



Paul  
Johnson



Tom Burke



Professor  
Paul Ekins



Kate  
Hampton  
and Coralie  
Laurencin



Dr Tooraj  
Jamasb



Dr Terry  
Barker and  
Athanasios  
Dagoumas



Richard  
Lambert

“green  
alliance...”

# Is there more to life than trading?

Seven views on designing a low carbon future

# 1

## **looking back to Stern: policy instruments for climate change**

Paul Johnson,  
Frontier Economics  
Page 5

# 2

## **winning the climate war: the role of regulation**

Tom Burke, Imperial  
College London  
Page 9

# 3

## **squeezing carbon out of the market: the role of carbon taxes**

Professor Paul  
Ekins, King's  
College London  
Page 13

# 4

## **trading works**

Kate Hampton and  
Coralie Laurencin,  
Climate Change  
Capital  
Page 16

# 5

## **a framework for electricity**

Dr Tooraj Jamasb,  
Electricity Policy  
Research Group,  
University of  
Cambridge  
Page 20

# 6

## **a framework for transport**

Dr Terry Barker  
and Athanasios  
Dagoumas,  
Cambridge Centre  
for Climate Change  
Mitigation Research  
Page 24

# 7

## **a framework for industry and a part for everyone**

Richard Lambert,  
Confederation of  
British Industry  
Page 28

### **Is there more to life than trading?**

Seven views on designing a low carbon future

Edited by Rebekah Phillips

ISBN 978-1-905869-12-1  
© 2008 Green Alliance

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission in writing of Green Alliance. Within the UK, exceptions are allowed in respect of any fair dealing for the purposes of private research or study, or criticism or review, as permitted under the Copyright, Design and Patents Act, 1988, or in the case of reprographic reproduction in accordance with the terms of the licenses issued by the Copyright Licensing Agency.

# Is there more to life than trading?

foreword by Stephen Hale,  
director, Green Alliance

The development of an effective policy framework to tackle climate change is the most pressing of tasks for today's political leaders and those who advise them. It is also an extraordinarily complex challenge. A successful framework will need to span all sectors of the economy, influence decisions and investments by businesses, individuals and others in the short-term and long-term, and be compatible with emerging European and international policy.



Green Alliance is publishing these essays to stimulate debate on the overall shape of this framework. There is currently too much focus on a myriad of often relatively ineffective individual policy instruments. Too little discussion and attention is devoted to the over-arching challenge of designing an approach that can deliver. Green Alliance aims to address that, and to advise and persuade politicians of all parties to develop a clear, compelling and long-term approach to securing emissions reductions.

We do not have the luxury of the time to experiment with different approaches, and learn from our successes and failures. We need a comprehensive and well-designed framework, and fast. Here, seven experts in environmental policy look at different aspects of our energy system and policy 'toolkit' and offer their views on the appropriate mix of instruments to deliver very challenging targets for emissions reduction.

Taken together, Green Alliance believes that they provide some important common themes. They confirm the importance of carbon pricing, but demonstrate the need for a stronger focus on promoting innovation and behaviour change. Both regulation and public expenditure are consistently underplayed but important means to deliver these goals. Emissions trading is not a silver bullet. There is 'more to life than trading'. The analysis offered here will be an important contribution to the blueprint for climate change that Green Alliance will publish in autumn 2008.

## **This time it's serious**

Now is a critical time for both government and opposition to outline their long-term strategies for emissions reduction. Climate campaigners perpetually claim that the next week, month or year is the defining one in the war against climate change. This time it is true: the next nine months are the most critical to date in the struggle to drive emissions reductions in the European Union (EU) and UK at the necessary scale and speed.

# “current energy policy is centred on the need for a carbon price, with emissions trading the primary means to achieve this”

By March 2009 EU governments and the European Parliament will conclude their negotiations on the EU climate and energy package,<sup>1</sup> published by the European Commission in January 2008. A new framework for EU action will be established, as well as sectoral targets for domestic action in the UK and other member states.

The UK will also set a new and long-term climate change framework by March 2009, in response to a deadline set by the groundbreaking climate change bill<sup>2</sup> that enshrines emissions reduction targets in legislation for the first time. The government should be applauded for this, as should both opposition parties for their strong support for this legislation. But now comes the really important part.

The chancellor’s March 2009 budget will be accompanied by carbon budgets specifying the government’s aims for emissions reductions from 2008-2022 and the actions the government will need to take to achieve these goals. Advice from the committee on climate change will be an important influence on this. It is critical that the government publishes a robust and credible plan, that drives low-carbon investment and emissions reductions across the economy, and ensures that every sector plays its full part.

## Where are we now?

UK climate change policy currently contains a complex range of sometimes overlapping policies, as demonstrated in tables one and two (right). Yet it is not delivering the emissions reductions necessary. Whilst the UK has already met its target for greenhouse gas emissions reductions under the Kyoto protocol, the UK seems certain to fall short of its domestic goal for a 20 per cent reduction in carbon dioxide (CO<sub>2</sub>) emissions by 2010 and on current projections is very unlikely to hit the climate bill 2020 target of a 26 per cent reduction.

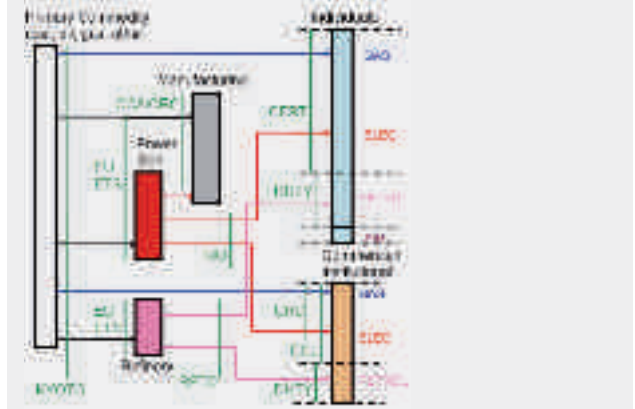
## Designing a delivery plan that works

The 2007 *Stern review on the economics of climate change*<sup>3</sup> emphasised the role of a co-ordinated policy package in tackling climate change. Sir Nicholas Stern argued that the right package should contain three main elements: a carbon price, implemented through tax, trading or regulation; policies to support innovation and the deployment of low carbon technologies; and action

**Table one: Policies outlined in the UK Climate Change Programmes**

UK Climate Change Programme 2000	
Energy Supply	Renewables Obligation (RO)
Business	Climate Change Levy (CCL); Climate Change Agreements (CCA); Building regulations; Carbon Trust
Transport	Manufacturer voluntary agreements; Vehicle Excise Duty; Fuel Duty Variables (biofuel/diesel/petrol)
Domestic	Energy Efficiency Commitment (EEC); Building regulations; Warm Front (& equivalent devolved administration); Market Transformation
Public Sector	Carbon Trust activities
Revised Climate Change Programme 2006	
Energy Supply	European Union Emissions Trading Scheme (EU ETS); Biomass heat subsidy
Business	Carbon Reduction Commitment (CRC); European Union Emissions Trading Scheme;
Transport	Renewable Fuels Transport Obligation (RFTO)
Domestic	Energy Performance of Buildings Directive; Products Policy

**Table two: The flow of energy and instruments in the UK energy system**



## “it is critical that we consider how to avoid the risks of locking into a high-carbon infrastructure”

to remove barriers to energy efficiency and inform, educate and persuade individuals about what they can do to respond to climate change. The absence or neglect of any one of these elements will lead to failure or, at the very least, a significant increase in the overall cost of meeting a given climate objective.

The contributions in this pamphlet make it clear that there is a need to re-evaluate the potential impact of emissions trading in the UK. Further action is needed in all three areas identified by Sir Nicholas Stern to deliver the targets to which all parties committed themselves in the climate change bill.

### **Carbon pricing**

Current energy policy is centred on the need for a carbon price, with emissions trading the primary means to achieve this. In fact trading seems to have become the default policy of choice in the energy sector. The EU emissions trading scheme (EU ETS) is seen as the key to driving down emissions in electricity generation and intensive industrial users,<sup>4</sup> and will soon be the main tool for reducing emissions from air transport. Trading will soon be the main policy for reducing energy emissions in the household sector (through the forthcoming tradable obligation on electricity suppliers)<sup>5</sup> and in the large non energy-intensive business sector (under the new carbon reduction commitment).<sup>6</sup>

Green Alliance is a strong supporter of emissions trading. Capping emissions through trading is a highly efficient policy tool, and the EU emissions trading scheme is arguably the world's single most important policy instrument for tackling climate change. Kate Hampton (page 16) rightly identifies many of the benefits of trading, but as Tom Burke argues here (page 9) so persuasively, the limits of trading need to be understood and addressed by policy-makers. Our energy policy framework has to deal with long-term horizons. It is almost impossible to predict a carbon price over the time period of many energy and transport investment decisions. Establishing credibility in a future carbon price takes time. Confidence will be built by clarity and predictability about the future rules and shapes of schemes. In the interim transition period, it is critical that we consider how to avoid the risks of locking in a high-carbon infrastructure, and where additional measures are justified to reduce those risks.

The emergence of proposals for new coal-fired power stations in the UK and across Europe is a clear indication that the carbon price signal from the EU ETS is not yet strong enough (it is inconceivable that either the UK or the EU can meet its aspirations for emission reduction and build new ‘unabated’ coal fired power stations). And, as Terry Barker argues (page 24), the proposals for inclusion of the aviation sector in the EU ETS will not have much, if any, effect on the emissions from this sector.

Paul Ekins argues persuasively (page 13) that well-designed carbon taxes, and tax rebates, will also be needed to help deliver a steady carbon price, as well as support institutional and behavioural change. Green Alliance finds that case compelling. We also believe that there is a strong case for using regulatory levers much more frequently to address the limitations of carbon pricing. It could be particularly effective in electricity generation, products, existing housing and for stimulating design in the car market.

### **Driving innovation**

The successful development and deployment of new and innovative technologies will be critical to maintaining our quality of life in a world with constrained emissions. Paul Johnson (page 5) and Tooraj Jamasb (page 20) both emphasise in their articles that carbon pricing and trading will not deliver sufficient investment in innovation, nor bring early-stage technologies to market. They support the argument proposed by Stern, the CEMEP report,<sup>7</sup> and echoed by Richard Lambert of the CBI (page 28), that government must use additional public expenditure to incentivise a dramatic acceleration in the development and deployment of new technologies. Green Alliance also believes in the powerful role that public procurement and other means can play.

UK and EU spending on research and development is far lower than needed at present, indeed lower than countries such as the US and Japan that are much less committed to action on climate change. As Green Alliance has previously argued<sup>8</sup> the EU budget and the revenues generated by the auctioning of permits in the EU ETS are two important sources of the funds needed to support the development of low carbon technologies.

## “there are clearly circumstances in which the price mechanism alone will not work”

Policies must also be brought in to support the commercialisation of these solutions, with a particular focus, in our view, on renewable energy and carbon capture and storage. Again, regulation is vital. It levels the playing field in such a way that companies that are innovative prosper, and should encourage research, development and demonstration projects by the big players.

### Behaviour change

The third plank of driving emissions reductions is helping consumers by making the environmental choice the easy choice. Government has yet to assign any transparent responsibility for meeting carbon targets onto individuals. The current proposals for an obligation on energy suppliers to reduce household emissions are a manifestation of this. This is a classic example of misaligned incentives: whilst the power to reduce emissions will lie with individuals, liability will be on the energy suppliers. The imposition of multiple economic instruments onto the same energy emissions<sup>9</sup> reflects a view that a single instrument applied upstream does not provide sufficient rationale to change organisational or individual behaviour downstream.

There has been much work in government on individual behaviour change, and the importance of personal action is a recurring theme for politicians of all parties. But current policies in energy, transport and housing do not provide people with the choices and incentives they need to reduce their carbon footprints. Only government can enable a dramatic shift in behaviour. We need a citizens’ manifesto for action: a comprehensive policy framework designed with the individual in mind. This should use all the policy tools at our disposal: choice-editing through regulation; incentivising through the tax system; and rebates supporting consumer uptake of low carbon innovation and leading by example.

### Conclusions

The consensus for a more comprehensive government approach to climate change continues to grow. In the words of the CBI’s climate change task force report:

‘Market forces will drive big changes, but they will not by themselves be enough to do the job. The full range of public policies must be deployed to create the right incentives. Priorities include promoting an effective market price for carbon; revenue-neutral tax reform to reward greener behaviour; and bigger, more focused research and development programmes to finance new technologies and solutions until they become commercial.’<sup>10</sup>

We hope this publication will focus debate on what that overall framework should look like. We cannot wait for the price of carbon to be stable enough to drive investment. Our energy framework requires more than a reliance on the European Union emissions trading scheme,<sup>11</sup> and the other nascent trading schemes. It requires the other tools in our policy arsenal: regulation, taxation, innovation support and policies to encourage behavioural change.

This vision needs to be appropriate for the current economic climate. It needs to be sufficiently sharp to deliver in the short-term while robust enough to withstand longer-term storms. It needs to provide incentives for individuals, businesses and others that have wide political support. The climate change bill, and the prospect of carbon budgets, provides a fantastic opportunity to establish this. We hope that both the government and opposition parties will make the most of this chance to step back, take stock of where we are, and set out a longer-term approach that can deliver.

# 1 looking back to Stern: policy instruments for climate change

Paul Johnson, research fellow, Institute for Fiscal Studies and senior associate, Frontier Economics

## The need to set a carbon budget gives the government a prime opportunity to create a new policy framework.

It is now some 18 months since the Stern review<sup>12</sup> was published to international acclaim. Although progress has been made in the UK and elsewhere towards designing policy to tackle climate change, we remain a long way from having the appropriate tools in place.

### What Stern said:

1. Establishing a **carbon price**, through tax, trading or regulation, is an essential foundation for climate change policy.

Putting an appropriate price on carbon – explicitly through tax or trading, or implicitly through regulation – means that people are faced with the full social cost of their actions. However it is essential that investors and consumers believe the carbon price will be maintained into the future (especially for investment in long-lived capital stock) or we may find over-investment in long-lived, high carbon infrastructure, which will make emissions cuts later on much more expensive and difficult.

The next ten to 20 years will be a period of transition, from a world where carbon pricing schemes are in their infancy, to one where carbon pricing is universal and is automatically factored into decision-making. In this transitional period, while the credibility of policy is still being established and the international framework is taking shape, it is critical that governments consider how to avoid the risks of locking into a high carbon infrastructure, including considering whether any additional measures may be justified to reduce the risks.

2. Policies are required to support the development of a range of low carbon and high efficiency technologies on an urgent timescale.

The second element of climate change policy is **technology policy**, covering the full spectrum from research and development, to demonstration and early stage deployment. Such policy is essential for achieving the deep cuts in emissions that are needed.

The private sector plays the major role in R&D and technology diffusion, but closer collaboration between government and industry will further stimulate the development of a broad portfolio of low carbon technologies and reduce costs.

Many low carbon technologies are currently more expensive than the fossil fuel alternatives, but costs of technologies fall with scale and experience. Carbon pricing gives an incentive to invest in new technologies to reduce carbon; indeed, without it, there is little reason to make such investments. But investing in new lower carbon technologies carries risks. Thus there are good economic reasons to promote new technology directly. In some sectors, particularly electricity generation, where new technologies can struggle to gain a foothold, policies to support the market for early-stage technologies will be critical.



# “delaying action is likely to make any particular target more expensive to achieve”

The removal of **barriers to behavioural change** is a third essential element, one that is particularly important in encouraging the take-up of opportunities for energy efficiency.

Even where measures to reduce emissions are cost-effective, there may be barriers preventing action. These include a lack of reliable information, transaction costs, and behavioural and organisational inertia. The impact of these barriers can be most clearly seen in the frequent failure to realise the potential for cost-effective energy efficiency measures.

Regulatory measures can play a powerful role in cutting through these complexities, and providing clarity and certainty. Information policies, including labelling and the sharing of best practice, can help consumers and businesses make sound decisions, and stimulate competitive markets for low carbon and high-efficiency goods and services. Financing measures can also help, through overcoming possible constraints to paying the upfront cost of efficiency improvements.

Fostering a shared understanding of the nature of climate change, and its consequences, is critical in shaping behaviour, as well as in underpinning national and international action. Governments can be a catalyst for dialogue through evidence, education, persuasion and discussion. Educating those currently at school about climate change will help to shape and sustain future policy-making, and a broad public and international debate will support today's policy-makers in taking strong action now.

Stern was always clear that multiple tools would be needed. Carbon pricing, and in particular trading, will need to be at the centre of the international policy response. But there are numerous other market failures here that will require, for example, public subsidy for research and development in carbon intensive industries and regulation to ensure that some low or negative cost changes, particularly in energy efficiency, are made.

In the UK, these issues are likely to become especially important in the context of the introduction of carbon budgets, limits on the total quantity of carbon that can be emitted over five year periods. But getting the balance right internationally is crucial. Poorly designed policy will make tackling climate change more expensive than need be. While Stern showed that well designed policy can lead to the possibility of tackling climate change at a cost of around one per cent of annual world GDP, it is also clear that poorly designed policy will cost a great deal more. In so doing it will risk losing public and political support. It is not going to be enough to design policies that will tackle climate change. We will need to implement policies that tackle climate change both efficiently and equitably.

## **Quantity targets and the price mechanism**

The actual relationship between greenhouse gas concentrations and temperature change is uncertain, as is the relationship between temperature

change and consequences for the physical and human world. We are working with considerable uncertainty. That uncertainty incorporates significant risk of catastrophic effects particularly if no action is taken. Given the risks and uncertainties, Stern argued in his review, and again forcefully in his Ely lecture, that the key policy response should be to target atmospheric greenhouse gas concentrations. We need to make a choice over what concentrations to target, dependent on our view of the risks and of the costs of achieving that target. Delaying action is likely to make any particular target more expensive to achieve. From the policy point of view the important point is that targeting emissions, and eventual concentrations, is a reasonable response to the economics of the risks involved.

Given that greenhouse gas emissions create an externality, the largest and most pervasive the world has known, in the words of Stern, one important part of the policy response must be to price that externality. Those emitting greenhouse gases need to take account of the external cost in their decisions. In this situation pricing can, traditionally, be done in two ways: through the tax system or through a trading system. The latter has three important advantages in tackling climate change. First, it involves placing caps on emissions and then trading allowances, providing some certainty as to final outcomes. Second, international agreements on trading

## “there are clearly circumstances in which the price mechanism alone will not work”

systems are more likely than agreements on tax. Indeed we already have such agreements. Third, trading allows significant flows of funds to developing countries, for example through the Kyoto Protocol's clean development mechanism (CDM).<sup>13</sup> Climate change will not be tackled without such flows of funds.

There are multiple problems with the current international trading systems, including the EU emissions trading scheme and the CDM. This is not the place to go into them. The point is that it is appropriate and necessary to concentrate considerable effort on making sure those mechanisms are well designed and work effectively. The price mechanism really must be a central element in tackling climate change.

Of course we also have a very important role being played by the tax system in the UK context, taxes on road fuel raise £25 billion annually and vehicle excise duties a further £6 billion. In fact road fuel duties raise very much more than any plausible cost of emissions, the large majority of the externality imposed by driving comes from the congestion created. On the other side we also have the rather odd situation of seeing domestic energy consumption effectively substantially subsidised through the imposition of a reduced rate of VAT at only five per cent. Since most other consumption has VAT imposed at 17.5 per cent this effectively amounts to a subsidy relative to a neutral system.

### **Beyond the price mechanism**

This is far from the end of the story, however. There are good economic reasons for using other mechanisms in addition. Indeed there are clearly circumstances in which the price mechanism alone will not work. Whether, for example, the carbon reduction commitment, a trading system being proposed for large non-energy intensive businesses, is going to be an efficient mechanism is at least open to question. It should force business to consider the costs and benefits of their energy consumption and abatement policies. But it might also impose significant compliance costs on a group of organisations for whom carbon trading is never going to be a central business.

With regard to the need for other mechanisms, probably the most important is technology, most urgently developing carbon capture and storage for coal-based electricity generation. There are huge quantities of readily available coal in the world, much of it in the developing world, including China. There is no conceivable price mechanism that will prevent it being burnt. Nor is the price mechanism likely to be adequate in itself to lead to the development and widespread deployment of carbon capture and storage (CCS) technology. Returns are uncertain, learning periods are long and benefits are spread. There will need to be a substantial international

programme of public support. It is likely to be important to design that support such as to allow the market to determine what is likely to be the most effective form of CCS technology to use.

Most marginal abatement cost curves show substantial savings of carbon emissions are feasible at negative economic cost through implementation of energy saving measures. Many people would be financially better off if they employed some simple energy saving devices including insulation and more efficient electrical goods. But behaviour change has been slow. There are barriers of information, lack of incentives for builders, possibly liquidity constraints and high discount rates. These are circumstances in which the price mechanism alone will not be adequate. Provision of information and indeed degrees of product regulation, or building regulations, are appropriate economic instruments.

In passing it is worth noting that there has been an unfortunate tendency to contrast the economic instruments of trading and fiscal incentives with other policy tools like regulation. These other tools are economic instruments. They can be used badly for sure. And appropriate analysis of the costs and benefits associated with using them needs to be carried out. But they can be the optimal economic instruments for reducing emissions.

## “fixed budgets with policy uncertainty and lack of transparency could lead us to a world of very inefficient and uncertain policy-making”

That said it is perhaps worth dwelling briefly on why regulation has, in some circles, got a bad name. In part it is because there are many circumstances in which pricing will lead to an economically more efficient outcome. Regulation can lead to excessive costs being imposed on producers and being passed to consumers. It can reduce competition in the market. Where it reduces choices available to consumers the loss of ‘consumer surplus’ can be significant. It can be subject to gaming between regulators and regulated, the latter often being at a major informational advantage. Getting regulation wrong, in climate change as in other policy areas, can be a high-cost business creating much inefficiency. Specifying regulation in terms of

inputs, for example use of particular technologies rather than outputs is, in particular, likely to be sub-optimal.

Finally, in the UK context, one does have to think clearly about the relationship between these instruments and the EU ETS. In any one period, reducing electricity consumption through regulation or any other instrument will not impact on CO<sub>2</sub> emissions across the EU, as EU-wide emissions will still reach the overall cap. The regulations might make a tighter cap next time round easier, but need to be seen in that context.

Going forward the carbon budgets create a considerable opportunity for government to set out much more clearly than hitherto how they intend

to use different instruments to reach the agreed targets. It will need a clear exposition of how and when to use different tools: the role of pricing, trading, regulation and so on. Without clarity over that policy framework one of the great opportunities presented by carbon budgets will be lost. Indeed, fixed budgets with policy uncertainty and lack of transparency could lead us to a world of very inefficient and uncertain policy-making, and hence very high costs of abatement.



# 2

## winning the climate war: the role of regulation

Tom Burke, professor emeritus, Imperial College London

### The role of carbon markets is smaller than is believed and too small to solve the problem.

Climate change is the defining issue of the twenty first century. If we find the solutions to the challenges it presents there is some prospect that the nine billion people with whom we will be sharing the planet can have secure and prosperous lives. If we do not find the solutions, then the prospect of prosperity and security for all of us will become increasingly remote.

Europe's political leaders have defined a two degrees rise in temperature as the threshold of dangerous climate change. Jim Hansen, the doyen of climate scientists, has recently argued that even that might be too high for safety. As things stand, the odds are at best about even that we can stay below this threshold. Unless global greenhouse gas emissions peak within the next decade or so and then decline very rapidly, those odds will worsen considerably.

Climate change is a bad problem that is getting worse but as things stand it remains manageable. If we continue as we are, it will very soon become unmanageable. To succeed, we must make the global energy system carbon neutral by about the middle of the century. This will be a massive task. It will require co-ordinated action on a scale never yet attempted by mankind, making the Apollo or Manhattan Projects look trivial by comparison.

But we start with an advantage. The technologies to solve this problem are available or within reach today. And

we know that we can afford to deploy them. Over the next 25 years shifting the world's energy system from carbon intensive to carbon neutral will cost the whole world a lot less than the \$600 billion annually that the Iraq war has cost the United States alone.

What we do not know is whether we can agree to spend the money to deploy the low carbon energy technologies that are necessary. That is down to the politics. For this generation of politicians to fail at a task that is within the envelope of our technical and economic competence to solve would be a betrayal of the future unparalleled in history.

One of the many factors making climate change a uniquely difficult problem is the ticking clock, the two parts per million increase in the concentration of greenhouse gases in the atmosphere each year. That clock is ticking faster. There is no rewind button on the climate. We cannot go back and correct mistakes. Once the extra carbon is in the atmosphere we must live with whatever climate it produces whether we like it or not.

This means that we cannot afford policy failure. With most issues, especially those as complex and politically difficult as climate change, we learn empirically, by trial and error. Policy options are implemented, policy failures identified and new policy options developed. Progress is incremental.



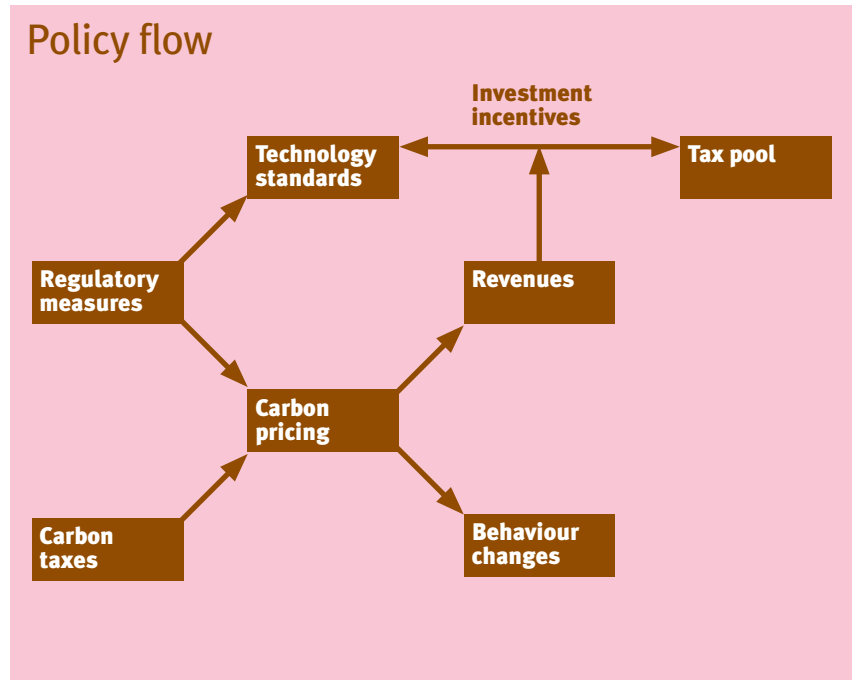
# “for this generation of politicians to fail would be a betrayal of the future unparalleled in history”

If we make the wrong policy decisions in the next few years, it will be impossible to keep the eventual rise in global temperatures below a devastatingly dangerous three degrees, let alone the two degrees Europe’s leaders think is already risky. Dealing successfully with climate change requires transformational change and policies that will produce it.

The principal policy tools available to politicians to tackle climate change are few in number although there is an infinite variety of ways in which they can be designed and combined. Essentially, they boil down to three: sermons, regulations and taxes. Sermons, technically voluntary measures, are the tool of first choice for almost any environmental problem. Climate change is no exception. But long experience in many fields has shown they don’t work.

The chart on the right shows the way in which the other two policy options flow through the economy.

There is a broad agreement among policy-makers that establishing a price for carbon is essential for making the transition to a low carbon economy. This can be done directly, by taxing carbon, or indirectly, by establishing through regulation a limit to the total amount of carbon allowed to be emitted (a cap) and then allocating rights to emit carbon under the cap to carbon-emitting businesses, either by giving away or selling those rights. Businesses with more emissions rights than they need are allowed to trade them with those who do not have enough, thus creating a cap and trade policy.



For many people, carbon prices are an alternative to regulation. This is a confusion. It is only an alternative if the price is set by a tax in which case it is a straightforward impost by government. To create a carbon market price by a cap and trade policy, a set of regulations must first be legislated both to establish the cap and then to allocate the emission rights and the terms under which they may be traded.

The theory is that a carbon price, however it is set, sends a signal to consumers and investors to alter their behaviour so as

to emit less carbon. This is seen by many policy-makers as a more efficient means of driving carbon out of the economy than simply setting technical standards to specify the amount of carbon goods, such as vehicles, or processes such as electricity generation or metal smelting, can emit.

If there is some uncertainty as to whether carbon prices really will produce transformational change in consumer and investor behaviour as rapidly as required, there is no doubt

## “there is no rewind button on the climate”

at all that they will generate massive revenue flows. The fate of the revenues arising from governments setting carbon taxes or selling emission rights is an under-discussed issue of central importance in climate change policy.

These revenues can either flow into the general pool of government revenues or into financing the adoption of the carbon neutral energy technologies necessary to preserve climate security. In Britain, the Treasury has already set its face firmly against using them to accelerate the transition to a low carbon economy. It believes that the carbon price signal alone will be enough to drive the necessary technology deployment.

There are a number of very good reasons for supposing that its faith in the magic of markets is misplaced. At best, a carbon price will make a difference at the margins. Price signals are helpful if you are making incremental decisions. However, incremental decisions will not stabilise the climate in the time we have available. Furthermore, there are many price signals in a market place and not all of them are going in the same direction. The fuel duty escalator illustrates this difficulty perfectly. As you may remember, it raised the tax on petrol six percent in real terms each year. But while the tax was going up, the real cost of driving fell for other reasons and real disposable incomes rose over forty percent. Not surprisingly,

driving behaviour did not change very much. The policy did however raise a very large amount of revenue for the government, all of which went into the general revenue pool.

If prices really did work as the magic theorists believe, you would expect that a rise in the price of oil from under \$20 a barrel at the beginning of the century to over \$100 today would have stimulated a huge rush to decarbonise the economy. What has actually happened is that it has stimulated massive investment in exploiting tar sands and oil shales, in converting coal to liquids and in developing environmentally destructive biofuels.

The truth is that markets work much better in economic models than they do in the real world. In the models, investors behave as you assume they will. In the real world, they are much more inventive. Generally, they try hard to find new ways to carry on doing exactly what they were doing before. Economic models are useful tools to help you think about the world. They are very dangerous alternatives to doing that thinking.

Nothing illustrates the incoherence in market distorted thinking about climate change better than a deep contradiction in this government’s policy. Such is its belief in the power of markets that in the same energy white paper we are told that we must liberalise energy markets as quickly as possible to drive energy

prices down for competitiveness reasons and that we must drive the price of carbon up aggressively for climate reasons.

Nowhere are we told how the left hand pushing energy prices down at the same time as the right hand is pushing them up leads you to anywhere other than the land of the deeply confused.

There are many other unsolved problems with a market-led climate policy. Markets, even when mature, are by definition volatile and prices in them difficult to predict. This discourages precisely the kind of high risk, long-life investments in the step change technology transition we need to stabilise the climate. Carbon markets are far from mature and thus even more volatile.

Without a global price for carbon, there will be competitiveness risks for those economies that do put a price on carbon. But to get a global price for carbon we have to agree a global cap on emissions and a mechanism for allocating the permits under that cap.

You have only to have read the papers recently to know what an impossible dream that is. America will not agree until the Chinese agree and the Chinese will not agree unless the Americans act first. And in any case, if they were to agree, it would be to the least they thought they could get away with.

## “the widely held belief that building carbon markets is the best policy for tackling climate change is the triumph – and tragedy – of theory.”

The widely held belief that building carbon markets is the best policy for tackling climate change is the triumph – and tragedy – of theory. Of course they have a role to play but it is currently much smaller than is believed and much too small to solve the problem.

In practise, three other policy tools are much more important and reliable if we are to mobilise the tremendous capacities of the business community in time to make a difference.

The first is to set the right technical standards to drive the technology deployments we need. A carbon neutral energy system will be much more electricity dependent as all of the gas will have to be driven out of domestic and much commercial heating and cooling. Coal will be the preferred fuel for most of this electricity generation. We need to put in place now the regulations necessary for all new fossil fuelled stations to be carbon neutral and for older stations to be progressively brought under this regime by 2030.

Britain is about to embark on a massive programme to build some three million houses in the coming years. It is committed to making these houses green. One way to ensure that this happens is to use a regulation to prevent the supply of gas to those houses. If we do not do so now we will only have to pay a lot more later to remove that gas if we are to achieve a carbon neutral energy system by mid-century.

The second is to structure the regulation of energy markets so as to allow utilities to pass through the additional capital and operational costs of making the low carbon transition to the whole of the customer base. This would spread the costs so thinly as to make them much more bearable than the current oil price rise we have absorbed with little difficulty. But to do this we must have reliable discovery of the costs of deploying the necessary technology.

Achieving this cost discovery makes the EU’s proposed programme of 12 demonstration plants by 2015 for coal-fired generation with carbon capture and storage an urgent priority. This programme has been proposed by the Commission but it is not funded. Its total cost might run to some six billion euros. This sounds like a lot of money until you realise that the windfall profits to the European electricity utilities from the second phase of the carbon trading system might amount to some 54 billion euros.

The third is to spend public money to buy the public good of a stable climate by paying to accelerate the rate at which low carbon technologies are deployed thus driving down their costs more rapidly than markets alone could ever accomplish. This will be particularly necessary to deploy the massive infrastructure to transport, compress and manage the carbon we must store from coal-fired power stations. We will similarly need to invest

in the infrastructure necessary to fully incorporate renewable technologies such as wind and solar into the electricity system.

This infrastructure is the equivalent in the competitive low carbon economy of the twenty first century to the motorway network in the twentieth century. No one would ever have suggested that road pricing would have built the motorway network. It is even less likely that a carbon price alone will build the infrastructure for a carbon neutral energy system.

Faced with this challenge, many politicians will be tempted to put this issue in the ‘too difficult’ box. They should have more faith, both in themselves and the public they lead. To win the cold war we spent billions of pounds each year to build weapons systems we hoped never to use. When they became obsolete, we spent more billions to build new weapons systems we hoped never to use. We did this because we had clear-eyed and determined political leadership.

Climate change threatens to undermine the prosperity and security of 60 million Britons a lot more certainly than did the threat of the cold war turning hot. But what is in question is whether we have the clear-eyed and determined political leadership to deploy the resources we know we have to win this battle.

# 3

## squeezing carbon out of the market: the role of carbon taxes

Paul Ekins, professor of energy and environment  
policy, King's College London

### Green fiscal reform might be a serious political challenge but it is vital to meeting the targets.

In Gordon Brown's first major speech on climate change, in November 2007, he suggested the need for a stronger emissions target than the current 60 per cent cut by 2050. He was allegedly advised that such a commitment would require a significant carbon tax. This article agrees with that advice.

It is politically unfortunate if carbon reduction policy requires carbon taxation, because governments everywhere have found it a seriously challenging policy option. But at least six northern European countries (Denmark, Finland, Germany, Netherlands, Sweden and the UK) have addressed the challenge and introduced carbon or quasi-carbon taxes. The task that must now be addressed is to introduce these taxes in more European, and other, countries, and to increase their rates substantially over time.

It is clear that such an increase in tax rates will only be politically feasible if it is implemented on a broadly revenue neutral basis, meaning that it is carried out explicitly as an exercise to shift the burden of taxation, from 'goods' like labour, wages and profits, to 'bads' like pollution and resource depletion, rather than to increase it overall. Opinion polls generally show public support for such a green tax shift. For example, in the poll carried out prior to the launch of the UK Green Fiscal Commission in November 2007, 77 per cent of those polled expressed support for a tax shift of this kind. The rub comes from the fact that this fell to 48 per cent support for taxes on petrol or home

energy use, with 35 per cent opposed, a level of opposition that makes such taxes politically problematic. But without them there can be no substantial tax shift.

The new Labour government in 1997 committed itself to a green tax shift with a forthright statement of intent on environmental taxation, and for some years pursued this intent with vigour, in its first term of office bringing in the climate change levy (CCL) (one of the quasi-carbon taxes referred to above) and the aggregates levy, both on a revenue-neutral basis by matching their revenues with reductions in employers' National Insurance contributions. But the unremitting hostility of business to the CCL and the oil price increases and fuel tax protests of 2000, allied to lack of cross-party consensus on the need for environmental taxes (the Conservatives, having introduced the fuel duty escalator in 1993, denounced it in 2000), caused new Labour effectively to abandon this agenda. By 2006 environmental tax revenues (the great majority of which are energy-based) were lower than in 2000,<sup>14</sup> and as a share of taxation had fallen to 7.3 per cent, substantially lower than the 9.1 per cent they accounted for in 1993, before green taxes featured on most national mainstream policy agendas at all.

Looking forwards, the argument is sometimes made that the policy scene has shifted, that emissions trading has now become the economic policy instrument of choice for the environment in those sectors that are most responsive



## “it is politically unfortunate if carbon reduction policy requires carbon taxation, because governments everywhere have found it a seriously challenging policy option”

to price, and that environmental impacts in other sectors are best dealt with by other policy instruments, such as regulation, voluntary agreements, information or public spending. I believe these arguments to be wrong.

First, in respect of those sectors covered by emissions trading, there are strong arguments to underpin the young and embryonic trading schemes: the EU ETS and the UK's carbon reduction commitment (CRC) for large organisations, with a carbon tax. One reason is to provide a floor for the carbon price and, therefore, some safeguard for investors against the kind of excessive volatility exhibited in phase one of the EU ETS. The other is that it would tax away some of the windfall gains that have been associated with the grandfathering of EU ETS permits, and allow other taxes to be lowered, ie it would give scope for a tax shift. As more permits were auctioned, as envisioned in the European Commission's proposals for phase three of the EU ETS, the effect of a European carbon tax in parallel with the EU ETS, would not be to increase the price of carbon, because this price would be set by the quantity of emissions permits in the EU ETS. Rather it would divide the price of carbon between the carbon tax and the permit price: the higher the carbon tax, the lower would be the price of permits. Once auctioning reached 100 per cent of permits, of course, there would be no need for both instruments, but an escalating carbon tax would be a very good way of preparing the market for this desirable state of affairs.

Similarly with the carbon reduction commitment, which is already paralleled by the quasi-carbon tax, the climate change levy.<sup>15</sup> Raising the CCL steadily over time would not increase the overall price of carbon, but reduce the price of the CRC permits, while providing revenue to government to allow other taxes to be reduced.

In other areas too environmental taxes provide an essential foundation on which other policy instruments can build. History shows that human ingenuity in finding new uses for energy is almost limitless. All energy sources have some environmental impacts, so some tax on energy use is always justified on environmental grounds to encourage efficient use and to curb such new uses as, for example, patio heaters (where the tax, if desired, could be levied on the product rather than the energy use), which seem a particularly inappropriate innovation in a society trying to get to grips with greenhouse gas emissions and climate change.

Thanks to policy innovation in the UK in recent years, especially in respect of energy use, there is now quite a diversified environmentally differentiated tax base on which to build. Greatly increasing the vehicle excise duty on low-mile-per-gallon motor cars could send a powerful signal about running costs at the point of vehicle purchase, which could of course be reinforced by substantial purchase taxes for these vehicles, as are in place in a number of European countries. Higher household

energy taxes would increase the information value, and the advertised financial savings, from the energy labels that are now shown on many new white goods. They would also reinforce the message, which still seems so difficult to get across, that many household energy efficiency measures actually save money over reasonable time scales.

Three reasons are routinely given for why it is either undesirable or impossible to use environmental taxes to achieve behaviour change or reinforce other policy instruments to the desired extent.

The first is because of their possible effect on competitiveness. In fact, this is a problem that arises for relatively few economic sectors: those that are both energy-intensive and exposed to intense international competition. The right policy approach here is not, because of these few sectors, to back off from environmental taxation for everyone else. But to put in place measures that will mitigate the competitiveness effects in those sectors that are particularly vulnerable. In fact, two policy approaches are currently under discussion in this regard: the global sectoral agreements, that are on the table in the context of the post-Bali climate change negotiations; and the border tax adjustments (BTAs)<sup>16</sup> that have been advocated by President Sarkozy, and which were mooted as a possibility by the European Commission in its most recent proposals on how Europe should seek to reach its

## “modest annual percentage increases in resource taxes and pollution charges would, over time, transform the economy”

climate change objectives. Both policy approaches should be developed in parallel. The UK has much to contribute in this context, with its own relevant experience of the climate change agreements (CCAs) associated with the CCL, and the BTAs should be used to deter countries or sectors that might be inclined not to join global carbon reduction efforts but to attempt to free ride on the efforts of everyone else.

The second is because of their possible effects on low-income people and households. In fact, these effects only arise because of the still deplorable nature of much of the UK building stock. Arguments about fuel poverty are unknown in those northern European countries that have already invested in energy efficient buildings. And this is something which needs to be comprehensively addressed if the UK is to have any chance of moving to a low carbon economy, irrespective of other arguments. There are a whole range of institutional and financial innovations that could be brought into play to accelerate greatly the pace of change of improvement of UK household energy efficiency, starting with the homes currently lived in by poor people. A rising tax on the household use of energy would give a signal to everyone else that the longer they waited before making their homes energy efficient, the worse off they would be, and a one-stop energy efficiency advice service (already largely in existence) should then be available to tell them what to do.

The third argument sometimes levied against environmental taxes, especially by the Treasury, is that they cannot be taken seriously as sources of revenue because, if successful at changing behaviour, they destroy their revenue base. Doubtless there are some environmental taxes of which this is true, the Irish plastic bag tax springs to mind. But there are also environmental taxes such as fuel duty of which, it is patently obvious, it is not.

Now revenues are the product of two factors: the tax rate and the quantity of consumption of the taxed product. As increases in the former change the price, the quantity consumed will fall in accordance with what economists call the price elasticity: the proportional reduction in consumption compared with the price change. If the elasticity in respect of the tax rate is minus one, then a certain proportional increase in the tax rate will reduce consumption by the same proportion, and revenues from the tax will be unchanged. It is well established that, for most energy use and transport, price elasticities are between zero and minus one, meaning that an increase in the tax rate will change behaviour to some extent, and result in increased revenues. If part of a tax shift, this might be termed a win-win outcome: for society, which gets less pollution, climate change and other environmental bads; for non-polluting taxpayers, who get reduced other taxes; and for the Treasury, able to rebalance the tax base away from labour and firms which are becoming more difficult to tax.

The UK Green Fiscal Commission was set up at the end of 2007 to break the political logjam on green fiscal reform. Its membership includes experts from business, leading academics, senior MPs from all three main UK political parties, three members of the House of Lords, and representatives from consumer and environmental organisations. It will investigate the options for green fiscal reform in the UK and assess the social, environmental and economic implications, such as those discussed above, of a substantial tax shift, such that, for example, 20 per cent of tax revenues come from green taxes by 2020.

The limited green fiscal reforms that have so far been implemented in the six north European countries have been positively evaluated for both their environmental and economic effects. Systematic implementation of such reform through escalators, modest annual percentage increases in resource taxes and pollution charges, would give people and businesses time to adjust but, over time, would transform the economy. As Gordon Brown was advised last November, it is not clear that the dramatic reductions in greenhouse gas emissions now being sought by the government, and about to be enshrined in the climate change bill, can be achieved in any other way.

# 4

## trading works

Kate Hampton and Coralie Laurencin,  
Climate Change Capital

### Looking for a strong foundation for climate policy? Emissions trading is a good place to start.

Whether it is the European left criticising the environmental integrity of the clean development mechanism or the American right claiming the Lieberman-Warner Bill represents the biggest tax hike in history, the carbon market has been under fire from all sides in recent months. While these critiques may contain partial truths, they miss the point. Emissions trading and the associated market for offsets constitute the first serious attempts at combating climate change. Here, we look at the rationale for emissions trading, sensible policy design, market oversight and the evolving role of international offsets.

Regulatory economists tend to view penalising ‘bads’ (eg pollution) as preferable to subsidising ‘goods’ (eg abatement technology). This view is based on the idea that governments should correct market failure by internalising external costs, but should not pick winners. Consequently, carbon pricing should form the central element of any climate policy framework. Of the two options for carbon pricing, emissions trading has proved to be more politically palatable than carbon taxation because it provides business with new commercial opportunities that make regulation more acceptable, and because politicians are usually unwilling to be associated with tax increases. While this does not seem like an argument that environmentalists should concern themselves with, there is something to be said for pragmatism. More importantly, however, under an

emissions trading regime, governments establish the cap while the market sets the price, whereas under a carbon tax, the government would have to pick a price with the market determining the outcome in emissions. Although they are theoretically similar, emissions trading provides greater certainty in the environmental outcome.

Advocates of taxes affirm that the volatility inherent in emissions trading undermines the investment signal, making it ill suited to investments in infrastructure. Volatility may indeed encourage investors to discount the market price; however, most of the emissions in the EU Emissions Trading Scheme (EU ETS) stem from companies that manage volatile commodity prices, often from proprietary trading desks on a daily basis; carbon is merely another variable to include in trading strategies. Business does not need price certainty in a risk-free environment: indeed appraising risks and returns is the core of investment decision-making.

Nevertheless, it is true that business dislikes policy risk, viewing it as one of the most unpredictable and therefore unquantifiable forms of risk. As the success of policy at inducing behaviour change will determine whether society is able to reduce emissions or not, it is essential that governments do their best to balance their own need for decision-making flexibility with business’s need for certainty.



## “emissions trading has proved to be more palatable than carbon taxation”

In order to be effective, governments need to build investor confidence by adhering to the following principles of effective market design:

– **Credibility.** Governments must set out a clear vision and framework for their policies. Policy incoherence must be avoided, eg energy policies must be consistent with climate policies. Commitment by heads of government is essential to avoiding ministerial bickering and incoherence.

– **Predictability.** Governments will need to maintain a level of flexibility in decision-making, eg for the purposes of international negotiations or to deal with shocks. However, if interventions can be made on the basis of pre-agreed technical criteria, rather than purely political intervention, then business will understand the rules of the game. Investors will expect policies to evolve over time but setting out in advance the timing and scope of reviews will help improve predictability.

– **Long-term visibility.** Infrastructure investments typically have long capital cycles, ie long planning lead times, followed by long lifespans. Policy should provide timely investment signals over relevant time periods so that investors can plan efficiently and achieve a commercial return from investing cleanly. Investors typically respond best if policy certainty can be provided for seven to 15 years. Near term policies must provide certainty, while longer-term efforts can be more flexible.

– **Simplicity.** High transaction costs should be avoided. This is particularly true for smaller businesses that may incur high compliance costs while not being material to the problem. Moreover, regulation will be inefficient if business does not understand what is expected and this will result in underachievement or more costly achievement and can have unintended consequences.

– **Transparency.** The public availability of information is essential to market functioning and facilitates enforcement.

By respecting these design principles, emissions trading, like any other policy instrument, can provide a stable, enabling environment. Indeed, the European Commission has proposed many changes to the EU emissions trading scheme to improve its design along these lines. If regulators are vigilant, lessons learned from implementation can be rapidly incorporated into market design. The EU ETS has only been running for three years and yet it is likely to be transformed in time for its third phase.

For example, the Commission has proposed a robust EU-wide cap on emissions, removing the opportunity for squabbling at national level. This proposal, if adopted as expected, will eliminate the political uncertainty and just-in-time decision-making that dogged the first two phases. The Commission has also proposed that phase three of the EU ETS should last eight years (from 2013 to 2020) with

a linear reduction through a fixed percentage beyond 2020. Given that political agreement on the regulation is expected in late 2008, this will provide business with at least 12 years' visibility. Further lessons from the early stages of the EU ETS that are being reflected in reform efforts include a radical shift from free allocation to auctioning. Phase one demonstrated that the free allocation of allowances does not prevent utilities passing on the full carbon cost to final end users. In the first two phases, huge windfall profits for utilities reduced the credibility of the system. The phase three proposal suggests full auctioning for the power sector.

In response to these policy signals, utilities across the EU have started to make announcements that the carbon price is having an impact on their investment decisions. This regulatory visibility comes at a key moment for investors in Europe's power sector: ageing infrastructure and environmental regulation such as the large combustion plant directive will require that utilities make massive investments in the coming years. In the UK alone, it is expected that 22GW of thermal power stations will be closed by 2020. Additional government support is certainly needed to finance the first generation of plants with carbon capture and storage (CCS), but the most promising mechanism is emerging from the ETS itself: financing CCS with a special reserve of EU allowances.

## “the real issue is whether policy-makers can keep up with the market”

The Californian electricity crisis in 2000<sup>17</sup> and the recent sub-prime mortgage crisis have made regulators more wary of financial markets, particularly in the United States. “Is the climate too precious to be trusted to the market?” they ask. The objective of emissions trading is to align public and private interest by internalising the social cost of carbon over time. Consequently, if the market is well designed and the level of stringency is adequate, companies seeking only financial returns should be correctly incentivised to deliver the right outcomes. However, abuse can occur in emissions markets, as in any other market.

There are three types of regulation required to govern emissions trading:

- environmental regulation: the regulation aimed at achieving the emissions objectives such as cap setting and allocation;
- financial regulation: the regulation of the commodity and its derivatives; and
- competition regulation: ensuring unfair subsidies are not given and prices are not manipulated.

While environmental regulation is specific to emissions trading, financial regulation and competition regulation are not. So far there is no evidence that emissions trading, beyond its environmental component, should be regulated differently from other commodity markets. A recent report

by the Financial Services Authority on emissions trading<sup>18</sup> did not recommend significant changes to the regulatory regime. The attention of the Commission’s DG Competition has contributed much-needed political pressure for more auctioning but has not resulted in challenges to the system either.

So if emissions trading can be effective, what about offsets? The objective of the carbon market is cost-effective emissions reduction globally. Consequently, a carbon instrument like the clean development mechanism (CDM) is likely to remain a key element the global carbon market in that it provides access to the lowest cost reductions in countries that do not yet have emissions trading regimes or, indeed, in sectors that are not yet covered. In addition, the CDM can link domestic emissions trading schemes indirectly, so that, if more than one scheme allows its regulated installations to use CDM credits called certified emissions reductions (CERs) for compliance, the pricing of carbon assets internationally will begin to converge to some extent. This may be less risky and more politically feasible in the near term than the direct linkage of emissions trading schemes. Full fungibility, ie the ability to substitute any compliance credit for any other, is widely viewed as undesirable from a domestic investment standpoint, so sensible restrictions on imported credits are both inevitable and welcome.

The CDM has been extremely successful in reaching the most cost-effective emission reductions first. Many of the early industrial gas projects have been criticised for delivering little sustainable development value, but they were without doubt additional and the carbon market correctly identified them as low hanging fruit worth picking. The CDM has now moved up the abatement curve and has met new challenges: recent criticisms have not been concerned with sustainable development but, rather, have suggested that energy efficiency and renewables projects are not additional. But surely these are exactly the types of projects that climate policy should incentivise. The real issue is whether policy-makers can keep up with the market, regulating away low hanging fruit once early movers have been rewarded. As policy and market understanding grows, this is increasingly likely.

The Bali roadmap, the UN deal from 2007, which sets out the pathway for negotiations on a post-2012 agreement, called for “monitorable, reportable and verifiable” mitigation actions from developing countries, provided that technology transfer and financing from developed countries is also monitorable, reportable and verifiable. The carbon market is an obvious place for much of this exchange to occur, provided that the underlying data is sound. All carbon transactions in the Kyoto compliance system are, by definition, monitorable, reportable and verifiable as they are tracked through registries and the international transaction log (ITL), managed by the UN.

## “carbon pricing is an essential yet insufficient tool in accelerating the global transition towards a low carbon economy”

The CDM is in flux, under an abundance of pressures for reform. The four main categories of issues are:

- improvement of the administration of the CDM to make it more business friendly, efficient and transparent;
- improvement of the environmental integrity of the CDM to guarantee the additionality of emissions reductions;
- scaling up the CDM beyond a project-by-project approach; and
- moving beyond a ‘one-size-fits-all’ offset-based approach to enable differentiation between developing countries.

Under these pressures, the CDM will not remain the same, nor will it be the only tool for engaging developing countries after 2012. Indeed, governments, think tanks, NGOs and industry groups have been developing reform proposals to address one or more of the concerns set out above. Increased standardisation can reduce transaction costs and improve environmental integrity at the same time. The regulatory system governing the CDM is fairly dynamic and has been correcting itself. Much of this self-correction has created investor uncertainty, by causing unpredictable delays during project review, for example. Despite this, the CDM is still likely to generate at least 1.5 billion tonnes of emissions reductions in carbon dioxide equivalent up to 2012, and that is a conservative risk-adjusted estimate from the UN Environment Programme. Whatever

the critics say, the CDM is a success story. Necessary reforms are in the pipeline and the institutions of the carbon market, like the CDM executive board, will have to continue to learn on the job and mature, improving investor confidence gradually.

It would be foolish to write an article about emissions trading without conceding that, as noted by Stern, carbon pricing is an essential yet insufficient tool in accelerating the global transition towards a low carbon economy. This is true for two main reasons. First, given the urgency of climate change and the combination of policy objectives governments are trying to achieve, a combination of measures will be required. New technologies will need additional support, such as capital grants for demonstration or feed-in tariffs for early deployment, to be able to bring

these technologies to scale. Carbon pricing penalises the ‘bad’ of greenhouse gas emissions and incentivises realisation of the lowest cost reductions across society. While additional support for new technologies brings them to market sooner than emissions trading would do on its own, thereby accelerating technological progress. Second, not all sectors respond well to carbon pricing. This is particularly true in the area of energy efficiency in the built environment. However, the CDM has demonstrated that industrial energy efficiency can be accelerated by a price signal so it is important not to generalise.

Just as there is no technological silver bullet, there is no policy silver bullet either. But if you are looking for a strong foundation for climate policy, emissions trading is not a bad place to start.



# 5

## a framework for electricity

Dr Tooraj Jamasb, Electricity Policy Research Group,  
Faculty of Economics, University of Cambridge

### Let's go beyond the targets and develop a long-term vision for low carbon electricity.

The electricity sector is a carbon-intensive industry and will therefore be expected to make significant contributions towards emissions reductions in the UK. Electricity is more flexible than most other sources of energy. Furthermore, we may find more energy demand being directed towards electricity use as a wider range of generation and demand-related technologies and solutions become available.

The electricity sector accounts for about 41 per cent of global CO<sub>2</sub> emissions and 31 per cent of total CO<sub>2</sub> emissions in the UK.<sup>19</sup> The government's targets for renewable electricity are 10.4 per cent for 2010-11, rising to 15.4 per cent for 2015-16, and 20 per cent for 2020. These will need to be revised upwards in response to the European Union's (EU) ambitious new targets proposed in January 2008 (in the table below).

There is no easy solution to achieve these targets. Meeting the ambitious 2020 and even longer-term targets of the UK and EU will only be possible through a broad range of measures. However, regardless of whether the 2020 targets are met, the timescale for climate policy objectives extends far beyond 2020. It is important to use the time between now and 2020 to establish a long-term low carbon framework that is in line with liberalisation, innovation, and security of supply objectives, with particular emphasis on the economic, technological, and political economy aspects.

Following is an outline for a climate change electricity policy framework for the UK along these lines.



#### EU's proposed overall targets for 2020

20 per cent cut in CO<sub>2</sub> reductions

20 per cent renewable energy  
(currently 8.5 per cent)

#### EU's 2020 targets for the UK

16 per cent CO<sub>2</sub> reduction in  
non-ETS sectors

15 per cent renewable energy  
(currently two per cent): electricity,  
heat/cooling, and transport  
(minimum ten per cent biofuels).

20 per cent increase in energy efficiency

## “there is no guarantee that market-driven actors will always make the most efficient or socially desirable investment decisions.”

Most low carbon technologies are more costly and, in particular, more capital intensive than conventional means of generating electricity from fossil fuels. Therefore, large-scale adoption of these technologies involves significant costs, making economic efficiency an important criterion for a low carbon framework for the electricity sector.

An economically efficient low carbon framework for the sector will require a monetary measure of the social cost of carbon to guide the decisions of policy-makers and market actors. Although uncertain and difficult to determine, the social cost of carbon will need to incorporate high level ethical and policy issues such as climate damages, distributional effects, and inter-generational equity. Another step in internalising the social cost of carbon will be the removal of subsidies such as the reduced VAT rate for residential users, currently at five percent.<sup>20</sup> Once the inefficiencies due to externalities, subsidies, and taxes are reduced, a more level playing field in the market between different technological options will be achieved.

While the UK has been at the forefront of efforts to liberalise electricity systems, there is no guarantee that market-driven actors will always make the most efficient or socially desirable investment decisions. Market failures still prevail: policy and regulatory uncertainty,<sup>21</sup> institutional factors such as planning permission, and technical factors such as network

constraints can all lead to inefficient investment decisions. This means that while there are lessons to be learned from the experience of other countries, the UK needs to develop a model that balances the needs of a low carbon, liberalised, and secure sector. It is within an efficient low carbon economic framework and a liberalised sector that national and EU level emissions trading can be most effective and improve the efficiency with which low carbon objectives are achieved.

Within a low carbon framework, the electricity sector should be viewed in terms of three main components: generation, transmission and distribution networks, and the demand-side. The UK should focus its efforts in reducing emissions on implementing measures that have obvious benefits. Whilst renewables, which reduce emissions from generation, currently require subsidies, significant cost-effective reductions with benefits can be achieved on the demand-side. Estimates of the costs and the emissions reduction potential of various measures for the UK show that many of the measures with negative carbon reduction costs or benefits are demand-related.<sup>22</sup> The benefits from such measures are often local and more tangible than those of emissions reduction from generation, making implementation and public acceptance easier to achieve. It is particularly useful to engage households, the commercial and public sector because these areas seem set to increase their relative shares of total consumption in the coming years.

At the same time, there will be a need to modernise the delivery networks. Resilient and flexible networks will enable active participation of the demand side in the competitive market and improve allocation of resources at times of supply shortages. Furthermore, the networks will have to support the delivery of electricity from renewable sources, which, by their nature, are intermittent and sometimes dispersed. In the medium-term the sector framework can prioritise efforts that begin from the end of the value chain and move upwards, ie from the demand-side through the delivery networks that support active demand and intermittent sources to generation.

### **Technology and R&D strategy**

Many of the UK's coal fired and nuclear power plants are approaching the end of their economic life. From the perspective of the electricity system, the types of resources that will replace these ageing assets are a major issue. This is particularly important because of the long asset life in the electricity sector, meaning that any new investments will remain part of the system for several decades to come. Also, if achieving sufficient levels of renewables proves to be difficult, nuclear power may emerge as the fallback low carbon option.

Due to technological progress, the cost differences among some low carbon technologies will gradually become smaller. As a result, the role of market instruments, regulatory incentives, and research and development (R&D) policy in deployment of specific technologies

## “political economy and practical considerations can result in the adoption of policies and instruments that deviate from the best theoretical options”

will become greater. Indeed, broadening the range of future options should be an important part of energy technology strategy. This is partly due to the inherent difficulty in identifying the best technologies and picking winners already at early stages of development by decision-makers as well as market actors.

Local resource endowments and demand characteristics will also play a role in the technological solutions that are chosen. Having a range of technology options is also important to take advantage of combining technologies at a local level such as biomass-solar or biomass-wind. Moreover, most renewable energy sources exhibit constraints on the extent to which they can contribute to a future low carbon sector. Some of the effects of cost reduction that renewables offer may be outweighed by an increase in implementation cost. For example, some of the best sites, from technical and public acceptance point of view, for wind farms may have already been developed or the opportunity cost of land for bio-energy or crops may increase.

The UK's technology strategy must be designed with regard to comparative cost and resource endowment. We can, to some extent, differentiate between the UK's short and long-term technological options with a view to differentiated innovation promotion. Some technologies can potentially contribute to achieving climate change goals in the medium-term. These would

primarily require economic instruments, demonstration units, and lowering of institutional barriers. However, some other technologies are in need of further technical progress through R&D efforts and can only make real contributions to the resource-mix in the long run.

Technical progress must be strengthened by addressing market failure in R&D. The cost of low carbon technologies can gradually be reduced by ‘learning by research’ through R&D and ‘learning by doing’ through capacity deployment. Both types of measures are costly and require efficient use and allocation of scarce resources among different technologies and they depend on expected return in terms of cost reduction and maturity.

Carbon pricing and emissions trading alone are unlikely to deliver sufficient R&D. At the same time, both private and public R&D spending declined following the liberalisation of the sector.<sup>23</sup> The role of R&D policy is therefore important. It is important that governments raise the level of support for R&D and demonstration projects, both in public research institutions and the private sector and that they support early stage commercialisation. Such policies should be complemented by tackling institutional and other non-market barriers to the deployment of new technologies. However, in a liberalised sector, this role will need to be different from the past and new arrangements and incentives will have to be developed.

International collaboration in specific technology areas among countries with comparative advantage can increase the effectiveness of R&D efforts. Moreover, the positive spillover effects of technological progress can facilitate the participation of developing countries in global efforts.

### **Political economy and public acceptance**

In order for the low carbon framework and its targets to be effective, the policies and instruments must be politically and socially sustainable. The EU has estimated that the cost of meeting the proposed targets for emissions and renewables will be about 15 euros per capita per week. This amounts to a rather substantial cost by any account. It is, therefore, important that the low carbon framework is cost-effective and delivers technical progress.

Political economy and practical considerations can result in the adoption of policies and instruments that deviate from the best theoretical options. For example, theory suggests the use of a carbon tax to curb carbon emissions from power generation. In practice, quota allocations and cap-and-trade schemes have proved more feasible. The merits of quantity controls are recognised as mostly attributable to the ease of implementation and capacity to evolve over repeated rounds. As Grubb and Newbery note, “policy needs to evolve in more efficient directions from the current systems, rather than expecting an ideal taxation system for ideal markets.”<sup>24</sup>

## “the low carbon policy framework for 2020 should be part of a longer-term vision”

Likewise, security of supply and resource mix considerations can result in policies that are not economically efficient or environmentally undisputed. For example, a policy aimed at enhancing security of supply and diversifying the resource mix can favour nuclear power as a carbon free option or promote coal power as a domestic source of energy.

Over time, to ensure sustained public acceptance, a low carbon framework will need to deliver technological progress and innovation. A carbon price or similar instruments will not be sufficient to remove market failures in R&D. Instead, there will be a need for specific incentives and even organisational arrangements to promote technical progress and innovation.

### Conclusions

The low carbon policy framework for 2020 should be part of a longer-term vision and strategic view that extends beyond meeting specific targets. The pursuit of specific emissions and renewable targets should be within the parameters of this longer-term vision and the objectives for the electricity sector. What this amounts to is a need for the 2020 framework to focus initially on establishing the conditions for achieving the long-term targets by developing and bringing together the economic, technological, and political economy dimensions of a low carbon electricity sector.

A liberalised and low carbon electricity sector will need to combine market competition with a high level of renewable sources, some of which will be dependent on government support and subsidies. The UK is at the forefront of electricity sector liberalisation and will need to develop its own model for a low carbon sector that balances the spheres of market and public sector intervention.

The UK should attach more weight to CO<sub>2</sub> reductions using measures that have obvious benefits. As discussed, most measures with negative carbon costs are demand-related and have benefits that are mostly local and more visible than those associated with emissions reduction from generation sources.

Electricity generation is the most flexible part of the energy sector with a varied range of technologies available. Many of these technological options are potentially feasible in the UK.<sup>25</sup> The level of R&D in low carbon technologies should increase and new models for improving the effectiveness of government R&D spending, increasing the role of the private sector, and organising innovative activities should be developed. The recent establishment of the Innovation Funding Incentive and the Energy Technologies Institute are positive steps in this direction, but the initiatives are emerging from a low R&D spending base.

Security of supply and low carbon objectives may conflict over two important technologies. A large share of the existing nuclear and coal-fired plants in the UK are ageing quickly and important policy decisions must be made concerning these, such as requiring capture-ready coal plants, nuclear decommissioning and waste management. Unless there is significant progress in renewable alternatives, both of these technologies will continue to play an important role in the future of the sector.

### Acknowledgement

Parts of this article draw substantially from Grubb, Jamasb, Pollitt, Eds., 2008, *Delivering a low carbon electricity system: technologies, economics and policy*, Cambridge University Press: Cambridge. All the views expressed here are, however, those of the author.

# 6

## a framework for transport

Dr Terry Barker and Athanasios Dagoumas, Cambridge Centre for Climate Change Mitigation Research

No single policy will do the trick. A low carbon transport sector is more likely to come from a portfolio of policies.

Transport is a particularly interesting sector as it is important for economic growth and development but also highly income elastic in the long-term, especially aviation. The sector is expected to grow faster than income and to dominate UK greenhouse gas emissions over the next century.

Policies to decarbonise our rising emissions from transport have become more critical with the introduction of the EU's target<sup>26</sup> to limit a rise in global temperature to no more than two degrees. This means that all sectors will need to substantially decrease their carbon footprint and even decarbonise by 2050 to 2060. Comprehensive policies will need to be in place by 2020 if the rise in transport emissions is to be checked, let alone reversed, yet current UK transport policies appear uncoordinated and unambitious.

Currently transport fuel is almost entirely fossil fuel based, and, as yet, there are no straightforward alternatives. Rising demand for travel will, therefore, have to be accompanied by rising relative prices and/or changes in technology and lifestyles, if substantial reductions in greenhouse gas emissions are to be achieved. Behaviour change is crucial, as it can lead to short-term energy savings and also long-term lock in, reducing the rebound effect from the implementation of other transport policies.

Although there are substantial investment and behavioural costs in decarbonising transport, there are also some very

considerable benefits. A whole systems approach suggests that managing and regulating the sector to treat its climate change impacts will also reduce other damaging externalities. In approximate order of social significance, the benefits are: less congestion; greater reliability of public transport; improved air quality and health; fewer crashes and accidents; accessibility; improved equity; and less noise, vibration, despoliation of the countryside, dirt and street clutter.

Yet non-environmentally driven transport policies can have ambiguous benefits. Vehicle distance charges, appropriate for congestion, are very effective at reducing the distance driven and therefore have a predictable effect on CO<sub>2</sub> emissions. Similar effects are expected from speed limit enforcement policies. But for air quality there can be trade-offs between CO<sub>2</sub> reduction and local air quality: the trend to switch to diesel (which has lower CO<sub>2</sub> emissions) has resulted in higher particulate and nitrous oxide (NO<sub>x</sub>) emissions in the past.

At the current shadow price of carbon, climate change is seen as a minor contributor in transport externalities, partly because the prices of road fuels are dominated by fuel duties, so an additional price of carbon has a minor effect on fuel prices at the pump. This suggests that a low greenhouse gas emissions transport sector is more likely to emerge from a portfolio of policies addressing transportation issues as a whole, rather than from a single policy, such as carbon taxation or trading.



## “it should be possible to use regulation to reduce emissions by 67 per cent by 2020”

### Special features of transport

– Income-elastic: Transport is a highly desired service, and plays a central role in economic growth and development. Passenger transport, especially by air, is strongly income-elastic, so it can be expected to grow even faster than the economy in general.

– Technology-driven: Transport is a heavily regulated industry for safety, efficiency and pollution reasons. Technology, and in particular information technology, heavily influences the market for vehicles. There is a high potential for non-linear rapid system change, as information costs fall and new ways of managing traffic and travel emerge.

– Location – and infrastructure-specific: Travel has limited relocation potential as the start and ends of journeys are often fixed and reliant on existing infrastructure: roads, rail tracks, airports, ports, cycle routes etc. Taxation therefore has a limited effect on international competitiveness in most cases. But in some cases it can be crucial: high port dues could redirect traffic to competing ports, for example. The absence of fuel duty in shipping and aviation reflects the fear of tax competition between countries to attract traffic. The ability to tax an airport like Heathrow – and not lose traffic – is probably more related to excess demand, income-elasticity and the very many reasons businesses locate in London, as well as the value of being a hub. In contrast there is much greater flexibility when behaviour is targeted by policy for example in shifting from cars

to public transport, which can affect the choice of destination, time, route, car occupancy, driving style and the decision to travel in the first place.

– Uncertainties: There are major uncertainties about the likely future emissions from the sector as a result of many factors. These include: the introduction of new transforming information technologies such as GPS; the acceptability of new policies, such as congestion charging and emission permits; fuel availability and prices; the behaviour of a complex system in conditions of limited facilities; and the pent-up demand and motivations of new vehicle purchasers, holiday passengers and drivers.

### Road transport

Decarbonising road transport requires market transformation via a combination of policies including fiscal, technological and behavioural measures.<sup>27</sup>

The regulation of national vehicle fleets for fuel economy, and increasingly for pollution, is long established, such as the phasing out of leaded gasoline, US car fuel economy standards developed in the 1970s and zero emission standards in California. Advances in monitoring, IT and telecoms mean that it should be possible to use regulation to reduce emissions by 67 per cent by 2020, through the adoption of existing technologies alone.<sup>28</sup> The King Review<sup>29</sup> estimates that by 2050, through a combination of policies – cleaner fuels, more efficient technologies,

consumer choices – we could see an 80 per cent reduction in total CO<sub>2</sub> emissions. Although this will require significant investment, a significant proportion will be returned to the road user in reduced fuel costs. How stricter standards may impact on safety is complex: the trend for more fuel-efficient cars will drive them to be lighter. But there is no simple relationship between weight and safety, as vehicle design, materials, behaviour, and infrastructure are also important.

Although the EU has already adopted stringent standards for new vehicles on air pollution, noise and safety, the harmonisation of these standards with other major markets – the US, Japan, China and India – should yield economies of specialisation and scale. The aim should be to reduce on-road CO<sub>2</sub> emissions by 50 per cent by 2020 per vehicle type, with a shift in the car fleet towards smaller, more efficient cars and significant penetration of hybrid and zero-emission vehicles across the board. The standards need to be carefully designed, future-proofed and flexible enough to be amended for unanticipated side effects. The Californian example shows that if a sufficiently large market leads in imposing standards, other markets will follow.

However the lower vehicle running cost that tighter regulatory standards will bring may have the unintended effect of increasing how often people use their cars. This would not only fail to address emissions, but may worsen other problems of congestion, parking, noise

## “policies targeting a behavioural shift have the potential to lead to significant transport emissions reductions”

and accidents. Use of road space has to be managed in ways that will promote lower emission alternatives, such as public transport, walking and cycling, taking into account the health and well being benefits that these activities bring. The use of congestion charging to promote freer traffic flows and revenues to support alternative forms of travel has some way to go, but will clearly complement the improved performance of vehicles through regulation.

An alternative way of managing congestion and pollution would be to introduce a tradable permit system such as the scheme for car manufacturers piloted in California. Each manufacturer had to buy permits according to the CO<sub>2</sub> emissions of their new vehicle sales. However such a scheme does not cover existing fleets and has little impact on everyday driver behaviour.

A more radical scheme would be to issue tradable fuel consumption rights to road fuel users.<sup>30</sup> A free annual allocation of rights would be made to car owners, in the form of an electronic card with points. Points would be deducted when buying fuel or driving in congested areas, or could be traded. The scheme could be extended to cover all pollutants, if acceptable monitoring is developed and users could opt out of the scheme and pay fuel taxes or congestion charges instead. Such a proposal is elegant and flexible, but imposes high compliance and management costs. It could also be

extended beyond car owners to become a full personal carbon-trading scheme, which would help address social issues, such as the fact that non-car users are usually the poorest.

In contrast with all the above measures, which are essentially medium-term, policies targeting a behavioural shift, such as investments in public transport, personalised travel planning and new cycle routes, have the potential to lead to significant transport emissions reductions in the short-term. The financial costs are usually minor relative to those for road and rail building. In a complex, congested system, pilot schemes are essential to see what works, ensuring that major investments to encourage a shift to walking and cycling take precedence.

### Air transport

Although currently the proportion of emissions from air transport is small in relation to road, it is growing at a much faster rate, and institutional arrangements to manage and reduce these emissions are largely prevented by a number of international agreements covering the industry. The International Air Transport Association (IATA) has made a commitment to make airlines zero carbon by 2050, but the fuel technology to do so does not yet exist, without offsetting. The use of biofuels as a kerosene substitute for aircraft fuel may have adverse effects on food prices and accelerated deforestation, as already witnessed in the use of biofuels for road transport.<sup>31</sup>

Indeed, the growth in passenger air transport, mainly through low-cost airlines and the increasing share of executive planes, and the absence of alternatives to fossil fuels or alternative modes for long-distance travel, suggests that aviation will come to dominate all greenhouse gas emissions by 2050.<sup>32</sup> Considering that emissions released at high altitude may have a greater effect than those from ground transport, reduction from this sector should become a priority.<sup>33</sup>

It is here that the use of an emissions trading scheme (ETS) may prove highly effective, although not in the form proposed by the European Commission for inclusion in the ETS. The problem with the EU proposal is that the implied small increase in costs of air travel is unlikely to have any effect on aviation's increasing emissions. However, a sector-wide ETS, with a managed gateway into the main ETS, and a specific cap on airline emissions would lead to increased efficiency and prices in the face of the growing demand for air travel. The commitment to a cap on emissions could be supported by restrictions on short-haul slots in airports, where alternative low greenhouse gas emissions modes of transport should be available, and planning refusal on airport expansion.

**“the problem with the EU proposal is that the implied small increase in costs of air travel is unlikely to have any effect on aviation’s increasing emissions”**

### **Conclusions**

Transport is probably the most challenging of the main sectors for decarbonisation, partly because greenhouse gas emissions are only one of its many social problems and partly because of international aviation and shipping, which have hardly even acknowledged the problem, let alone developed credible policies to address it. A portfolio of policies for market transformation to reduce emissions by 2020 would combine strong policies to influence vehicle purchasers at the point of sale, with policies for vehicle use, investment to help shift behaviour and congestion charging, at the same time as raising the cost of emissions in real terms. The development of pilot schemes for fuel rights seems a potentially equitable, efficient and flexible way of limiting greenhouse gas emissions and allocating road space. Current EU proposals to include aviation in emissions trading are unlikely to make much difference to the growth in the sector’s emissions. Specific caps on international aviation and shipping could cut the emissions, but will require international political leadership and agreement.

### **Acknowledgments**

We would like to thank Jillian Anable, Abigail Bristow, Chris Nash, and Stephen Perkins for comments on earlier versions of the paper.



# 7

## a framework for industry and a part for everyone

Richard Lambert, director general,  
Confederation of British Industry

**Business must be green  
to grow and we need  
new partnerships  
to drive the demand for  
a low carbon economy.**

A concerted effort will be required by government, business and consumers if we are to build a low carbon economy. The government has established a framework of carbon targets for the UK. Action now needs to focus on implementing change on the ground. Government and business will need to work together more closely to manage the transition, to agree the deliverables, understand the barriers and solutions, and streamline efforts to secure carbon reduction in practice.

This was one of the main messages from the CBI's climate change task force that I convened last year. Our mission was to assess the risks to business of climate change, and identify actions that can be taken to reduce this risk. It was the first time that chief executives from leading UK businesses across the economy had sat around the same table to discuss one of the most challenging issues of our times. After ten months of intensive discussion, our report was published in late November.

The report was underpinned by analysis from the consultants McKinsey that provides an indication of the technologies that will need to be employed to meet our carbon reduction targets, as well as the cost and carbon saving for each technology.

The analysis suggests that there is a very strong likelihood that we will miss the government's 2020 target. Yet with urgent action, we could be back on track by 2030

to achieve the long-term targets, and the project is affordable. We calculated that by 2030 the additional cost of meeting long terms targets will be approximately 40 euros per tonne of carbon dioxide (tCO<sub>2</sub>), although in the short term (ie by 2020) the figure is likely to be higher: 60-90 euros per tCO<sub>2</sub>. This is about £100 per household per year by 2030.

This assumes, though, that everyone plays their part.

### **Delivering an appropriate policy framework**

As we make the transition towards a low carbon future, we will require policy frameworks that facilitate this change. Later this year, the climate change bill will enshrine in legislation some long-term carbon reduction targets for the UK. This kind of long-term certainty will certainly help to drive investments in low carbon technologies. But alone it is unlikely to be enough.

In his review, Nicholas Stern concluded that there are three fundamental policy levers: price, technology and behavioural change. Government has a role to ensure that the potential of these levers is maximised.

Let me take each in turn:

### **The price challenge**

Creating a price for carbon will be fundamental. Our ultimate goal should be to establish an international agreement that puts a price on carbon across the



## “with urgent action we could be back on track by 2030 to achieve the long-term targets, and the project is affordable”

global economy. The international process to establish a successor to the Kyoto protocol has reached a critical stage. All parties have agreed that, by December 2009, talks on a new international agreement that limits emissions of greenhouse gases must be concluded. If successful, this will establish a global price for carbon. But, be in no doubt, this is going to be a challenge.

In the EU we have taken a commendable lead in the carbon debate by establishing the EU emissions trading scheme (ETS), which in the absence of a global system, sets an EU-wide cap for carbon emissions for some of Europe's largest polluters. The system covers approximately 50 per cent of UK CO<sub>2</sub> emissions, or 700 installations, allotting carbon caps to each site. Those that reduce emissions beyond their allotted cap can sell their surplus carbon to those that have exceeded their cap.

Launched in 2005, the ETS is into its second phase of operation – which lasts from January this year to 2012 – and we now have the opportunity to reflect on the system and make improvements where necessary. Ensuring that the ETS meets its potential – whilst being mindful of those sectors of the economy that compete in international markets that do not need to internalise the cost of carbon – is going to be a challenge. Going forward we also need to ensure that the ETS remains flexible so that, as other trading systems spring up, and they will, they can easily link up. Getting a robust system in place will be a major step in the task of

persuading other large emitters to sign up to an international agreement at the end of next year and building long term certainty for business investments.

### Is the ETS alone enough?

The McKinsey analysis for the task force report demonstrated that, while all the required technologies are known, only about half of them are currently economically viable. And so we come to the second lever: technology.

A robust ETS will support investment in some of the carbon abatement options but it will not provide enough support for the more expensive, but necessary, technologies. This is especially so for those technologies which have been developed but now need to be demonstrated at commercial scale. Carbon capture and storage is an obvious example. Zero carbon homes are another. While we know the individual technologies that together will build a zero carbon home, we need to demonstrate how they will come together effectively.

If we are to take full advantage of the opportunities that these low carbon technologies and others present – one estimate suggests that the market for low carbon technologies could be worth three trillion dollars in the early years of a global deal to limit emissions – government must play its part in supporting this source of wealth creation. In developing new opportunities for the UK, government and business will need to think strategically about existing UK strengths that can be

easily developed. The Energy Technology Institute is a good start but must only be the beginning. To avoid picking losers, business and government need collectively to identify families of technologies on which to concentrate their efforts. As a starting point, I would suggest that we should look to our strengths in financial services (the City of London has established itself as a leading carbon market), engineering and construction and ICT. We also have strengths in understanding the science and impacts of climate change: the Met Office and the UK Climate Impacts Programme are world leaders in their field.

### Empowering consumers

The McKinsey work identified a collection of technologies focused around energy efficiency, particularly in residential buildings. Although these technologies save both money and carbon, they have not yet been fully implemented. How then do we encourage the uptake of energy efficient technologies in our housing stock? This brings me to Stern's third policy lever: behavioural change.

Engaging the public to make changes to their homes but also to green their lifestyles would make a major impact. Our research indicates that consumers directly control about 35 per cent of UK emissions through the energy they use in their homes and transport choices. They influence another 25 per cent of emissions through their shopping basket. If we empower consumers to demand low carbon goods and products, this will create competition to provide low carbon solutions.

## “getting a robust system in place will be a major step... (towards) an international agreement... and building long-term certainty for business investments”

To provide the trigger for this step change in behaviour, a carefully crafted package of policies will be required, focused around better information, targeted regulation and price incentives.

Consumers are not yet sufficiently engaged. Most recent consumer surveys indicate that the public increasingly acknowledges green issues. While a third takes them into consideration, at least a third are sceptical about the green agenda and the majority are confused about what they can do that will really make a difference. Rather alarmingly, research by HSBC suggests that UK consumers are more sceptical about their role in supporting efforts to tackle climate change than their counterparts in France.

There is, therefore, certainly room for provision of better and clearer information for householders. Around the task force table, there was an appetite for expanding the current A to G labels used on refrigerators that have been extremely successful in raising awareness among consumers and promoting more efficient product design. Smart meters should also be rolled out across the building stock, especially in residential buildings, as quickly as possible.

Regulation should also form part of the package of policies but it needs to be focused on areas where it is possible to make a material difference. The McKinsey work indicates that in the UK we can save over 30 million tonnes of CO<sub>2</sub>

through appliances and lights. Minimum standards for the use of some electric appliances have been established by the EU and are currently undergoing revisions. To achieve savings, it is important that the scope of the legislation is expanded to include all electrical appliances and minimum standards must be updated regularly.

But, most important of all is to ensure price incentives for consumers. Although a minority are willing to pay more to be green, most consumers are primarily motivated by low prices and are not willing to pay extra. In general, our research found that consumers expect a payback of 18 months to two years on green investments but around 70 per cent of the opportunities to cut building-related emissions have a payback period of over two years even though they would deliver a lifetime saving in energy bills.

Reducing these payback periods to encourage take up of energy efficient technologies must be part of changing behaviour to ensure savings in buildings. One approach to this would be to look again at property taxes, such as business rates and council taxes that were designed for the old economy, to see how they can be greened to reward those that improve the carbon performance of their property.

### **Business has to play its rightful part**

Business also has a big role to play to meet the UK's carbon aspirations. It is too often seen as the problem but gets less recognition for being part of the solution.

The carbon targets are challenging, and if we are to meet them business will need to instigate a major deployment of resources across the economy, in addition to what is already being done.

There is still some way to go to make sure that the whole business community is ready for the challenge. Various surveys indicate that awareness could be improved. A survey by the Economist Intelligent Unit of over 600 international senior executives showed that less than one in five firms had a carbon reduction plan. One UK survey found that for 80 per cent of all SMEs and 40 per cent of major energy users, emissions reductions were not a priority. Awareness is also low about the need to adapt to the effects of a changing climate.

For those businesses that are looking at managing their emissions, like consumers, pay back periods are too long and therefore more efficient technologies such as motor systems or boiler systems only get considered when old equipment needs replacing.

For the investment community, keen to get a better understanding of the carbon footprint of their investments, it is often difficult to establish an overview of corporate emissions. Although the carbon disclosure project last year recorded greater feedback than in previous years, reporting is not yet sufficiently consistent, comprehensive or comparable to assess performance and establish sector benchmarks.

## “quite simply business will need to be green to grow”

As we move forward, firms will need to change their business models to meet the demands of a low carbon future. This will require new management systems that measure energy, manage emissions and provide transparent reporting for stakeholders, consumers and investors. Business will increasingly be judged on its green credentials – those that green their businesses will be rewarded. Quite simply business will need to be green to grow. If we are successful, British business will be able to capitalise on the new market for low carbon technologies.

### **Conclusion**

To put words into action the task force members signed up to a pretty challenging set of commitments focused around:

- cutting emissions in households, by working with employees and developing new products and services that will enable cuts in domestic emissions;
- developing a reporting standard that can be used across wider business communities;
- cutting emissions from corporate cars and buildings;
- strengthening work with government to co-ordinate and manage the implementation of emissions savings projects; and
- increasing resources at the CBI to enhance the CBI’s work domestically and internationally.



If we are serious about meeting the UK’s carbon reduction targets, business will need to work more closely with government and consumers. We will need to build new partnerships: with government, to establish the appropriate frameworks to support a price for carbon, R&D in essential low carbon technologies, and to incentivise consumers; with other business, to develop low carbon solutions as well as build trust through transparent reporting. We need to work together to empower consumers to change their behaviour and to drive the demand for a low carbon economy.

## notes and references

<sup>1</sup> The 'Climate action and renewable energy package' is the European Commission's legislative proposal to achieve agreed EU objectives in the fight against climate change. It proposes reducing its overall emissions to at least 20 per cent below 1990 levels by 2020 and increasing the share of renewables in energy use to 20 per cent by 2020. It sets out the contribution expected from each member state to meeting these targets and proposes a series of measures to help achieve them.

<sup>2</sup> The climate change bill, published on 13 March 2007, is a draft law aimed at moving the United Kingdom to a low-carbon economy and society. The target is a 60 per cent cut in the UK's carbon emissions by 2050 (compared to 1990 levels), with an intermediate target of between 26 per cent and 32 per cent by 2020.

<sup>3</sup> Stern, N., 2007, *Stern review on the economics of climate change*, HM Treasury

<sup>4</sup> From 2008 the EU Emissions Trading Scheme will cap 52 per cent of projected UK carbon dioxide emissions.

<sup>5</sup> The carbon emissions reduction target (CERT) came into effect on 1 April 2008 and will run until 2011. It is an obligation on energy suppliers to achieve targets for promoting reductions in carbon emissions in the household sector.

<sup>6</sup> Announced in the energy white paper 2007, the carbon reduction commitment scheme (CRC) (formerly the energy performance commitment) will apply mandatory emissions trading to cut carbon emissions from large commercial and public sector organisations

<sup>7</sup> Commission on Environmental Markets and Economic Performance, November 2007, *Commission on environmental markets and economic performance report*.

<sup>8</sup> Hale, S. 2007, *A European budget for climate security*, Green Alliance.

<sup>9</sup> eg CRC and CCL are applied to the same unit of energy and EU ETS and electricity use in EEC<sub>3</sub>/CERT are applied to the same energy consumption chain.

<sup>10</sup> CBI, November 2007, *Climate change: everyone's business, A report from the CBI climate change task force*.

<sup>11</sup> From 2008 the EU emissions trading scheme will cap 52 per cent of projected UK carbon dioxide emissions.

<sup>12</sup> Stern, N., 2007, *Stern review on the economics of climate change*, HM Treasury

<sup>13</sup> The clean development mechanism (CDM) is an arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries.

<sup>14</sup> ONS, 2007, <http://www.statistics.gov.uk/CCL/nugget.asp?ID=152>

<sup>15</sup> The climate change levy is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' national insurance contributions and additional support for energy efficiency schemes and renewable sources of energy. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

<sup>16</sup> Border tax adjustments are import fees levied by carbon-taxing countries on goods manufactured in non-carbon-taxing countries.

<sup>17</sup> The Californian electricity crisis resulted from the gaming of a partially deregulated California energy system by energy companies such as Enron and Reliant Energy. The energy crisis was characterised by a combination of extremely high prices and rolling blackouts. Price instability and spikes lasted from May 2000 to September 2001.

<sup>18</sup> FSA, 2008, *The emissions trading market: risks and challenges*.

<sup>19</sup> Defra, 2007, Estimated emissions of carbon dioxide by IPCC source category, type of fuel and end user: 1970-2005, *E-digest of environmental statistics*, January, Department of Environment, Food and Rural Affairs, London.

<sup>20</sup> See Hope, C. and Newbery, D. 2008. 'Calculating the social cost of carbon', in Grubb, M., Jamasb, T. and Pollitt, M., Eds., op. cit.

<sup>21</sup> In the interim, final approval of the proposed EU targets will take approximately 1-1.5 years of national and European negotiations of the targets and will be a source of market uncertainty.

<sup>22</sup> CBI, November 2007, *Climate change: everyone's business, A report from the CBI climate change task force*.

<sup>23</sup> Jamasb, T. and Pollitt, M., 2008, 'Liberalisation and R&D in network industries: The case of the electricity industry', Research Policy (forthcoming).

<sup>24</sup> See Grubb, M and Newbery, D. 2008. 'Pricing carbon for electricity generation: national and international dimensions', in Grubb, M., Jamasb, T. and Pollitt M., Eds., op. cit.

<sup>25</sup> See Jamasb, T., Nuttall, W., and Pollitt, M., Eds., 2006, *Future electricity technologies and systems*, Cambridge University Press: Cambridge.

<sup>26</sup> Intergovernmental Panel on Climate Change (IPCC), 2007, 4th Assessment Report. Stern, N., 2007, *Stern review on the economics of climate change*, HM Treasury.

<sup>27</sup> Anable, J. and A. L. Bristow, 2007, *Transport and Climate Change: Supporting document to the CfT report*, prepared for the Climate Change Working Group of the Commission for Integrated Transport.

<sup>28</sup> Kågeson, P., 2007, *A European regulation on the fuel efficiency of new cars*, Nature Associates. Plotkin, S. E., 2007, *Examining fuel economy and carbon standards for light vehicles*, IEA-OECD Joint Transport Research Centre Discussion Paper No. 2008-1.

<sup>29</sup> King Review, 2007, *The King Review of low carbon cars, Part I: the potential of CO<sub>2</sub> reduction* [www.hm-treasury.gov.uk/pbr\\_csr/reviews/pbr\\_csro7\\_king\\_index.cfm](http://www.hm-treasury.gov.uk/pbr_csr/reviews/pbr_csro7_king_index.cfm).

<sup>30</sup> C. Raux, C, 2008, *How should transport emissions be reduced? Potential for emission trading scheme*, IEA-OECD Joint Transport Research Centre Discussion Paper No. 2008-3.

<sup>31</sup> OECD-ITF (International Transport Forum), 2007, *Biofuels: linking support to performance*, Joint Transport Research Centre, IEA-OECD, Paris.

<sup>32</sup> Anderson, K., Bows, A. and Upham, P, 2006, *Growth scenarios for EU and UK aviation: contradictions with climate policy* Tyndall Centre Working Paper, 84.

<sup>33</sup> Ibid.

### **Green Alliance**

Green Alliance is an independent charity. Our mission is to promote sustainable development by ensuring that environmental solutions are a priority in British politics. We work with representatives from the three main political parties, government, business and the NGO sector to encourage new ideas, facilitate dialogue and develop constructive solutions to environmental challenges.

Green Alliance  
36 Buckingham Palace Road, London SW1W 0RE  
tel: 020 7233 7433 fax: 020 7233 9033  
email: [ga@green-alliance.org.uk](mailto:ga@green-alliance.org.uk)  
website: [www.green-alliance.org.uk](http://www.green-alliance.org.uk)

Green Alliance is a registered charity 1045395 and a company limited by guarantee 3037633.

This work is part of Green Alliance's climate change theme ([www.green-alliance.org.uk/climatechange](http://www.green-alliance.org.uk/climatechange)), which is kindly supported by the following organisations:



Designed by Howdy  
website: [www.howdydesign.co.uk](http://www.howdydesign.co.uk)

Printed by Park Lane Press using a waterless offset process with vegetable- oil based inks on ECF 100 per cent recycled paper

## **Is there more to life than trading?**

Through this collection of essays, Green Alliance aims to stimulate debate on the overall shape of future energy and transport policy. There is currently too much focus on a myriad of often relatively ineffective individual policy instruments. But it is the development of an effective overarching policy framework to tackle climate change that is the most pressing of tasks for today's political leaders and those who advise them.

These essays come from a variety of perspectives but some important common themes emerge. Carbon pricing, through emissions trading, is the current policy of choice for politicians. But, while carbon pricing is important, we also need stronger political support for innovation and behaviour change. Regulation and public expenditure are consistently underplayed but they are important means to deliver these goals. What is demonstrated clearly here is that there is 'more to life than trading'.