1 below illustrates.² At best, these pledges could reduce the current rate of increase in emissions and extend the duration of the carbon budget. Nonetheless, action to reduce emissions must be accelerated to mitigate the worst impacts of climate change.

The consequences of climate change beyond 2°C would be devastating. For example, the World Bank (2012) has projected that an increase of 4°C would result in a dramatic increase in the intensity and frequency of high-temperature extremes. Tropical South America, central Africa, and all tropical islands in the Pacific would be likely to regularly experience heat waves of unprecedented magnitude and duration. The coolest months would be substantially warmer than the warmest months at the end of the 20th century. In regions such as the Mediterranean, North Africa, the Middle East and the Tibetan plateau, almost all summer months are likely to be warmer than the most extreme heat waves presently experienced. For example, the warmest July in the Mediterranean region could be 9°C warmer than today's warmest July.

The business world would be turned upside down with dire consequences for the supply chain of raw materials and access to overseas markets, as a result of disruption caused either by extreme weather directly or by shortages and volatility in prices. Both outcomes would negatively affect economic growth around the world.

EU leadership on climate change

While the scientific case for reducing emissions is clear, the political challenges to doing so are substantial. The central challenge for a coordinated international approach is to determine the scale and pace of action to be taken by different countries in order that the carbon budget is not exhausted. Important factors include (by no means exhaustively):

- current emissions of countries
- current emissions of individuals in countries ('per capita' emissions)
- the responsibility of western, industrialised countries for the majority of historical emissions
- the right of developing countries to grow their economies without the burden of high energy costs
- the capacity of countries to reduce their emissions.

It is an exceptionally difficult task to negotiate the myriad complexities of these issues in such a way that international progress accelerates in line with the requirements of climate change science. The formulation developed at the first UNFCCC conference of the parties in 1992 was for the development of 'common but differentiated responsibilities and respective capabilities'.

In interpreting its own 'common but differentiated responsibilities and respective capabilities', the consistent approach of the EU has been to use unilateral action as the foundation for diplomacy aimed at galvanising others to act.

² Analysis by the Australian government, published prior to the release of the most recent IPCC report.

Experience shows that this strategy can be successful, as the UN's climate chief has explained:

'Domestic legislation is critical because it is the linchpin between action on the ground and the international agreement ... It is clear that domestic legislation opens the political space for international agreements and facilitates overall ambition.'

Christiana Figueres, quoted in Harvey 2013

An example of the EU's approach, which was supported by the UK government, can be seen in the agreement of the '20:20:20' climate framework a year before the 2009 UNFCCC negotiations in Copenhagen. The framework committed the EU by 2020 to reduce its greenhouse gas emissions by 20 per cent compared to 1990 levels, to raise the share of EU energy consumption produced from renewable resources to 20 per cent, and to achieve a 20 per cent improvement in energy efficiency.

While high expectations meant many people perceived the Copenhagen conference as a failure, the process led to pledges under the Copenhagen Accord from all the major emitters, including the US, China and other emerging economies. These cover over 80 per cent of global emissions and were formally brought into the UNFCCC process at the Cancun meeting the following year (UNEP 2012).

Another interesting example occurred at Durban in 2011, when the EU offered to do a 2nd Commitment Period of the Kyoto Protocol in exchange for all countries signing up to a post-2020 agreement to be agreed by 2015. In doing so, the EU formed an alliance with the Alliance of Small Island States and the Africa group, which put Brazil, South Africa, India, China and the US under pressure.

Debate is currently underway on the shape of the framework that will last from 2020 to 2030 and form the basis of the EU's negotiating position in the climate negotiations to take place in 2015.³ This report will make clear the importance of this framework being quickly agreed with an ambitious greenhouse gas emissions reduction target for 2030.

Swift agreement of an EU position is vital for several reasons. First, it will significantly raise the potential for an international deal in 2015. Second, it is critical for keeping down the costs of the low-carbon transition, since mitigation costs get more expensive over time. For example, every delayed \$1 of investment in the energy sector before 2020 will cost an additional \$4.30 after 2020 (IEA 2011). Delaying further action until after 2020 could mean an extra \$5 trillion of global investment is required between 2020 and 2035 in order to meet the below-2°C target (IEA 2013). Third, it is vital for EU competitiveness. Our continent has fewer natural resources than the US⁴ and higher labour costs than China, which means it has to become more resource efficient if it wants to compete in the decades ahead.

The EU's 'first mover' strategy on climate action has recently come under fire. Critics argue that, since the EU is responsible for only 12 per cent of global emissions (WRI 2013), it cannot stop climate change alone and so should not deliver burdensome emission reductions if other countries carry on emitting regardless. This argument has

3 The UK has set out its position that the EU should adopt a unilateral emissions reduction target of 40 per cent rising to 50 per cent in the context of a meaningful international agreement. A decision on the EU's framework is expected in 2014.

4 Notably shale gas and tight oil.

grown in volume as energy costs have risen in recent years. In the UK, for example, subsidies for low-carbon generation and charges for energy efficiency have been unfairly blamed for bill increases at a time when rises in wholesale gas costs have had a greater impact on bills (CCC 2012). Similar debates have emerged in Germany, which has embarked upon an ambitious expansion of renewable energy.

The critics' argument is based on the flawed misconception that the rest of the world outside the EU is not taking action on climate change. Overcoming this misconception is a key challenge for the international climate negotiations, since many governments underestimate what other countries are doing (Stern 2013).

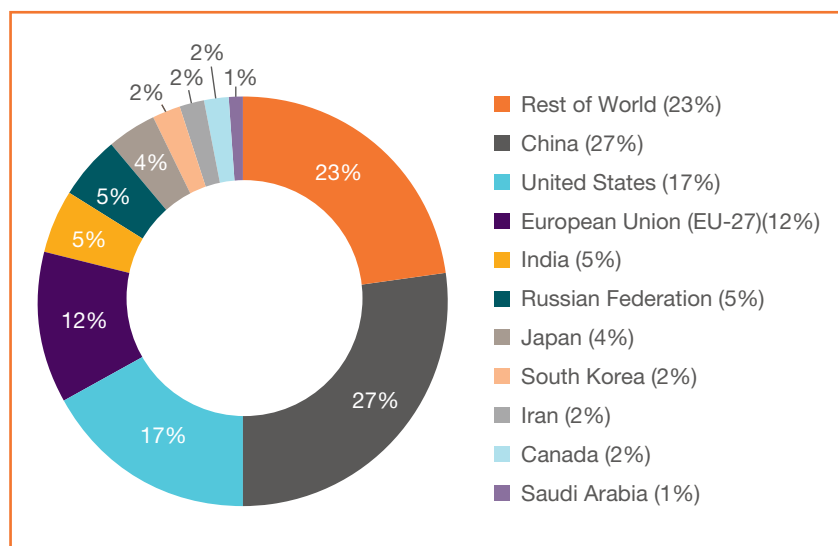
In fact, there is a huge amount of activity occurring across the world, including in China and the US, whose engagement is vital if the worst impacts of climate change are to be successfully mitigated. The EU can take much of the credit for galvanising this international response. Furthermore, if the EU can use its own commitment to emissions reductions after 2020 as leverage for equivalent reductions from countries representing the other 88 per cent of global emissions, this would be an enormous strategic and diplomatic success.

Nonetheless, there is an important role to be played by EU member states in compensating energy-intensive industries as the transition takes place. Meanwhile, imagination should be used – including consideration of the possible role of 'border carbon adjustments' – to raise the ambitions of other countries and regions. This is discussed in more detail in chapter 5.

Action in China and the US and the prospects for a global deal

If international efforts to reduce emissions are to be successful it is vital that the world's two largest emitters, China and the US, take action. As figure 2.2 shows, China is responsible for 27 per cent of global emissions and the US for 17 per cent (WRI 2013). As this report explains, both countries are currently taking action on emissions and there are promising signs for how this activity may develop in the future.

Figure 2.2
Major global emitters



Source: World Resources Institute 2013 (based on 2011 data)

Carbon reduction is now firmly embedded within China's domestic economic strategy. The current overarching approach was set out in the 12th Five-Year Plan, which was published in March 2011. The plan specifies a national target to reduce the carbon intensity per unit of GDP by 17 per cent from 2005 levels by 2015, along with other complementary targets⁵ (Townshend et al 2013). Meanwhile, China will invest up to \$1.28 trillion in its green economy between 2011 and 2015 (Tian 2012).

China's National Development Reform Commission and State Council, two central government bodies, are widely expected to introduce an absolute cap on emissions from 2016, which will supersede the emissions intensity target (Point Carbon 2013). The absolute cap would underpin the operation of a national carbon-pricing scheme, which is in development and expected to be introduced by 2020 at the latest. While the level of the absolute cap is yet to be determined, its introduction would mark a major step-change in approach, demonstrating that China acknowledges the need for economic growth to occur within constrained carbon limits.

An additional reason for optimism about China's approach is that public concern about poor air quality is at very high levels, which has helped to keep the issue of emissions at the fore for policymakers. A recent survey found that nearly half of people (47 per cent) in China rate air pollution as a very big problem, up from 36 per cent in 2012 and 31 per cent in 2011 (Pew Research Centre 2013).

In the US, President Obama used the inauguration speech for his second term in office to make clear his personal commitment to tackling climate change.

'We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations. Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires and crippling drought and more powerful storms.'

'The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition, we must lead it. We cannot cede to other nations the technology that will power new jobs and new industries, we must claim its promise. That's how we will maintain our economic vitality and our national treasure – our forests and waterways, our crop lands and snow-capped peaks. That is how we will preserve our planet, commanded to our care by God.'

Obama 2013

Unfortunately, President Obama's desire to act on climate change is not matched by a majority of legislators in the US Congress, which limits the options he has available for reducing emissions. Indeed, all previous attempts to pass national legislation to restrict emissions in the US have failed. Obama has therefore adopted a regulatory approach, taking advantage of the 2009 'endangerment finding', which ruled that carbon dioxide was considered to be a pollutant under the Clean Air Act. That finding has enabled the US Environment Protection Agency (EPA) to use its existing powers to restrict carbon dioxide

⁵ Including increasing the number of pollutants included in the 'total emissions control' system and new targets for the energy intensity of GDP (a reduction of 16 per cent by 2015), the percentage of non-fossil-fuel energy (to increase to 11.4 per cent by 2015 from 8 per cent in 2011) and an increase in forest coverage of 21.6 per cent. The overarching target is in line with the 40–45 per cent of GDP target by 2020 made by China under the Copenhagen Accord.

emissions from light-duty vehicles (2012–2016 model years) and heavy-duty vehicles (2014–2018 model years). The Obama administration also plans to restrict emissions from power plants and factories using this legislation (EPA 2013).

There is also significant action at the regional and state level in the US. For example, California passed the Global Warming Solutions Act in 2007, which set a total cap on greenhouse gas emissions and required the development of a scoping plan that set out how to achieve this target (California EPA 2013).

In the past, tension between the US and China on issues of economic competitiveness has been a key reason why a comprehensive international agreement has been out of reach.⁶ This dynamic may be easing. Recent bilateral talks between the two countries resulted in a commitment to work together to reduce emissions from heavy-duty trucks and other vehicles by raising fuel efficiency standards and introducing cleaner fuels, to develop carbon capture technologies, increase energy efficiency in buildings, promote smarter grids, and improve reporting of greenhouse gas emissions. The two nations will have the opportunity to identify more common ground at the UN world-leaders' climate summit to be held in New York in 2014.⁷ This event will mark a major staging post towards the next meeting of the UNFCCC, to be held in Paris in 2015.

It remains the case the case that the US is unlikely to ratify a global deal. This would require agreement by two-thirds of the US Senate, but attitudes among Republicans against domestic action on climate change are currently firm. Recognising this constraint, the Obama administration is suggesting a binding regime of monitoring, verification and reporting. This need not be ratified, since it would not require a formal treaty, but would oblige the US to report on its progress in reducing emissions.

Indeed, there are other reasons to be optimistic about the nature of any deal that is agreed in 2015. Unilateral action on climate change is increasingly taking place spanning the multi-national, national, regional and local levels. Many countries will arrive at the negotiations able to make substantial offers reflecting the action they are already taking. A multilateral approach that marries bottom-up actions with an achievable top-down deal is necessary partly to ramp up ambition through peer pressure but also to capture more emissions reductions from key emerging economies such as India, Russia and Brazil.

Bottom-up action: clean technology and carbon pricing

Bottom-up activity on climate change can include a wide range of measures, including regulations or taxes to reduce emissions, support for low-carbon sectors, and action to protect forestry. Two areas in particular illustrate the level of action that is occurring outside the EU: investments in clean technology and the development of carbon-pricing schemes.

Clean technology investments

International levels of investment in clean technology are a key benchmark for assessing the scale of action on climate change. High levels of investment demonstrate that both governments and investors judge there to be economic potential in clean technology. This

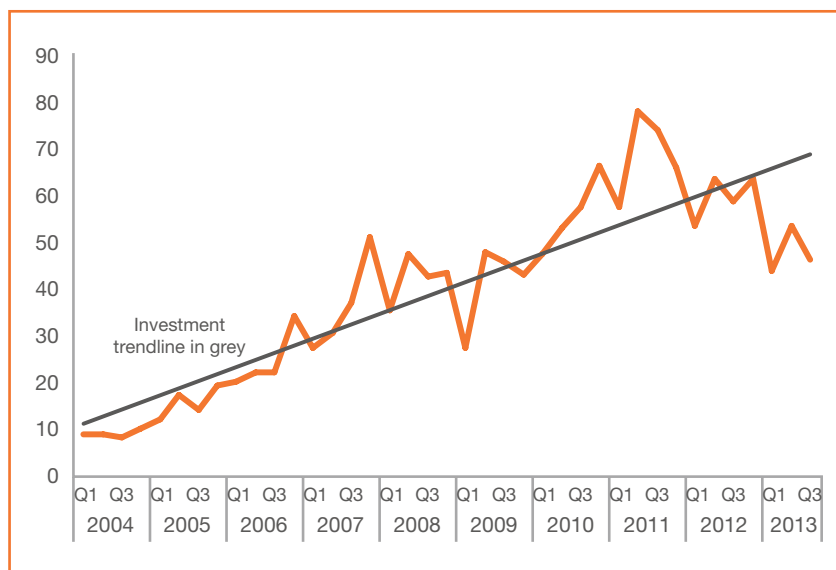
6 China strongly advocated against binding targets for developing countries at the time of the UNFCCC Kyoto Protocol, claiming it was not historically responsible for emissions and must be able to grow its economy. The US Senate meanwhile refused to ratify the Kyoto Protocol precisely because it did not include targets for developing countries.

7 See <http://www.un.org/climatechange/summit2014/>

is based on both the specific potential of individual technologies and an assessment of the significant export opportunities created by action around the world to reduce emissions.

Figure 2.3 shows how international levels of investment in clean technology have grown over the past decade. Investment levels have increased more than five-fold from around \$18 billion in the first half of 2004 to \$97 billion in the first half of 2013. The greatest level of investment seen in any one year, totaling nearly \$275 billion, occurred in 2011 (Bloomberg New Energy Finance 2013). The recent downturn is due to the withdrawal or expiration of key financial incentives in many developed countries and policy uncertainty in some long-standing clean energy markets, including the UK. But investments in countries outside the G20 increased by 52 per cent in 2012, and overall levels of investment are far above historic levels (ibid, Ernst & Young 2013).

Figure 2.3
New investment in clean energy, 2004–2013 (\$bn)



Adapted from Bloomberg New Energy Finance 2013
Note: 'Clean energy' includes wind, solar, energy efficiency and electric cars.

David Cameron has often talked about the need for the UK to remain competitive in the 'global race' with rapidly growing economies such as Brazil, India, China and South Africa. Clean technology is one area in which the global race is clearly taking hold. Table 2.1 shows the breakdown of clean technology investment by countries in 2011 and 2012.

China and the US are, by a significant margin, the leading investors, demonstrating that they are taking seriously the economic opportunities presented by decarbonisation. Most striking is how investment by China was almost double that of the US in 2012, (\$65.1 billion compared to \$35.6 billion). China continued to expand, particularly in solar, where it aims in 2013 to install a world-record 10GW of both grid-connected and distributed photovoltaic generation. Meanwhile, investments in the US fell, although there was still enough for 49 per cent of new electricity generating capacity to come from renewables (Pew Charitable Trusts 2013).

Investment appears to have fallen back in many EU countries, showing the damage caused by a combination of budget austerity and the problems facing the Emissions Trading Scheme (discussed further in chapter 3). Indeed, the EU share of investment

is down from 40 per cent in 2009 to just 25 per cent in 2012. Nonetheless, 70 per cent of new capacity in the EU was renewable for the second consecutive year (Pernick et al 2013).

Table 2.1
Top 10 countries by
clean energy investment,
2011–12 (\$bn)

Country	2011	2012
China	54.1	65.1
US	56.8	35.6
Germany	31.3	22.8
Rest of EU-27	17.7	16.3
Japan	9.3	16.3
Italy	30.1	14.7
UK	10.0	8.3
India	12.5	6.9
South Africa	0.03	5.5
Brazil	7.8	5.3

Source: Bloomberg New Energy Finance 2013

More broadly, the global low-carbon and environmental business market is worth around €4 trillion a year and is expected to grow at over 4 per cent per year to nearly €5 trillion by 2016. The EU has carved out a 22 per cent share of this market, worth over €900 billion a year, compared with a 19 per cent share for the US and 13 per cent for China. Over the last four years, Europe's low-carbon market has grown by over 10 per cent, or £85 billion. It has been estimated that if the EU can build and maintain a leading position in clean technology, increased exports could contribute €25 billion a year to GDP this decade (GGG 2013). In the UK, it is believed that a third of the UK's growth in 2011/12 is likely to have come from green business (CBI 2012).

Carbon pricing and trading

Alongside the scale of clean technology investments, the number of new domestic schemes that have implemented a carbon price is another key benchmark of international action on climate change.

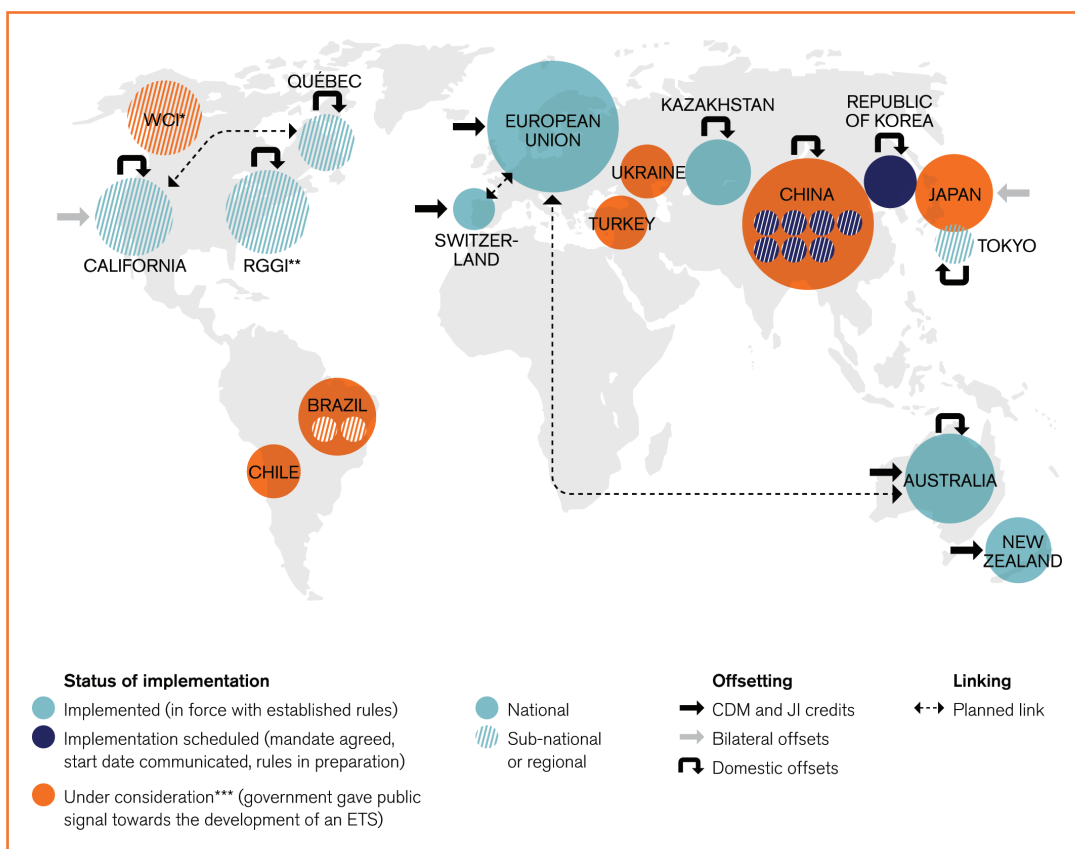
A large number of carbon-pricing schemes (which include emissions trading and carbon taxes) are now in place across the world, covering a significant portion of global emissions. The World Bank's Carbon Finance Unit estimates that by May 2013 the total implemented and scheduled carbon-pricing schemes covered at least 3.3 gigatonnes of CO₂e/year, or 7 per cent of the 50 gigatonnes of CO₂e emitted globally per year. The emissions of countries and regions with carbon-pricing mechanisms⁸ total around 10 gigatonnes of CO₂e/year, equivalent to 21 per cent of all global emissions. This has the potential to rise to 48 per cent if all countries examining the possibility of these schemes were included (World Bank 2013).

As figure 2.4 shows, carbon trading schemes are now implemented, scheduled or under consideration on every continent aside from Africa. Schemes are underway in both China and the US. China has developed a pilot emissions trading system in seven municipalities and provinces. The intention is for this pilot, launched in 2013, to be expanded into a national scheme by 2020 (see the following section). In the US there are two major schemes: the California Cap-and-Trade Program and the Regional Greenhouse Gas

⁸ That is, emissions from all sectors, not just those covered by the pricing schemes.

Initiative, which covers 10 states.⁹ See the appendix for details on each of the schemes that are implemented, scheduled or under consideration worldwide.

Figure 2.4
Emissions trading schemes implemented, scheduled or under consideration



Source: World Bank 2013

Notes:

* Western Climate Initiative: British Columbia, California, Manitoba, Ontario and Québec

** Regional Greenhouse Gas Initiative: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont

*** Schemes under consideration are at different stages in the process.

The size of the circles is not representative of the size of the schemes.

Mexico's Congress passed a General Law on Climate Change, which provides the federal government with the authority to create programmes, policies, and actions to mitigate emissions, including an ETS.

Costa Rica is working on the design of a domestic carbon market that would contribute to meeting the country's carbon neutrality goal.

In addition, a number of countries have introduced carbon tax schemes, including Australia, Denmark, Finland, Ireland, Japan, Norway, South Africa, Sweden, Switzerland and the UK. More detail is provided in the appendix; the focus of this report is on emissions trading mechanisms in particular.

Conclusion

It is imperative that international action on climate change accelerates. The world's governments need to demonstrate that the forces of transformational change can overcome the forces of incumbency, and a global deal is the main way to do it.

9 Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont.

As the former foreign secretary's special representative for climate change, John Ashton, has argued:

'Only a binding regime can convince those whose capital allocation decisions shape the economy that a high carbon business model will expose them to greater risk and hit their returns harder than betting now on low carbon; that governments in other words are serious; that these promises will be kept even if the going gets rough.'

Ashton 2011

The EU has taken the lead on international climate change negotiations in recent years. This has given the EU an important diplomatic role, which is far greater than the sum of its parts. It has helped to pump-prime low-carbon growth, with many so-called 'green' sectors growing faster than other parts of the economy during the downturn. It is likely to prove cheaper than delaying mitigation action until a later date. Finally, it has helped to establish the City of London as the preeminent home of carbon finance (discussed further in chapter 4).

Since the debacle of Copenhagen, many other countries, notably China and the US, have paradoxically begun to catch up with the EU and roll out their own emissions trading schemes, many of which have been modeled on the EU's original. Sadly, the EU's own momentum has slowed during this period, as problems have beset the EU ETS. The next chapter examines the achievements of the EU scheme, the challenges it is facing and its future potential.

3. A PATIENT WORTH SAVING: THE EU EMISSIONS TRADING SCHEME

The EU ETS is the flagship EU climate change policy, one now emulated across the globe. The scheme can count several achievements yet has been beset by difficulties. If political obstacles can be overcome, the scheme can be reformed to:

- play a key role in ensuring that EU emissions are reduced at the lowest cost to consumers and businesses
- drive emission reductions abroad
- ensure that EU businesses remain competitive.

Pioneering carbon trading

The EU ETS was the first and by far the largest carbon trading scheme in the world. It currently covers 31 countries and approximately 45 per cent of total EU greenhouse gas emissions.

Carbon trading is a policy measure for tackling climate change that drives emissions reductions by making polluters pay to emit. Working alongside policies that provide targeted support to low-carbon technologies and overcome behavioural barriers to emissions reductions, pricing carbon should be a central component of climate change policy (see box 3.1).

Carbon trading is a specific type of carbon-pricing scheme in which the total amount of emissions that a designated group of companies can emit is capped. These companies can then trade the right to emit carbon among themselves. In the EU scheme, the right to emit is determined by the ownership of carbon credits, known as 'European Union Allowances' (EUAs). Companies in designated sectors must secure allowances for each tonne of carbon dioxide or its greenhouse gas equivalent that they emit. By trading EUAs, a company with too few credits can buy from a company with too many. This enables affected firms to reduce emissions at a faster or slower pace, in line with their individual commercial decisions.

The EU ETS has developed in three phases, becoming larger and more complex over time. An initial pilot phase ran from January 2005 to December 2007. The second phase ran from January 2008 until December 2012, to coincide with the first commitment period of the Kyoto Protocol. The third phase launched in January 2013 and will run until 2020.

For the second and third stages of the scheme, in addition to trading emission allowances between one another, companies have had the opportunity to offset their emissions by investing in an emissions-saving project abroad. This can be done either in a developing country, via the Clean Development Mechanism (CDM), or in a transition economy,¹⁰ known as Joint Implementation (JI). These offset mechanisms were intended to limit the costs of carbon abatement in the EU ETS, thus complementing rather than substituting for domestic attempts to reduce emission levels.

¹⁰ Primarily countries of the former Soviet Union.

Box 3.1: The benefits and limitations of carbon pricing

According to neoclassical economic theory, setting a price on externalities such as carbon emissions is the most cost-efficient way to internalise that externality. These models assume perfect information of market participants and rational decisions once all prices are known. In the real world, because political, technological and behavioural factors are not captured by the neoclassical model,¹¹ complementary policies are required to tackle climate change.

- **Political factors:** A carbon-pricing scheme is an artificial construct, operating within parameters that have been set by an administrative body. As a result, any such scheme carries with it a risk that the parameters will initially be set following lobbying by affected organisations and can be altered should the political environment change. Long-term policy certainty is a necessary underpinning of low-carbon investments, because they tend to be highly capital intensive with long pay-back periods. Targeted policies to provide certainty to investors are therefore required alongside carbon-pricing schemes.
- **Technological factors:** Many of the technologies required to decarbonise the economy are immature and consequently expensive. In the short term, and aside from environmental factors, investment in established technologies such as coal-fired power plants may be more attractive than investment in low-carbon technologies such as solar photovoltaics. Additional policy support can drive rapid cost reductions in low-carbon technologies and accelerate the rate at which they become competitive.
- **Behavioural factors:** In the real world, decision-making is not always rational and behavioural factors have a much greater role than traditional theory allows (see Dolphin and Nash 2012). For example, while it may be economically rational for residents to install energy efficiency measures in their homes, many do not because they believe the process is more hassle than its worth. In these situations, targeted policy support is required to incentivise or promote the desired behaviours.

Achievements of the EU scheme

The EU ETS has recently attracted significant criticism after the failure of several high-profile attempts to improve the scheme. The challenges facing the scheme are discussed below, but first it is important to recognise its achievements.

Capping emissions

From the outset, an overarching objective of the EU scheme has been to cap emissions in designated sectors across the whole of the EU. It is an inarguable fact that the EU ETS has succeeded in doing this, thus helping the EU to achieve its emission reduction commitments under the UNFCCC Kyoto Protocol.

The first phase of the scheme, which ran from 2005 to 2007, had a relatively unambitious cap. For the second phase, which ran in line with the first Kyoto commitment period from 2008 to 2012, the cap was set to contribute to overall emissions reductions of 8 per cent by the EU-15 by 2012, compared to 1990 levels. This target was exceeded (EEA 2013). The duration of the scheme has been extended to align with the Kyoto

¹¹ See Dolphin and Nash 2012 for more on non-traditional economic theory.

extended commitment period, which was agreed at the UN climate negotiations in Doha in 2012. This third phase of the EU ETS will run from 2013 to 2020 and has introduced an emissions cap for the period of 21 per cent below 2005 levels. The 2020 target will support an overall carbon emissions reduction target across all sectors in the EU of 20 per cent compared to 1990 levels.

Already, in 2013, EU production emissions have nearly met the 2020 cap requirement (Morris 2013). If offset emissions are included, production emissions are well below the cap level. The EU has been able to achieve its 2020 target in advance of the deadline primarily because of a decline in economic activity following the global financial crisis.

Proving the concept of cap-and-trade

One reason we can be sure that EU emissions are below the ETS cap level is that the scheme is based on rigorous systems for monitoring production emissions from affected companies. Indeed, without these systems the scheme would simply fail to function, as it would not have the confidence of market participants and governments. This helps to illustrate the second key achievement of the scheme, namely the scale and complexity at which it operates.

The EU ETS has grown substantially over time. It currently covers many sectors¹² across 31 countries, up from 15 countries at introduction in 2005. The latest phase has incorporated more greenhouse gases, including nitrous oxide and perfluorocarbons.

The operational coverage of the EU ETS, both with respect to the number of companies and types of emissions, is a substantial technical feat. Furthermore, it is a notable political achievement. The scheme has secured buy-in from a diverse range of governments, industry and the financial sector. These participants have committed to uphold the quality assurance practices that are necessary to maintain the integrity of the market. The monitoring, reporting and verification mechanisms, which are constantly being improved, have been a particularly important development.

Building international influence

Another achievement of the EU ETS is the significant influence it has had beyond the EU, evident in four distinct ways. First, Iceland, Liechtenstein and Norway are all directly involved in the scheme despite being outside the EU. Australia and Switzerland are currently involved in negotiations to link their schemes with the EU ETS.

Second, the scheme has played a key role in linking up action on climate change between developed and developing countries. The EU ETS was the first emissions trading scheme to integrate the CDM and JI offset markets, and the CDM market in particular has produced tangible benefits. These include enhancing dialogue between countries and putting in place measureable standards that will provide useful lessons as the scheme is reformed and enters a new phase (to be called the 'New Market Mechanism').

Third, the scheme has had a role in driving international action in the aviation sector. While the initial inclusion of aviation in the ETS was opposed by several countries, the decision spurred discussion on aviation emissions within the International Civil Aviation Organization, which resulted in agreement in October 2013 that work would be carried out towards a global market-based measure. In light of this, the EU is expected to make a decision in early 2014 on the most appropriate course of action for flights within EU

¹² Sectors covered include oil refineries, steel works, commercial aviation, and the production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals.

airspace, following a legislative proposal from the European Commission. If and when the ETS is expanded to include internal flights by companies based outside the EU, an important precedent will have been set with regard to imports. Indeed, the door will have been opened to similar approaches in other sectors, in the form of border carbon adjustments. These adjustments (detailed further in chapter 5) have the potential to drive emissions reductions beyond the EU while at the same time protecting the competitiveness of EU businesses.

Finally, the EU ETS has had international influence by spearheading the proliferation of carbon trading across the globe, as described in the previous chapter. In following the EU's lead, the countries that have adopted carbon trading have sought to build on the successes of the EU ETS and learn from its mistakes. Indeed, the European Commission has been very active in supporting the development of new carbon trading schemes. With so many schemes now in existence and looking to the EU ETS for lessons and inspiration, it is vital that problems currently facing the EU scheme are addressed.

Problems with the EU scheme

While the EU ETS has succeeded in its objective of capping EU-wide emissions, it has not delivered on its secondary objective of encouraging low-carbon investment. To do so it would need to fulfil two conditions, both relating to the price of emission allowances in the market. First, the price must exhibit a degree of stability. Unpredictability increases the cost of capital for investment, which is a major risk for the capital-intensive energy sector. Second, and more importantly, the price must not be too low. The minimum price necessary to drive investment in low-carbon technologies is unclear, since it depends in part on the uncertain and unstable price of high-carbon alternatives. However, industry figures have said a price of €30 would be effective (Tindale 2012).

The price of carbon in the market has spent long periods at a level far below that required to incentivise low-carbon investment. The reason for this 'bottoming out' is that the market has been beset by the oversupply of emission allowances. This has occurred for different reasons during each phase of the scheme, and the European Commission has attempted to respond with varying degrees of success.

Oversupply of allowances during phases 1 and 2

During both the first and second phases of the scheme the allowance price fell to very low levels due to an oversupply of permits. In phase one, the price reached a high of €35/tCO₂ in mid-2007 before collapsing once market participants realised there was a problem of oversupply (Tindale 2012). The oversupply resulted from countries being able to determine their own emission caps for the first phase and setting them too high. This was largely in response to the lobbying of carbon-intensive industries, in particular the steel and cement industries, which argued that their competitiveness would be hardest hit by the scheme. In the end, it transpired that the number of allowances distributed during the first phase was 7 per cent greater than the actual emissions for which affected sectors were responsible (Sandbag 2010).

Heading into phase two, reforms were implemented to rectify this oversupply. Companies were restricted from carrying surplus credits over into the second phase and the European commission introduced a much stricter overall emissions cap, at 6 per cent below 2005 levels. As a result of the reforms, the allowance price reached a high of €36/tCO₂ in 2008 – but again oversupply led to a collapse in prices, down to €7/tCO₂ in 2009 (Chevallier 2010). The economic downturn across Europe following the financial crisis of 2008 was

a key factor. This had adverse effects on industrial production, meaning emissions were lower than predicted and the demand for allowances was suppressed, thus lowering the price.¹³ In addition, the market was flooded with credits from the offset mechanisms that were introduced during this second phase (Guardian 2012). A key reason for this was a flawed methodology for determining whether CDM projects created emission savings that were additional to a 'business as usual' scenario.¹⁴

Table 3.1 shows how both the recession caused by the global financial crisis and the oversupply of offset credits created the surplus in allowances that occurred during phase two. In all but the first year of this trading period, the number of emission units significantly outstripped actual emissions from affected sectors. By the end of 2011, the cumulated surplus was nearly 1 billion units, of which offset credits were responsible for around 50 per cent (Herman and Matthes 2012).

Table 3.1
Emission unit allocation
during phase 2 of the
EU ETS

	2008	2009	2010	2011	Total
	Million EUA, CER, ERU or tonnes of CO₂*				
Units freely allocated to companies	1,961	1,976	1,998	2,001	7,938
Units made available to companies through auctions and sales	45	79	92	83	300
Offset credits available (CDM and JI combined)	83	81	137	255	556
Total available units	2,090	2,137	2,227	2,340	8,793
Verified emissions in affected sectors	2,123	1,882	1,939	1,903	7,846
Surplus emission units	-33	255	289	436	947
Cumulated surplus of emission units	-33	222	510	947	

Source: Herman and Matthes 2012

* CERs/Certified Emission Reductions can be obtained by implementing emission reduction projects through the CDM. ERU/Emission Reduction Units can be obtained from projects through JI.

Oversupply of allowances during phase 3

Prior to the start of phase 3 in 2013, several improvements were made to the EU ETS (see Kossoy and Guigon 2012). Reforms included:

- more consistent rules for setting emission targets and allocating allowances
- abandoning national emission caps in favour of a harmonised cap covering all participating countries, declining annually by 1.74 per cent below phase 2 levels
- calibrating the cap to account for emission reductions achieved by other EU climate policies, in particular the renewables target
- the introduction of more stringent rules over the type of offset credits accepted
- capping the amount that offset credits can contribute to emission reductions at 50 per cent

¹³ Additional downward pressure on prices grew as, in an attempt to capture revenue during the downturn, companies sold off their carbon credits, thus further flooding the market with a surplus of allowances. Some financial institutions that had served as key players in the carbon market collapsed, such as Lehman Brothers and Bear Sterns, while others diverted their investments away from the carbon market towards less risky assets, all of which served to further depress prices.

¹⁴ In some cases, CDM investments have ended up supporting factories to remain open just for the sake of emitting greenhouse gases and claiming credits for them.

- stipulating that far more allowances will be auctioned and far fewer given away for free than in earlier phases.¹⁵

Despite these changes, the existing oversupply of allowances in the market that emerged during phase 2 has not been addressed. Sandbag estimates that 1.8 billion surplus allowances have been carried over into phase 3 (Morris 2013). Moreover, because the recession helped the EU to overachieve against its 2020 emissions reduction target, there is now 877 million tonnes of headroom between 2013 and 2020. Unless allowances are withdrawn, there will be upward pressure on emissions over the next seven years (ibid).

Attempts have been made to address the oversupply of allowances. A key proposal was to withdraw 900 million surplus allowances from the scheme and reintroduce them at a later date when the EU's economy improves – a process referred to as 'backloading'. The proposal was passed by the European Commission's Environment Committee but then defeated, unexpectedly, in a council vote in April 2013. After the failure of the vote, prices in the market dropped dramatically to €2.81/tCO₂ (Carrington 2013).

The backloading proposal did not pass for a number of reasons. Some countries were fundamentally opposed to the proposals. This included Poland, who claimed the move would cost them in excess of €1 billion (Keating 2012). The opposition of others was more surprising. A group of UK Conservative MEPs voted against it, despite backloading having the support of the UK government.¹⁶ Since the British government has introduced a carbon tax that 'tops up' the EU ETS carbon price (called the 'carbon price floor') these MEPs effectively voted for UK businesses and consumers to pay higher taxes on carbon than their counterparts on the continent (see box 3.2). In addition, German MEPs abstained from the vote, despite the German climate minister having sent a joint letter to Reuters with ministers from the UK, Italy, Denmark, Sweden and France a week before the vote, calling for the approval of the backloading proposal (Euractiv 2013). Germany's shift in position appears to have occurred in response to lobbying from its domestic industries, which were concerned about the impact on German competitiveness (Climate Group 2013).

After the backloading vote the lobbying activities of an industry group representing businesses across Europe, Business Europe, were called into question. They had argued that backloading represented unwarranted interference in the carbon market and would undermine European competitiveness by pushing up energy prices. However, the industry group was heavily criticised for not accurately representing the interests of its members, since many were keen to see the vote passed (Business Green 2013). Indeed, there have been a variety of industry voices arguing for backloading, including Alstom, Shell, Dong, SSE and Vestas (Tindale 2012). A better approach to dealing with concerns over competitiveness and 'carbon leakage', known as border carbon adjustments, is examined in chapter 5.

¹⁵ Industries that are particularly vulnerable to carbon 'leakage' (that is, likely to move production to a country that falls outside of the EU ETS in order to regain competitiveness) will continue to receive free credits.

¹⁶ In fact, the UK government had wanted to go further, calling for 1.2 billion allowances to be removed.

Box 3.2: The EU ETS and the UK carbon price floor

In the UK, the carbon price floor, announced in the 2011 budget, levies a charge on the carbon content of fuels used for power generation which is additional to the cost of carbon in the EU ETS. The government aims for the combined cost of the EU ETS and carbon price floor to increase in a straight line to £30 per tonne in 2020 and £70 per tonne in 2030. The policy is flawed since it will not reduce emissions at the EU level: any emission reductions in the UK will simply result in more emission allowances being available for other EU ETS participant countries (Maxwell 2011).

As part of the linear trajectory, the carbon price floor will be £18.08/tonne of carbon in 2015/16. As a result, the price of wholesale electricity in the UK will be around 17 per cent (£8/MWh) higher than 2013 prices. Without reform to raise the price of carbon in the EU ETS, and thus reduce the unilateral tax on energy in the UK from the carbon price floor, the competitiveness of British industry will be undermined.

Conclusion

The backloading proposal was recently returned to the EU parliament and was finally passed. Despite all its weaknesses, the ETS is a patient worth saving because of its significant achievements, in terms of capping emissions, proving the concept of cap-and-trade, and increasing the EU's international influence.

These achievements will count for little, however, if the deeper structural issues associated with the ETS are not addressed to allow the scheme to deliver its full potential. The continued failings of the ETS has dented confidence in Europe's political commitment and damaged the prospects for schemes elsewhere. It has also had a detrimental effect on one of Britain's primary comparative advantages: the City of London.

Structural reforms to revive the EU ETS will provide significant opportunities for new services and products in carbon trading, as well as other financial products related to climate change. If reform is blocked or delayed further, it will send a wider signal to the business and investment community that the EU's decarbonisation strategy is in question and will squander the potential benefits to the City of London. Chapter 4 examines developments within the City of London in recent years. Chapter 5 sets out ideas for structural reform of the ETS, among other recommendations.

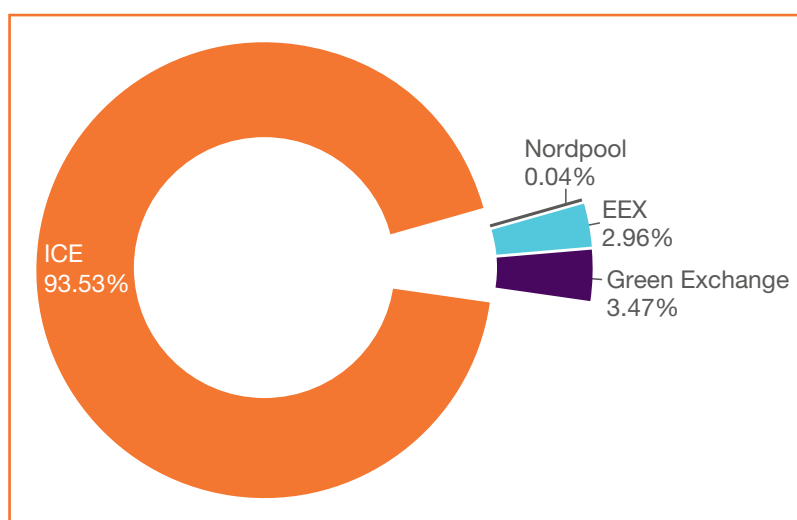
4. LOSING OUR ADVANTAGE: THE CITY OF LONDON IN DECLINE

The establishment of the EU ETS in 2005 was heralded as a significant opportunity for the City of London. Many of those opportunities have been fulfilled and more present themselves in the plethora of new carbon-pricing regimes being set up worldwide, as described in chapter 2. Problems within the ETS, however, pose a serious risk to the predominance of the City as the home of carbon finance and a number of jobs have already been lost. This chapter examines these opportunities and risks.

In 2006, the City of London Corporation published an early analysis of the interaction between emissions trading and the ‘substantial financial rewards’ that it could offer the City of London (CEAG 2006). The report set out the ‘prospects for London to become the leading international provider of emissions market services to the mushrooming industry’. It outlined that London had captured many ‘first mover advantages by the early implementation of the UK ETS in 2002 and by the vigorous promotion of the EU ETS’.

Many of these predictions have turned out to be accurate. In 2006, the European Climate Exchange (ECX) – based in London – dealt with more than twice the volume of emissions trades than its nearest competitor. In September 2013, the London-based Intercontinental Exchange (ICE), the ECX’s successor, had 93.5 per cent of the market and traded 27 times the volume of its closest competitor, as figure 4.1 shows (ICE 2013).

Figure 4.1
Market share of active carbon exchanges



Source: ICE 2013

Total annual volumes of emissions contracts have increased every year, with volumes in 2012 nearly 100 times greater than in 2005 (ibid). In September 2012, the average daily volume of European Union Allowances (EUAs) on the ICE was 27.7 million, compared with approximately 350 million during 2005 in total (ibid, CEAG 2006). As one speaker said at an IPPR roundtable discussion in September 2013 hosted by the City of London Corporation:

‘London is the centre of carbon futures. Its position in the carbon markets is pretty stable, nowhere else is close.’

Global developments in carbon-pricing regimes also provide an opportunity for the City of London. Although the world is unlikely to see a global carbon market of the kind envisioned in the run-up to the UNFCCC talks in Copenhagen in 2009 (Lazarowicz 2009),

there are instances of existing and emerging carbon market regimes linking up. For example, the European Commission and Australia announced in 2012 a pathway to link the EU ETS and Australian Emissions Trading Scheme (EC 2012a). The two-way link will commence no later than July 2018, with Australian businesses allowed to use EUA to help meet liabilities under the Australian scheme from July 2015. Although the new Australian prime minister, Tony Abbott, would like to repeal the Australian scheme, this is not possible without support from the Labor Party in the Australian Senate, which is not forthcoming. Meanwhile, the European Commission is negotiating with Switzerland to link the EU and Swiss schemes.

These new international linkages mean that there will be more liquidity within the EU ETS and therefore more potential business for the City of London. As countries introduce carbon-pricing regimes, there are opportunities for the City to provide expertise to governments and regulated firms in designing and complying with monitoring, reporting and verification systems and to help establish exchanges.

Alongside these positive developments, the EUA price has collapsed, as documented in the previous chapter. The instability surrounding the ETS and the resulting crisis in demand for traded units through the CDM has jeopardised jobs in a number of banks and financial institutions, as summarised in table 4.1.

Table 4.1
Developments in financial
service institutions

Institution	Development
Barclays	Sold its carbon trading business to Tricon, a Swedish carbon trading company.
Camco Clean Energy	Scaled back its UK staffing.
Deutsche Bank	Closed its global carbon trading operations.
EcoSecurities	Laid off 85 per cent of its staff, many of whom were UK-based.
JP Morgan	Scaled back its environmental markets team.
Morgan Stanley	Closed its full-time carbon desk, now covered only part-time.
Nedbank	Scaled back its operation.
Sindicatum	Closed its London operations aside from one lawyer; moved everyone else to Singapore.
TFS Green	Scaled back its operation.
UBS	Closed its climate change advisory practice.

As well as a 'push' from the instability caused by the continued uncertainty surrounding the ETS, there are a number of 'pull' factors from other markets. As one senior banker outlined at IPPR's roundtable discussion:

'Most activity is now in the new markets – China, California, Australia etcetera. Europe [is] very slow now. There is some residual demand for services related to the ETS but there is far more in the new markets.'

The City of London has often benefited from being in a timezone that meant it could link the close of the Asian trading day with the start of the day in New York. This benefit appears to be disappearing in relation to carbon trading, as most of the new activity is taking place in Asia. Financial centres like Sydney and Singapore are better positioned, and a number of banks have set up a presence in those countries rather than carrying out activities from London.

Another City figure contrasted what was taking place in the far east with the debacle in Europe:

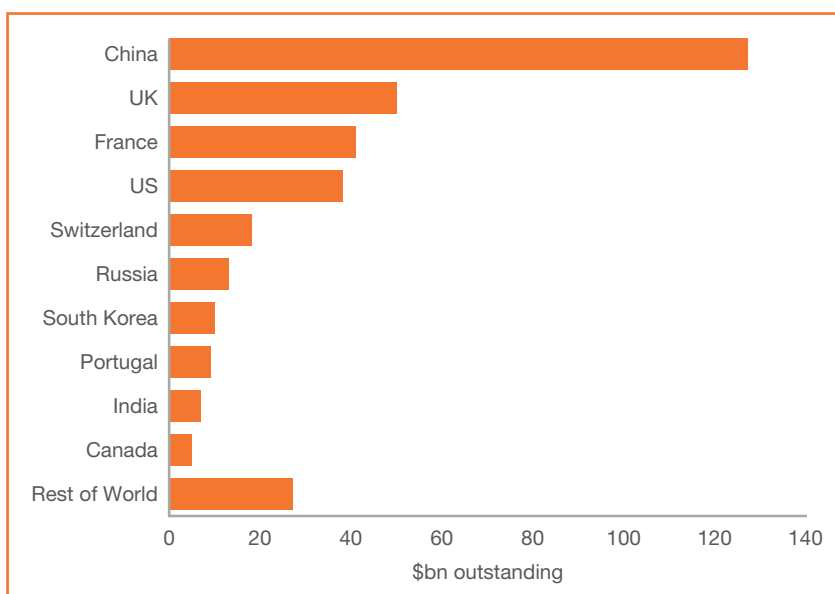
‘Structural reform has to be seen as enduring and stable and free of policy and regulatory interference. If there is a lack confidence that that can be delivered then major questions are going to be asked about the ETS, especially against the backdrop of what is happening elsewhere, such as China.’

A third speaker widened the discussion to put concerns about ETS reform in the context of the question about whether the UK should leave the European Union or hold a referendum on that question:

‘In the event that we were to withdraw from the EU, it may threaten the future of the ETS itself because the UK government has been very supportive, so that is a concern.’

Alongside these concerns about the impact of the impasse over the ETS on the City of London, there was some optimism that although carbon trading may not provide the number of domestic jobs once envisaged, there were other opportunities to deploy new products. For example, HSBC has revealed that there was a 25 per cent increase in the issuance of new climate-themed bonds from 2011 to 2012 (Climate Bonds 2013). Climate-themed bonds outstanding in 2013 total \$346 billion – predominantly for transport projects (\$263 billion) but also for energy (\$41 billion) and finance (\$32 billion). Although China is the country with the largest issuance, the UK is in second place with \$50 billion, as figure 4.2 shows. The US is fourth, with \$38 billion.

Figure 4.2
Top 10 countries for
climate-themed bond
issuance



Source: Climate Bonds 2013

At IPPR’s roundtable, one individual saw a clear role for the City in the years leading up to the crucial 2015 UNFCCC conference meeting in Paris.

He characterised this as ‘frameworks, principles and solutions’:

‘In terms of frameworks there’s probably a role in the regulatory side of things to encourage more dissolution from companies. Make things easier for companies in terms of what companies need to be disclosing. What is a material risk disclosure when it comes to climate change.

‘On principles – examples are from the [United Nations Environment Programme] Principles for Responsible Investment and Principles for Sustainable Insurance.

‘The easiest one for the city is solutions. Helping new companies go public on AIM¹⁷ or whether its green bonds, or new instruments that help to mobilise private capital, that’s an area for the city to shine.’

Climate risk and resilience was also mentioned as a crucial way of expanding the role of the City of London beyond carbon markets. Recent research has shown that three-quarters of businesses do not have a formal climate resilience strategy in place, so this has the potential to be a major growth area (Nichols 2013).

Although the City of London has been hit by the wider problems with the EU ETS and the resulting collapse of activity, there is a major opportunity in the broader business of carbon risk and resilience. However, for this opportunity to be realised by the City it is crucial that structural reforms to the ETS are enacted and that political obstacles are directly addressed. The next chapter sets out a number of proposals for how the scheme could be improved.

17 Although it has been argued that in practice it would not be a tax because it would not actually set a fixed price for allowances (Tindale 2012).

5. BACK ON TRACK? REFORMS TO MAINTAIN EU MOMENTUM ON CLIMATE CHANGE

With the international climate change negotiations in sight, it is imperative that the EU maintains its momentum in tackling emissions. Not only is this vital in order to bolster and raise the ambitions of other countries, it is also necessary if the EU is not to be overtaken by countries seeking to gain competitive advantage in the low-carbon transition.

The EU ETS has a central part to play in EU climate policy by ensuring the EU's emissions are reduced at the lowest cost and that the proliferation of carbon trading schemes around the world continues. Furthermore, as the scheme moves increasingly to a system of auctioning emission allowances it could generate new revenue for EU governments.

However, the ETS is facing substantial challenges. Deep structural reforms are necessary if it is to remain the centrepiece of EU action on climate change and play its role in encouraging low carbon investment. In this final chapter we propose three routes forward for EU climate policy, with a focus on necessary reforms to the EU ETS.

Proposal 1: Agree an ambitious EU 2030 climate package

It is imperative that the EU moves quickly to agree its climate policy framework for the period 2020 to 2030. There are two clear benefits. First, it will provide increased certainty for business on the direction of EU policy and unlock necessary long-term investments. As the CBI has said: 'It's critical to get political agreement on a 2030 EU emissions target by the end of [2014], to encourage the levels of investment that we need in low-carbon technology' (CBI 2013).

Second, the earlier the agreement is in place, the more time there will be for other countries to determine what offer they will make towards a global climate deal, which should be agreed at the 2015 meeting of the UNFCCC in Paris. China, in particular, looks to the EU to set the global benchmark on ambition.

There is only a brief window of opportunity in which to agree the 2030 framework. This must be seized. The process is currently paused while the shape of the new German government is decided and its view on climate policy becomes clear. Once this occurs, negotiations on the framework can restart. The window closes again in the run-up to the European parliamentary elections in May 2014, particularly if the EU is to be in a position to put an ambitious offer on the table at the Ban Ki-Moon Global Climate Summit in September 2014. In practice, this means that agreement needs to be reached at the European Council in March 2014.

The priority must be to agree the scale of emissions reductions that will be achieved across all EU member states by 2030. All other potential targets, relating to renewable energy or deployment of energy efficiency for example, are secondary concerns. The UK government has set out its position, calling for a unilateral 40 per cent cap compared to 1990 levels moving to 50 per cent in the context of a comprehensive global deal (DECC 2013a). This is the right level of ambition. It is in line with the most cost-effective decarbonisation pathway to 2050, as identified by the European Commission's Low Carbon Roadmap in 2011, with the EU's 'fair share' of the international effort to meet the globally agreed below-2°C target, and with the UK's legislated decarbonisation targets.

The key challenge to agreeing this level of commitment will be to determine how emissions reductions are shared between EU member states and the appropriate interim target for 2025. Unanimity is required at the European Council. Special attention will need to be given to Poland, which is reliant on high-carbon, energy-inefficient infrastructure. Additional effort is therefore needed to help Poland exploit the opportunities from

increasing its energy efficiency and providing enhanced support for their transition away from domestic coal.

Ambitious 2025 and 2030 emissions targets are likely to face resistance from some stakeholders, in particular the most energy-intensive manufacturers. However, the entire EU 2030 package should not be watered down to accommodate one sectional interest. Indeed, many other businesses want to see action on climate change because it will bring growth in jobs and exports to the EU. A more appropriate approach to accommodating sector-specific concerns, therefore, is to couple highly ambitious targets with targeted policies to help energy-intensive industries. These compensation schemes can be financed by increased government revenues arising from a higher carbon price.

An ambitious target to reduce greenhouse gas emissions must be agreed at the European Council in early 2014. This should agree a 40 per cent reduction by 2025 and 50 per cent reduction by 2030.

Proposal 2: Structural reform

A first step for EU ETS reform should be to align the scheme with the EU's broader 2025 and 2030 climate change objectives and revised 2020 objectives, if and when these are agreed. The ETS is the most cost-efficient tool for driving emissions reductions and, with the affordability of energy such an important issue, should be at the centre of the EU's and national decarbonisation strategies

Given the time and energy that has been put into the creation of the EU ETS, its relative success in driving down emissions in Europe and, perhaps most significantly, its role providing a template for other countries looking to adopt their own carbon-pricing schemes, it is critical that the ETS is properly reformed rather than left to rot. Meaningful reform will also provide significant benefits for the City of London, as outlined in chapter 4.

In addition to ensuring that the ETS is aligned with the EU's wider climate ambitions, it is important that structural reforms are put in place to ensure that the recent debacle relating to the oversupply of permits does not recur. This requires both a one-off reform to permanently remove surplus allowances in phase 3 of the scheme, so that the EU's existing emissions reductions are not reversed, and the introduction of preventative measures to protect against large surpluses and fluctuations in the future.

The European Commission has set out a series of options for structural reform. Renewed effort must be focused on retiring a number of allowances in phase 3. The Commission says that this 'can be effective in addressing the overall supply-demand imbalance' (EC 2012b). The EU has suggested that 1.4 billion allowances need to be withdrawn in order to bring the ETS into line with the EU's agreed long-term objective of reducing emissions by 80 to 95 per cent by 2050 compared to 1990.

There are other estimates of how many allowances should be withdrawn. Deutsche Bank has suggested that retiring 1.2 billion emissions in phase 3 'might well lift prices back into the €15 to €20 per tonne range' (Curien and Lewis 2012). The campaigning organisation Sandbag suggests that 1.7 billion should be removed to keep the ETS on track for a reduction of 30 per cent by 2020 (Morris 2013).

In addition to this one-off measure to improve the operation of the ETS in phase 3 and bring it into line with existing 2050 objectives, the ETS needs a new mechanism to ensure that the fiasco of recent years is not repeated. The European Commission refers to this as

'discretionary price management mechanisms' and suggests two approaches: a carbon price floor or a price management reserve (EC 2012b).

A carbon price floor, which has already been adopted unilaterally in the UK, would 'create more certainty about the minimum price, giving a better signal for investors' (EC 2012b). A price management reserve would adjust the supply of allowances when an exogenous shock, such as the global financial crisis, reduces overall emissions due to falling economic activity. As has taken place in recent years, this kind of exogenous shock has a detrimental impact on the carbon price and, therefore, on the efficient functioning of the market and the signal to investors.

Both of these schemes have significant merit insofar as they combine a market-based approach to emission reduction with the price certainty required by investors. They would be popular with national finance ministries, guaranteeing higher auctioning revenues which could be used for low-carbon policies or to compensate consumers and businesses which are affected by rising energy bills. Nonetheless, there are significant political obstacles to their agreement and a number of vested interests – German power companies, for instance – would mount vigorous lobbying operations to block the proposals. Stakeholders at a recent DECC consultation event viewed these proposals as being 'too radical' and feared it would 'work against the logic of the market and impair price formation' (DECC 2013b). They might also be seen as a harmonised EU tax, which would prove impossible to agree among the states.¹⁸

One alternative proposal which received widespread support at the DECC consultation event entails reform to manage supply in order to protect against both the future accumulation of large surpluses and any supply crunch or price spike (ibid). A version of this proposal, known as a demand shock adjustment reserve, is the favoured approach of Sandbag (Morris 2013).

There are compelling reasons for having an agreed set of rules to determine when allowances should be removed, including to avoid the unseemly spectacle of recent negotiations over the backloading proposals. This was described by the centre-right thinktank Policy Exchange as a 'highly politicised and disorderly process for intervention' (Moore 2013). Rules could, for example, look at the level of surplus in the system; a combination of a maximum surplus and maximum price; or changes in the level of industrial production. All of these have potential drawbacks but nonetheless appear more politically feasible than a price floor.

Most proposals on the issue favour the use of an algorithm to determine interventions in the market when the rules have been breached. However, an algorithm would not be able to differentiate between different causes of surpluses. For example, a significant breakthrough in innovation in one sector could cause a surplus of a kind which should not result in allowance withdrawals across the board.

Policy Exchange has recommended the establishment of a new agency, modelled on the UK Committee on Climate Change (CCC), to provide independent advice on cap management decisions (ibid). The danger with an advisory agency like the CCC is that it does not have executive powers and final decisions are therefore open to political interference.

¹⁸ Although it has been argued that in practice it would not be a tax because it would not actually set a fixed price for allowances (Tindale 2012).

A better principle would be to create a new reserve management institution called the Carbon Market Policy Committee. This would be based on the Bank of England's Monetary Policy Committee which has 'goal dependence' but 'instrument independence'. In other words, the committee's objective (to reduce emissions at the lowest cost) would be decided by statute and subject to political oversight, while the tools used to achieve this aim (the supply of allowances) would be wielded independently. Table 5.1 outlines the similarities with an instrument-independent central bank.

Table 5.1
Functions of an instrument-independent Monetary Policy Committee and Carbon Market Policy Committee

	Monetary Policy Committee	Carbon Market Policy Committee
Goal	Growth path without inflation	Emissions reduction at lowest cost
Instrument	Supply of money	Supply of allowances (free allocation + auctions)
Economic signal	Interest rates	Carbon price
Risks of interference	Short-term growth leads to medium-term inflation	Short-term carbon lock-in leads to high future costs

Source: Adapted from Climate Economics Chair 2013

An institution of this nature builds in added flexibility. For example, if a carbon price floor or reserve price became politically feasible in future, the rules of the Carbon Market Policy Committee could be amended without the need for the creation of a new institution.

The EU ETS emissions cap for 2030 must be set in line with the total emissions cap agreed by member states.

As part of the EU's climate and energy package, agreement should be reached on the desired level of emissions reduction for 2020, 2025 and 2030 to keep the EU on a cost-effective path to its existing 2050 objectives.

Allowances should be permanently removed from the ETS scheme for phase 3 to ensure that the EU is on course to deliver these targets.

A rules-based reserve system should be established to respond to exogenous demand shocks. A new Carbon Market Policy Committee should be put in place to manage this reserve system. It should be given clear goals, underpinned by legislation, for the quantity of allowances that should be removed following a shock and to determine when intervention is necessary. Like the Bank of England's Monetary Policy Committee it would have instrument independence in pursuing these goals.

Proposal 3: Investigate the introduction of carbon border adjustments

Achieving structural reform to the ETS will not be easy, particularly since governments around Europe are worried by rising energy costs for consumers and businesses and the resulting impact on competitiveness. A major concern is that as an effective ETS will further increase energy costs and cause 'carbon leakage' whereby European businesses are unable to compete in the global marketplace against companies in other countries which have lower carbon prices. This is exacerbated by concerns about the abundance of cheap energy in the US (Barroso 2013).

A compelling case study of how the EU has been able to use the ETS to create a level playing-field for its industry is the deal reached recently to include aviation in the scheme from 2016 (Harrabin 2013). The initial proposal to include emissions from flights into and out of the EU led to widespread criticism and threats of retaliation from China and the US, among other countries. The final decision was delayed for a year to allow sector-specific negotiations through the International Civil Aviation Organization (ICAO). Although there

are some concerns about the final deal, it is likely that all airlines will in time join a global scheme to cut emissions. To give momentum to global discussions, the EU has proposed that flights to and from countries outside the European Economic Area will benefit from a general exemption from the ETS for the proportion of emissions that take place outside European airspace. Only the emissions from the proportion of a flight taking place within European airspace will be covered. Nonetheless, a system is now in place to cover companies based outside the EU when they 'export' their service over the borders into the EU.

The EU should explore adopting a similar approach for other sectors, particularly energy-intensive industries such as steel and cement. These border carbon adjustments, sometimes known as border tax adjustments, would ensure that the embedded carbon price of imports is treated equally to that of domestically produced goods. Although they would probably provoke as much opposition from affected countries as the case of aviation did, they are likely to be WTO-compatible and covered by the 'general exemption' of the general agreement on tariff and trade which relates to the conservation of natural resources (Helm et al 2012). Marginally different schemes may be needed for different sectors, depending on their level of trade and the amount of electricity needed in the production process (Grubb and Counsell 2010).

An international system of border carbon adjustments, imposed by countries with carbon-pricing regimes on those without, could form the backbone of an enforcement mechanism for any deal reached through the UNFCCC process. This would act as a useful 'plan B' if formal ratification of a global agreement on climate change proved elusive, perhaps due to the intransigence of the US Senate or Chinese exceptionalism. In this instance, countries could agree to binding domestic legislation to reduce their own carbon emissions and use border carbon adjustments to ensure that countries not willing to enact legislation do not unduly benefit from their inaction.

Since this outcome might become necessary, it would be prudent for the EU to begin investigating the imposition of border carbon adjustments now. It could use its bureaucratic and legal expertise to provide the world with an off-the-shelf model, as it has done with its monitoring, reporting and verification regime.

The EU should begin exploring the introduction of WTO-compliant border carbon adjustments for certain sectors, including energy-intensive industries. This should be carried out transparently with the international community, with the understanding that it could prove to be an effective enforcement mechanism for an informal global agreement negotiated through the UNFCCC.

REFERENCES

- Ashton J (2011) 'Only Diplomacy: Hard-Headed Soft Power for a Time of Risk, Scarcity and Insecurity', speech, Chatham House, 21 February 2011. <http://www.chathamhouse.org/publications/papers/view/109591>
- Australian Government (2013) 'Pathway to below 2 degrees', webpage, Canberra: Department of the Environment. <http://www.climatechange.gov.au/international/international-action/global-context-australias-place/pathway-below-2-degrees>
- Barroso JM (2013) 'Energy priorities for Europe', presentation to the European Council, 22 May 2013. http://ec.europa.eu/europe2020/pdf/energy3_en.pdf
- Bloomberg New Energy Finance (2013) 'Global trends in clean energy investment – Q3 2013 Fact Pack', 14 October 2013. <http://about.bnef.com/fact-packs/global-trends-in-clean-energy-investment-q3-2013/>
- Business Green (2013) 'Did your company inadvertently help wreck the EU emissions trading scheme?' <http://www.businessgreen.com/bg/analysis/2264888/did-your-company-inadvertently-help-wreck-the-eu-emissions-trading-scheme>
- California Environmental Protection Agency [California EPA] (2013) 'Assembly Bill 32: Global Warming Solutions Act', webpage. <http://www.arb.ca.gov/cc/ab32/ab32.htm>
- Carrington D (2013) 'EU carbon price crashes to record low', *Guardian*, 24 January 2013. <http://www.theguardian.com/environment/2013/jan/24/eu-carbon-price-crash-record-low>
- Chevallier J (2010) *Carbon prices during the EU ETS Phase II: Dynamics and volume analysis*, Paris: Université Paris Dauphine. http://hal.archives-ouvertes.fr/docs/00/45/91/40/PDF/chevallier_phaseII.pdf
- Climate Bonds Initiative (2013) *Bonds and Climate Change: The state of the market in 2013*, London. http://www.climatebonds.net/files/Bonds_Climate_Change_2013_A3.pdf
- Climate Economics Chair (2013) 'Response to the European Commission's Consultation on structural options to strengthen the EU Emissions Trading Scheme', 25 February 2013. http://ec.europa.eu/clima/consultations/articles/0017/organisations/climate_chair_en.pdf
- Climate Group (2013) 'Interview: Matthew Gray on the impact of the EU ETS', blogpost, 19 April 2013. <http://www.theclimategroup.org/what-we-do/news-and-blogs/interview-matthew-gray-on-the-impact-of-the-eu-ets/>
- Committee on Climate Change [CCC] (2012) *Energy prices and bills – impacts of meeting carbon budgets*, London. http://www.theccc.org.uk/wp-content/uploads/2012/12/1672_CCC_Energy-Bills_bookmarked.pdf
- Conciliation Energy Advisory Group Ltd [CEAG] (2006) *Emissions trading and the City of London*, London: City of London. <http://www.cityoflondon.gov.uk/services/environment-and-planning/sustainability/Documents/pdfs/emissions-trading-city-of-london.pdf>
- Confederation of British Industry [CBI] (2012) *The colour of growth: Maximising the potential of green business*, London. http://www.cbi.org.uk/media/1552876/energy_climatechangerpt_web.pdf
- Confederation of British Industry [CBI] (2013) 'CBI responds to launch of EU Green Paper on 2030 emissions targets', press release, 27 March 2013. <http://www.cbi.org.uk/media-centre/press-releases/2013/03/cbi-responds-to-launch-of-eu-green-paper-on-2030-emissions-targets/>

- Curien MC and Lewis I (2012) *EU energy: ETS reform should not be set aside*, Global Markets Research: Special Report, London: Deutsche Bank. http://www.longfinance.net/images/reports/pdf/db_etsreform_2012.pdf
- Department for Energy and Climate Change [DECC] (2013a) *A 2030 framework for climate and energy policies: UK Government Response to Commission Green Paper COM(2013) 169 final*, London. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210659/130703_response_for_publication.pdf
- Department for Energy and Climate Change [DECC] (2013b) 'DECC Future of the EU ETS event 12/04/2013'. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/192571/future_of_eu_ets_april_2013_event_report.pdf
- Dolphin T and Nash D (eds) (2012) *Complex new world: Translating new economic thinking into public policy*, London: IPPR. <http://www.ippr.org/publication/55/9499/complex-new-world-translating-new-economic-thinking-into-public-policy>
- Environment Protection Agency [EPA] (2013) 'Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act', webpage. <http://www.epa.gov/climatechange/endangerment/>
- Ernst & Young (2013) *Renewable energy country attractiveness indices*, issue 36, February 2013. [http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_February_2013/\\$FILE/Renewable_energy_country_attractiveness_indices.pdf](http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_February_2013/$FILE/Renewable_energy_country_attractiveness_indices.pdf)
- Euractiv (2013) 'Six EU Climate Ministers, including Germany's, support backloading of ETS allowances', 12 April 2013. <http://www.euractiv.com/climate-environment/germany-supports-backloading-emi-news-519065>
- European Commission [EC] (2012a) 'Australia and European Commission agree on pathway towards fully linking Emissions Trading systems', press release, 28 August 2012. http://europa.eu/rapid/press-release_IP-12-916_en.htm
- European Commission [EC] (2012b) *The state of the European carbon market in 2012*, COM(2012) 652, Brussels. http://ec.europa.eu/clima/policies/ets/reform/docs/com_2012_652_en.pdf
- European Environment Agency [EEA] (2013) *Trends and projections in Europe 2013 – Tracking progress towards Europe's climate and energy targets until 2020*, Copenhagen. <http://www.eea.europa.eu/publications/trends-and-projections-2013>
- Green Growth Group [GGG] (2013) *Going for green growth: The case for ambitious and immediate EU low carbon action*, London: Department for Energy and Climate Change. <https://www.gov.uk/government/publications/going-for-green-growth-the-case-for-ambitious-and-immediate-eu-low-carbon-action>
- Grubb M and Counsell T (2010) *Tackling carbon leakage: Sector-specific solutions for a world of unequal carbon prices*, London: Carbon Trust. <http://www.carbontrust.com/resources/reports/advice/tackling-carbon-leakage-sector-specific-solutions>
- Harrabin R (2013) 'EU hails ICAO plan for global green tax on aviation', BBC News website, 7 October 2013. <http://www.bbc.co.uk/news/world-europe-24429721>
- Harvey F (2012) 'European countries "using emissions trading to subsidise overseas rivals"', *Guardian*, 20 November 2012. <http://www.theguardian.com/environment/2012/nov/20/europe-emissions-trading>

- Harvey F (2013) 'Domestic climate laws are essential, says UN', *Guardian*, 13 January 2013. <http://www.theguardian.com/environment/2013/jan/13/climate-laws-un>
- Helm D, Hepburn C and Ruta G (2012) *Trade, climate change and the political game theory of border carbon adjustments*, London: Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment. <http://www.cccep.ac.uk/Publications/Working-papers/Papers/90-99/Trade-climate-change-game-theory-carbon-adjustments.pdf>
- Herman H and Matthes FC (2012) *Strengthening the European Emissions Trading Scheme and raising climate ambition: Facts, measures and implications*, Berlin: WWF and Greenpeace. http://awsassets.panda.org/downloads/greenpeace_wwf_2012_studie_emissionshandel_en.pdf
- Intercontinental Exchange (2013) *The Emissions Market: ICE Futures Europe*, New York. https://www.theice.com/publicdocs/ICE_Emissions.pdf
- Intergovernmental Panel on Climate Change [IPCC] (2013) *Climate Change 2013: The Physical Science Basis, Summary for Policy Makers, Working Group I Contribution to the IPCC Fifth Assessment Report*, Geneva. http://www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved27Sep2013.pdf
- International Energy Agency [IEA] (2011) *World Energy Outlook 2011*, Paris. http://www.iea.org/publications/freepublications/publication/WEO2011_WEB.pdf
- International Energy Agency [IEA] (2013) *Redrawing the energy-climate map: World Energy Outlook Special Report*, Paris. http://www.iea.org/publications/freepublications/publication/WEO_Special_Report_2013_Redrawing_the_Energy_Climate_Map.pdf
- Keating D (2012) 'Poland urges rejection of backloading plan', *European Voice*, 17 December 2012. <http://www.europeanvoice.com/article/2012/december/poland-urges-council-to-reject-ets-backloading/76011.aspx>
- Kossov A and Guigon P (2012) *State and Trends of the Carbon Market*, Cologne: Carbon Finance Unit. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTCARBONFINANCE/0,,contentMDK:23206428~menuPK:5575595~pagePK:64168445~piPK:64168309~theSitePK:4125853~isCURL:Y,00.html>
- Lazarowicz M (2009) *Global Carbon Trading: A framework for reducing emissions*, London: The Stationary Office. <http://streitcouncil.org/uploads/GlobalCarbonTradingframeworkforreducingemissions.pdf>
- Maxwell D (2011) *Hot air: The carbon price floor in the UK*, London: IPPR. <http://www.ippr.org/publication/55/7629/hot-air-the-carbon-price-floor-in-the-uk>
- Morris D (2013) *Drifting towards disaster: The ETS adrift in Europe's climate efforts*, London: Sandbag. http://www.sandbag.org.uk/site_media/pdfs/reports/Drifting_Towards_Disaster_25.6.2013_Final_1.pdf http://www.sandbag.org.uk/site_media/pdfs/reports/Drifting_Towards_Disaster_25.6.2013_Final_1.pdf
- Moore S with Newey G (ed) (2013) *If the Cap Fits: Reform of European Climate Policy and the EU Emissions Trading System*, London: Policy Exchange. <http://www.policyexchange.org.uk/publications/category/item/if-the-cap-fits-reform-of-european-climate-policy-and-the-eu-emissions-trading-system>
- Obama B (2013) Inaugural address, 21 January 2013, Washington DC: White House Office of the Press Secretary. <http://www.whitehouse.gov/the-press-office/2013/01/21/inaugural-address-president-barack-obama>

- Pernick R, Wilder C and Winnie T (2013) *Clean energy trends 2013*, Clean Edge. http://www.cleandedge.com/sites/default/files/CETrends2013_Final_Web.pdf
- Pew Charitable Trusts (2013) *Who's winning the clean energy race*, Washington DC. <http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/-clenG20-Report-2012-Digital.pdf>
- Pew Research Centre (2013) *Environmental Concerns on the Rise in China*, Washington DC. <http://www.pewglobal.org/files/2013/09/Pew-Global-Attitudes-Project-China-Report-FINAL-9-19-132.pdf>
- Point Carbon (2013) 'China could set absolute cap on emissions in 2016: paper', 21 May 2013. <http://www.pointcarbon.com/news/1.2381015>
- Sandbag (2010) *Cap or trap? How the EU ETS risks locking in carbon emissions*, London: Sandbag. http://www.sandbag.org.uk/site_media/pdfs/reports/caportrap.pdf
- Stern N (2013) 'Economic growth, poverty reduction and managing climate change', presentation to IMF and WRI, 2 April 2013. <http://www.imf.org/external/np/fad/environ/pdf/040213.pdf>
- Tian W (2012) '\$1.28 trillion to be invested in green economy', *China Daily*, 13 November 2012. http://www.chinadaily.com.cn/china/2012cpc/2012-11/13/content_15924634.htm
- Tindale S (2012) *Saving emissions trading from irrelevance*, London: Centre for European Reform. http://www.cer.org.uk/sites/default/files/publications/attachments/pdf/2012/pb_ets_29june12-5344.pdf
- Townshend T, Fankhauser S, Aybar R, Collins M, Landesman T, Nachmany M and Pavese C (eds) (2013) *Climate Legislation Study: A Review of Climate Change Legislation in 33 Countries*, third edition, London: GLOBE International
- United Nations Environment Programme [UNEP] (2012) *The Emissions Gap Report 2012*, Nairobi. <http://www.unep.org/pdf/2012gapreport.pdf>
- United Nations Framework Convention on Climate Change [UNFCCC] (2013) Cancun Agreements, Bonn. https://unfccc.int/meetings/cancun_nov_2010/items/6005.php
- World Bank (2012) *Turn down the heat: Why a 4°C warmed world must be avoided*, Washington DC. http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf
- World Bank (2013) *Mapping carbon pricing initiatives: developments and prospects*, Washington DC: Carbon Finance at the World Bank. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/05/23/000350881_20130523172114/Rendered/PDF/779550WP0Mappi0til050290130morning0.pdf

APPENDIX

INTERNATIONAL EMISSIONS TRADING AND CARBON TAX SCHEMES

Table A1
Emissions trading schemes around the world

Country, scheme (status)	Start date	Percentage of national/regional emissions covered	Details
Europe, EU ETS (implemented)	2005	45%	Largest trading scheme in the world covering 31 countries and 11,000 power stations and industrial units. The EU is currently debating structural changes to the ETS.
US, California Cap-and-Trade Program (implemented)	2012	35%	The cap decreases by 2% in 2014. There are discussions with Quebec about linking the two schemes.
US, Regional Greenhouse Gas Initiative (implemented)	2009	20%	Covering Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Covers all electricity generators with a capacity of 25MW or greater. Following a review in 2012 a 45% reduction to the cap in 2014 has been proposed. The cap will then decline 2.5% each year from 2015 to 2020.
China, Pilot Trading Schemes (implemented)	2013	35–60%	Seven provinces will introduce pilot trading schemes in 2013: Beijing, Chongqing, Guangdong, Hubei, Shanghai, Shenzhen and Tianjin. These pilot schemes will inform the development of a national trading scheme to be introduced by 2020.
Australia, Carbon Pricing Mechanism (implemented)	2011/2015	60%	Trading scheme to be introduced by 2015. The scheme will be linked with the EU ETS by 2018. Until the scheme is introduced a carbon price has been fixed, rising by 2.5% per year in real terms.
Canada, Quebec, Cap-and-Trade System (implemented)	2013	30%	Starts with a fixed cap, introducing an annually decreasing cap in the second compliance period.
Kazakhstan, Emission Trading Scheme (implemented)	Pilot scheme: 2013 Second phase: 2014	50%	The amount that can be emitted by participants in the trading scheme will decrease by a linear amount annually in the second phase.
New Zealand, Emissions Trading Scheme (implemented)	2008	50%; 100% as of 2015	Mandatory but includes some voluntary opt-ins. It will regulate emissions in all sectors of the economy by 2015.
South Korea, Emissions Trading Scheme (scheduled)	2015	60%	National trading scheme to introduced by 2015 based on the design of the EU ETS.
Switzerland, Emissions Trading Scheme (implemented)	2008	10%	The scheme covers industry with a thermal input greater than 20MW.
Brazil, British Columbia, Chile, Costa Rica, Mexico, Turkey, and Ukraine (considering)		TBD	These countries are all considering emissions trading schemes.

Sources: World Bank 2013, Globe International 2013

Table A2
Carbon tax regimes
around the world

Country, pricing mechanism/s	Details	Price per tonne CO ₂ e (all US\$)
Canada, British Columbia, Revenue Neutral Carbon Tax	Tax levels remain stable until further notice	\$29
Denmark, CO ₂ Tax	Annual increases of 1.8% between 2008–2015	\$26
Finland, CO ₂ Tax	Tax rate depends on the fuel type	\$39–\$78
Ireland, Natural Gas Carbon Tax; Mineral Oil Tax; Carbon Charge; Solid Fuel Carbon Tax	Fixed rate	\$26
Japan, Tax for Climate Change Mitigation	Gradual Increase over 3.5 years	\$3
Norway, CO ₂ Tax	Tax rate depends on fuel type and usage	\$4–71
South Africa, Carbon Tax	Will be implemented in January 2015; annual increases of 10% between 2015–2020	\$13
Sweden, CO ₂ Tax	Fixed rate	\$163
Switzerland, CO ₂ Tax	Fixed rate	\$38
UK, Carbon Price Floor	Tax rate changes every year and is the difference between the EUA price and the annual carbon floor price target. Floor price target is starts from £16/tCO ₂ e in 2013, linearly increasing to £30/tCO ₂ e by 2020	\$7

Source: Herman and Matthes 2012

* CERs/Certified Emission Reductions can be obtained by implementing emission reduction projects through the CDM. ERU/Emission Reduction Units can be obtained from projects through JI.