Greener, Cheaper

Contributing authors Dr Robert McIlveen
and Professor Dieter Helm
Edited by Dr Simon Less

Greener, Cheaper

Contributing authors
Dr Robert McIlveen and Professor Dieter Helm

Edited by Dr Simon Less

Policy Exchange

About the Authors

Robert McIlveen is a Research Fellow in the Environment and Energy Unit at Policy Exchange. He completed his PhD in Political Science at the University of Sheffield in 2008. At Policy Exchange he has worked on a range of policy areas including waste, public transport, energy markets, energy security and infrastructure.

Dieter Helm is an economist specialising in utilities, infrastructure, regulation and the environment, and concentrates on the energy, water and transport sectors primarily in Britain and Europe. He is a Professor at the University of Oxford and a Fellow of New College, Oxford. He holds a number of advisory board appointments in Britain and Europe, including Chairman of the Academic Panel, Department of Environment, Food and Rural Affairs, and Chief Advisor to the Polish Roundtable on a Low Carbon Economy. He was a member of the DTI's Sustainable Energy Policy Advisory Board from 2002 to 2007, of the Prime Minister's Council of Science and Technology from 2004 to 2007, and of the DTI's Energy Advisory Panel from 1993 to 2003.

Dieter is an Associate of the Smith School of Enterprise and the Environment, and Associate Editor of the Oxford Review of Economic Policy. His career to date has spanned academia, public policy and business. He founded OXERA (an economics consultancy) in 1982 and has published extensively on economic topics. He is an Honorary Vice President of the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust.

Simon Less is head of the Environment and Energy Unit at Policy Exchange. He was previously a Director at Ofwat, leading market reform in the water sector, and before that held a number of senior civil service positions in the Treasury, including leading on energy policy, and the Ministry of Justice. He has also worked in the DTI and in NatWest's corporate banking business. Simon is a regulatory consultant, and a trustee of ReStore Community Projects, a north London furniture reuse charity. He has a first class degree and PhD from Cambridge University in chemistry, and an MBA from Imperial College Business School.

Published by
Policy Exchange, Clutha House, 10 Storey's Gate, London SW1P 3AY
www.policyexchange.org.uk

ISBN: 978-1-906097-82-0

Printed by Heron, Dawson and Sawyer
Designed by SoapBox, www.soapboxcommunications.co.uk

Policy Exchange's Economics Unit

Policy Exchange's Environment & Energy Unit conducts innovative and independent policy research into a wide range of environmental challenges, including climate change. We produce a range of publications and bring together stakeholders through events and other means, to disseminate our findings and promote our ideas.

Our work seeks ways to tackle environmental challenges effectively, while minimising adverse impact on living standards. We promote well-designed regulation to harness the power of markets to achieve positive environmental outcomes.

To find out more about the work of the unit, contact:

Dr Simon Less
Head of the Environment and Energy Unit
Policy Exchange
Clutha House
10 Storey's Gate
London
SW1P 3AY

Email: info@policyexchange.org.uk
Telephone: 020 73402650
Fax: 020 7222 5859

www.policyexchange.org.uk

Acknowledgements

The authors would like to thank all those who supported the project, both financially and with their time and expertise. We would like to thank those who attended the two roundtables, and who gave their opinions and advice at various points throughout.

Contents

	Acknowledgements	4
	Note on Referencing	6
	Executive Summary	7

Section One: Cutting the Cost of Cutting Carbon

Dr Robert McIlveen, Research Fellow, Policy Exchange

1	Rational Environmentalism Policy	14
2	The EU Emissions Trading Scheme	22
3	Policies Overlapping the EUETS	26
4	Policies Outside the EUETS	39
5	Conclusions on Section 1	47

Section Two: The Case for a Carbon Tax

Professor Dieter Helm, University of Oxford

1	Introduction	54
2	Taxes Versus Permits	56
3	Consumption Versus Production	61
4	The EUETS – and the Case for a Floor Price	64
5	The Choice of Tax Bases	67
6	Implementation and Institutions – Making the Tax Credible	72
7	Conclusions on Section 2	77
	Conclusions and Recommendations	79
	Bibliography	82

Note on Referencing

This report's two sections should be cited separately, i.e.:

McIlveen R (2010) *Cutting the Cost of Cutting Carbon*, in Less, S (ed) *Greener, Cheaper,* Policy Exchange, London
Helm D, (2010) *The Case for Carbon Taxes*, in Less, S (ed) *Greener, Cheaper*, Policy Exchange, London

Executive Summary

Robert McIlveen

> *"I want this generation to be the one that bucks the trend: to be the generation that finds a way to combine economic, social and environmental progress."*
> David Cameron, speech "The choice isn't between economy and environment" 2008

> *"It would be absurd to adopt policies which would bankrupt the industrial nations, or doom the poorer countries to increasing poverty."*
> Margaret Thatcher, speech to the 2nd World Climate Conference, 1990

Climate change is a major challenge facing the UK and the world, requiring substantial action to reduce carbon emissions. The title of this report – *Greener, Cheaper* – reflects the importance of cost-effectiveness, seeking ways to achieve our climate change goals, without needlessly sacrificing economic or social welfare. This principle should be central to policymaking, because the more cost-effectively we make carbon savings, the further and faster we are likely to proceed. In the very challenging economic circumstances we now face, it has become even more important.

This report has two sections, both of which address the question of how to improve UK carbon reduction policy. The first, *Cutting the Cost of Cutting Carbon* by Robert McIlveen, explores the current suite of climate change policies. It looks at whether or not the existing policies are well-designed or cost-effective. It also examines how the individual policies overlap or push against one another, and makes recommendations on specific policies and the overall policy framework. The second section, *The Case for a Carbon Tax* by Dieter Helm, presents a detailed look at options for carbon taxation.

Cutting the Cost of Cutting Carbon

The UK's set of climate change policies now form a tangled web. Instead of being a coherently designed system, politicians have added more and more elements over time. Some of the individual policies are very expensive and in urgent need of reform. This report explores both the efficacy and efficiency of individual policies – which vary widely – and the relationships between them. This latter point is important because there are many overlaps between policies.

Cost-effectiveness of policy is vitally important for political reasons but also for economic ones. Much of the running on the costs of climate change policy have been made by those resisting it; it is time that those who take the threat seriously take the costs seriously too. Decarbonising the economy will be difficult and

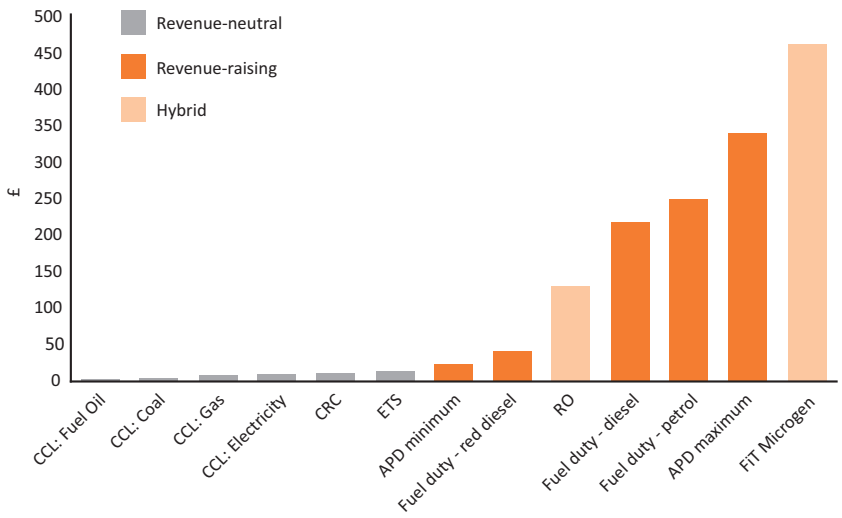
expensive, and policies which are unnecessarily expensive hinder efforts to decarbonise the economy. Public support and economic viability are going to be crucial for decades if long-term decarbonisation is to be achieved – and cost-effectiveness is critical to both.

(i) Cost effectiveness

Many of the policies overlap with the EU Emissions Trading Scheme (EUETS). Carbon savings made by these policies may therefore be offset by carbon reductions foregone elsewhere in the EU under the ETS cap. These policies cannot therefore aim to result in additional carbon reductions up to 2020. But they can aim to make emissions reduction cheaper, if they are able to make savings cheaper than the EUETS price.

However this report finds that many policies make meeting 2020 carbon targets *more*, not less, expensive. The RO and FiTs, in particular, are an order of magnitude more expensive per tonne of carbon saved than other policies.

Figure ES1: Cost per tonne of carbon abatement under various policies (£/tCO2)



Some argue that the high costs of policies such as the RO and FiTs, as well as the proposed Renewable Heat Incentive, are justified because they support demonstration and early-stage deployment of new technologies. There would be a strong case in some circumstances for policies to support 'learning by doing', in order to reduce the costs of globally-promising technologies. This is one of the most useful contributions the UK can make to addressing global carbon reduction. However, policies like the RO and FiTs, are mostly about mass deployment of known technologies. For this reason these policies end up lavishing huge levels of subsidy in attempts to mass deploy early-stage technologies at huge cost, rather than achieving least-cost decarbonisation.

Table ES1: The policies covered – and who pays.

Policy	Sectors covered	Who pays in the end
EU Emissions Trading Scheme (EUETS)	Electricity, heavy polluters	All customers via bills
Renewables Obligation (RO)	Electricity	All customers via bills
Climate Change Levy (CCL)	All business	Business customers via bills; likely passed on to end customer
Carbon Reduction Commitment Energy Efficiency Scheme (CRC)	Non-energy intensive organisations (public and private)	Organisations enrolled via bills; passed on to taxpayers and end customers
Feed-in Tariffs for microgeneration (FiTs)	Electricity	Customers via bills
Carbon Capture and Storage Levy (CCS Levy)	Electricity	Customers via bills
Renewable Heat Incentive (RHI)	Heat	Customers via bills
Fuel Duty	Transport	Drivers via petrol/diesel
Air Passenger Duty (APD)	Transport	Passengers as tax on ticket

(ii) Simplification of the policy mix

The UK now has a large number of overlapping climate policies. One transaction can be taxed several times over. Electricity generation is the main focus of much of this complexity: electricity prices for consumers encompass the costs of the European Union Emissions Trading Scheme (EUETS), as well as the Renewables Obligation (RO) and will soon also incorporate the CCS Levy and the cost of Feed-in Tariffs (FiTs) for microgeneration.

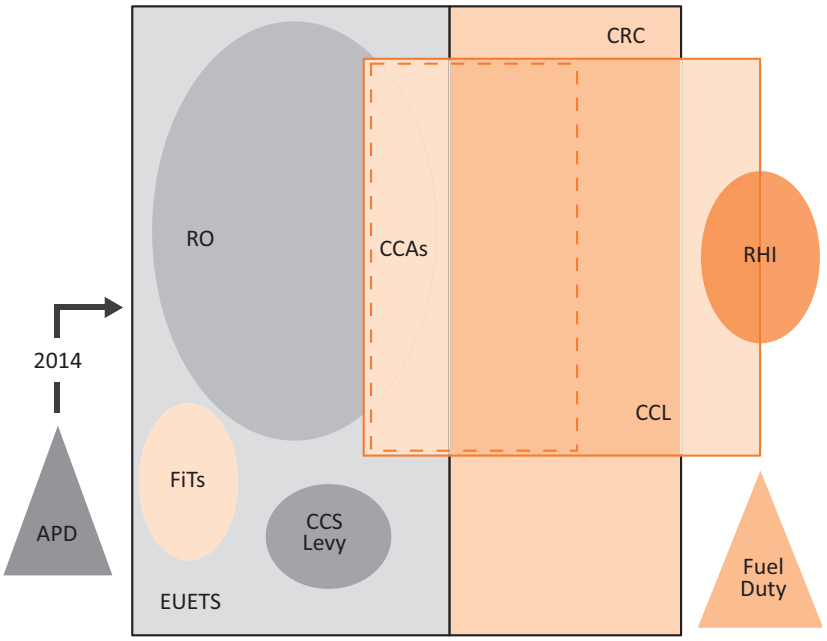
For many businesses, the Climate change Levy (CCL) is added on top – complemented by the Carbon Reduction Commitment Energy Efficiency Scheme (CRC), which also covers public sector organisations. Some companies will face incentives and costs from *all* of these policies.

The public sector is also affected. As well as paying through energy bills, the CRC covers public and private sector organisations. The logic of the scheme means that already high-performing public organisations (or private companies) could end up losing financially while private sector companies (or public sector organisations) which have not already taken action could profit.

While individual policies can have perverse and distorting effects, the complexity of the policy mix as a whole adds further distortions. Instead of a neat single price for carbon, the layering up of all kinds of different policies – which themselves price carbon differently – means that there are now a multitude of prices for carbon in the UK. This distorts economic choices and is damaging to the economy.

To make matters worse still, many of the individual policies are themselves quite complex, featuring several different rates, bands or carve-outs. So another key message of the report is the need to simplify and reduce the administrative burdens of the individual policies. The Carbon Reduction Commitment (CRC) is a good example of a policy which could achieve most or all of its benefits at lower cost and with much less complexity.

Figure ES2: Policy overlaps (simplified)



The recommendations from this section include simplifying, replacing and abolishing selected policies. Where there are positive elements, these are recognised – the CRC has had good outcomes in terms of raising organisations' awareness of how much energy they could save, for example. But plans for a cap and trade system within the CRC are unnecessary.

At the very least, some policies which are wasting money should be abolished, including the feed-in tariffs. These are a hugely expensive public subsidy for microgeneration, a marginal potential contribution to decarbonisation. The £8bn cost of this programme could achieve so much more elsewhere, for example in expediting buildings' energy efficiency. The Renewables Obligation, which springs from an EU renewables target, must also be reconsidered at some point.

To simplify the system more broadly and make it more efficient, we should consider replacing several of the current policies with a simple, non-distorting carbon tax.

The Case for a Carbon Tax

Exploring the relative theoretical and practical merits of carbon permit trading and carbon taxation, the report makes a strong argument for taxation, given the likely shape of the damage and cost functions associated with climate change – and the possibility that, in choosing a quantity-based approach we would might easily pick the wrong quantity. The complexity of permit schemes leaves them open to "rent-seeking vultures" and this raises costs as well as damaging cost-effectiveness and public trust. A tax may enable a more long-term, credible carbon price to be established. In the context of the need to reduce the deficit, a carbon tax also offers a potentially attractive way to raise revenue.

The EUETS is, however, unlikely to be replaced in the foreseeable future. A carbon tax can be designed to act, in part, as a floor price within the EUETS. The report recommends that the tax go wider, as an upstream tax on all fossil fuel inputs (oil, coal, gas etc) which would approximate to the most economy-wide carbon tax. This would have implications for a variety of other policies – the CCL, fuel duty, the Renewables Obligation and APD.

Introducing a carbon tax presents an opportunity to shift the burden of the costs of climate change from production of emissions to their consumption. This could include consumption of emissions embedded in some imported goods, through border carbon tariffs, proposed here to tackle 'carbon leakage' without sliding into protectionism.

Maximising the credibility of tax over the long term is a crucial challenge. Three options are discussed, ranging from relying on the Treasury's institutional inertia, to a long-term cross-party agreement, to assigning responsibility to the independent Climate Change Committee. Whatever the mechanism, the trajectory of the tax rate ought to start low and rise over time, to ensure a high carbon price after 2020. This will maximise substitution of high- for low-carbon technology over time without damaging the economy now.

Greener, Cheaper

This report is the first in series outlining how to improve significantly the cost-effectiveness of current policy as well as showing a better way forward for the long term. Simpler, better targeted policy which is credible over the long term is essential if we are to hit our long-term goal of substantially decarbonising the economy. Some of the issues raised in this paper will require further consideration. However, we can draw some initial conclusions.

Policy Recommendations – Section 1

1. The feed-in tariffs scheme for microgeneration should be abolished. Its £8 billion cost cannot be justified by comparison with other options for tackling the problem of climate change. It largely subsidises well-off households, to achieve massively costly carbon reductions. Any alternative public support for microgeneration should be narrowly focused on those technologies likely to be a significant part of the solution to global carbon reduction, and should not be about supporting mass deployment. There are areas where targeted support for microgeneration makes sense – in particular in isolated rural communities or even as part of international development – but not at the scale envisaged under the current scheme.

2. The Renewable Heat Incentive should be scaled back from aiming for 12% renewable heat by 2020 to aim for 8.5%. The £7-14 billion net cost of the additional 3.5% of renewable heat cannot be justified by comparison with other measures to tackle the problem of climate change.

3. The Carbon Reduction Commitment should be simplified, by cancelling the permitting and cap and trade parts of the CRC scheme. The CRC has the potential to be an effective policy. But the burdens from the permitting and cap-and-trade elements of the scheme are unnecessary and burdensome. They are

unlikely to be effective where energy is a minor cost to businesses, on top of the reporting and league table requirements which already appear to be having successful in driving management focus and action on energy efficiency.

4. The Renewables Obligation and EU renewable energy target should be reviewed. The RO and RHI are tremendously expensive schemes, both as innovation and carbon reduction policies. They are driven by the Government's commitments under the EU Renewable Energy Directive. Government has a role in supporting research, development, demonstration and early stage deployment of low carbon technology. But subsidising mass roll-out of known technologies is inevitably a very expensive way to reduce emissions. A review should identify the full costs to the UK of meeting the 2020 EU renewable target and identify approaches to reducing those costs. Policy Exchange will explore these issues in more detail in future work.

5. At a minimum, the CCL should reformed so that it taxes carbon. The preference for coal built into the CCL when founded is illogical, while the effects of the policy have long since dissipated. The CCAs have been ineffective and, along with a wider reform of the CCL, should be abolished.

Recommendation 5 is, however, not as thorough or potentially far-reaching as the recommendations outlined in section 2. While it would be an improvement, it would not offer as much opportunity to improve the rest of the policy mix by reforming or abolishing other policies; it would not play the same potential role in shaping climate policy for the long term. This report therefore recommends the creation of a true carbon tax.

Policy Recommendations – Section 2

1. Introduce an upstream fuel tax as an approximation to a carbon consumption tax, placed upon the main fuels according to their carbon content. This would ideally be net of the EUETS, not additional to it. This would act as a floor price for the EUETS (within the UK) as well as taxing carbon more consistently across the whole economy.

2. The carbon tax should start at a low level and rise over time. This would maximise substitution of high-carbon for low carbon in the future without damaging the economy.

3. The tax must be credible over the long term. The report suggests three options for ensuring this: first, rely on the institutional inertia of the Treasury; second, rely on a cross-party agreement over at least 20 years not to abolish or lower the tax; and third, and most radical, task the Climate Change Committee with setting the rate.

4. A border adjustment to the tax could be used to prevent 'carbon leakage' in vulnerable industries. Such a tax would obviously raise many questions. However, assuming this can be designed to be both simple and acceptable under WTO rules, it could approximately level the carbon price paid by all producers, effectively imposing the same carbon price on imported products as domestic production. It should be considered further.

Section One

Cutting the Cost of Cutting Carbon

Robert McIlveen

1
Rational Environmental Policy

The idea that environmental policy should be rational is an odd jumping off point for a report: of course it should be. Yet the environment, and climate change in particular, has sometimes appeared to be subject to policy decisions and political debate that seem to be far removed from a rational approach to policy.

The politics of the environment, and in particular climate change, can take on an extremely polarised nature. Those who refuse to accept any of the science clash with those who are determined to see their pet projects put into practice. Proponents of different solutions clash as they seek favour for their preferred approaches. Questioning the cost-effectiveness of particular climate change policy choices can be a political minefield. Pragmatic voices are easily drowned out.

But the significant potential costs of climate change policy should make it a legitimate concern of everyone including those, like us, who take the risks posed by climate change very seriously. Climate change policy should be as cost-effective as possible. Wasteful climate change policy would not only cost more than it needs, but also achieve less – both directly because of limited resources available to tackling it, but also because of the sensitivity of public support for tackling climate change to the costs of doing so.

Science supports there being major risks from climate change, but climate science is difficult and there remains significant uncertainty around exactly what the impacts will be. Uncertainty does not mean we should do nothing. But nor does it mean that we should do everything.

Back to sustainability

The idea of sustainability was summed up by the Brundtland Commission in 1987 as meeting "the needs of the present without compromising the ability of future generations to meet their own needs."[1] This balances environmental, economic and social needs. While the original context was development, our response to climate change should seek an economy and society that flourish within the limits of the natural environment – and an environmental policy which does not place unnecessary burdens on the economy or society.

This report focuses on one particular environment policy area, climate change mitigation. As a challenge, climate change has several difficult features which make it uniquely tough to deal with: uncertainty over its effects and the best technological responses, a long time scale, economically costly measures and the need for challenging international co-ordination if mitigation measures are to be effective.

1 United Nations (1987) Our Common Future: Report of the World Commission on Environment and Development

Uncertainty

Uncertainty abounds in climate predictions, as the IPCC recognises in its approach of describing findings by the level of agreement and the amount of evidence available.[2] Given uncertainty around how temperature rises might trigger other changes in our environment, and how these changes will themselves interact, policymaking is very difficult.

While the rise in atmospheric concentrations of carbon dioxide and the greenhouse gas effect are well understood, the impact in terms of climate changes and their physical consequences has greater uncertainty. The possibility of "tipping points", whereby a certain temperature rise triggers a major, irreversible change (e.g. permafrost melting and releasing large amounts of methane) adds to uncertainty.

The IPCC's level of certainty varies with different issues. For example, IPCC Working Group II says:

> *"Difficulties remain in reliably simulating and attributing observed temperature changes to natural or human causes at smaller than continental scales. At these smaller scales, factors such as land use change and pollution also complicate the detection of anthropogenic warming influence on physical and biological systems."*[3]

The IPCC is less certain about the effects of climate change upon ecosystems and food and forestry than on freshwater and coastal impacts, for example.[4]

Governments also face the uncertainty about what other governments will do.[5] No government wants to make costly cuts to emissions only to see others failing to make, or reneging on, commitments. This would be the worst outcome for any government, paying the costs of mitigation without receiving benefits from mitigating climate change.

Another area of uncertainty relates to how we value future generations' needs and capabilities – an issue very pertinent for climate change mitigation policy because of its very long timescale. Climate change is an unusual challenge in politics: in no other field do we have binding targets set 40 years ahead. We can probably predict roughly what society might look like in 2030 based on trends today (although with a lot of uncertainty), but we would struggle to meaningfully predict how capable human society will be in 2100 of dealing with climate change.

Other important uncertainties and unknowns when considering climate mitigation over a 40 year period include uncertainties about economic growth and technological change, including both energy using and energy-generating technologies. Conditions of uncertainty suggest greater priority for certain strategies, for example, ones which generate and develop a wide range of technological approaches and deploying cheapest options first. It is very far from a simple binary choice between doing everything and doing nothing.

The figure below shows a cost curve where the first two measures generate a net financial saving, the next is a low-cost option and beyond that the costs start to escalate. Uncertainty about the scale of the climate change challenge creates uncertainty about how far we should go along the curve. In that decision we must be led by the latest science, and be ready to adjust priorities as we learn more. But we should also recognise there is uncertainty about the shape of the curve, which will also change over time as technologies develop and mature. Under any circumstances , there is a strong argument for deploying the most cost-effective things first.

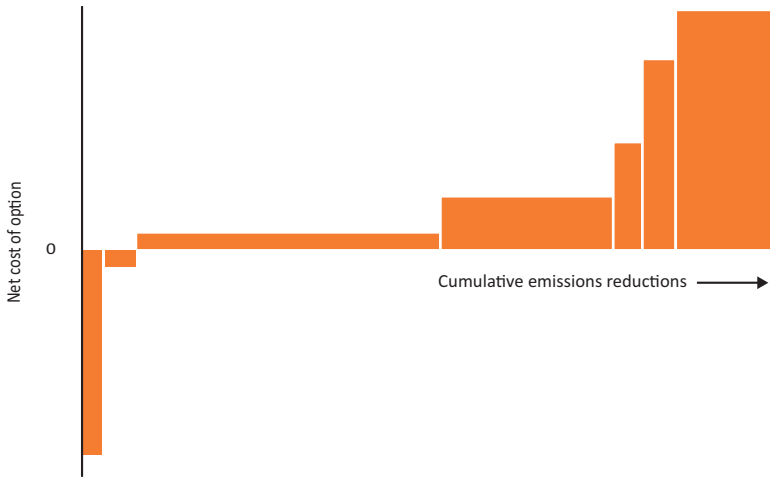
2 Intergovernmental Panel on Climate Change (2005) "Guidance notes for lead authors of the IPCC fourth assessment report on addressing uncertainties"

3 IPCC (2007) Synthesis Report p73

4 IPCC (2007) *Summary for Policymakers* pp11-12

5 Barrett, S (2010) *Negotiating the Next Climate Change Treaty* Policy Exchange

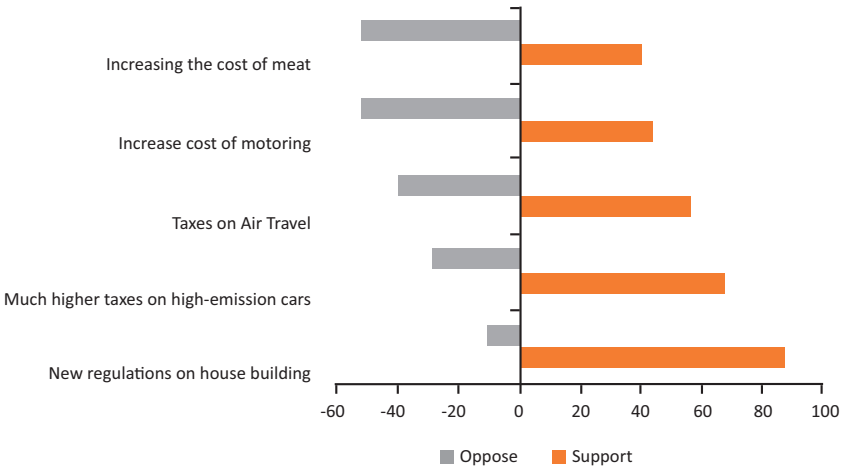
Figure 1.1: Example cost curve



Public opinion and climate change policy

Public opinion places significant constraints upon climate policy, as it does on all policy areas. Government, political parties and campaign groups can shape public opinion to an extent, although perhaps not as dramatically as they would often like to think. Demonstrating that decarbonisation is both necessary and being done at least cost is essential to ensuring public acceptance.

Figure 1.2: Public support/opposition for selected climate policies[6]



While the majority of the public believe that the climate is changing (83% agreed with the statement "from what you know and have heard, do you think that the Earth's climate is changing and global warming taking place" with 15% disagreeing, in November 2009)[7], this does not mean that all those same people are willing to pay high costs for tackling it. People in the same poll tended to be willing to support measures where the costs appeared to be low or mainly borne by other people, but

6 Populus/Polimetrix, June 2009

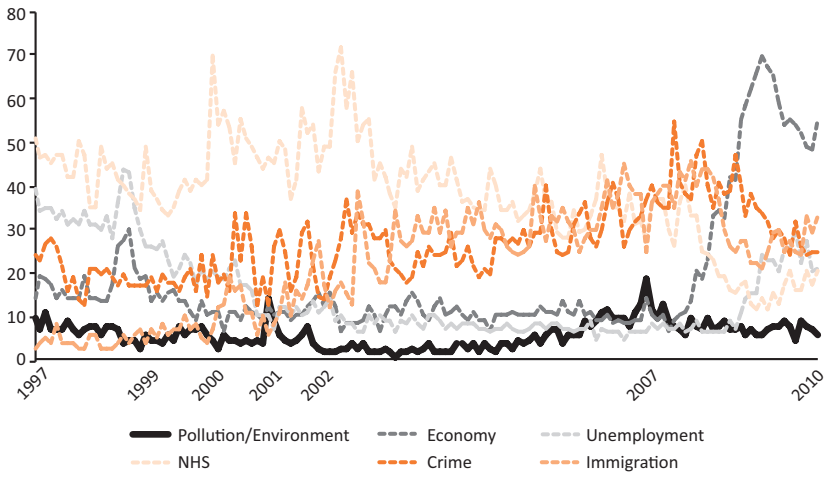
7 Populus for the Times, November 6th-8th 2009

much less so measures which would have more significant costs for them. In a separate poll in the US, over 55% of people supported a climate bill if the costs were thought to be $80 pa, but this fell to less than 10% support if the costs were $770.[8]

While public opinion should not dictate policy, it should be recognised as a constraint on it. In the case of climate change, rising energy costs, as a result of decarbonisation measures, may have a direct effect on public acceptance of action to tackle climate change. The cost of climate policy is certainly on the agenda of low-tax pressure groups and looks likely to remain there.[9] This is no bad thing – badly designed environment policy under-achieves for the environment and adds greater economic and social costs.

Decarbonisation is one policy goal among many others for government, all of which compete for attention, resources and priority. While the environment does have a reasonable profile among other issues, looking at figure 1.3 it is clearly not in the first rank of the public's concern. In MORI's series on the most important issue facing Britain, the environment has not been the top issue since the late 1980s. At its highest point since 1997 (19% in January 2007 named it as a top issue) it was still behind crime, immigration and the NHS.[10]

Figure 1.3: MORI's "Most Important Issue Facing Britain Today" series, 1997-2010[11]



The variation over time in the public's environmental concern is quite small, only varying between 1% and 19% between 1997 and 2010. By comparison, the proportion naming the economy as the top issue ranges from 7% to 70%. While the environment recorded higher scores in the late 1980s, it is now an issue with similar public priority to housing or drug abuse.[12]

When considering the scale of the transformation being talked about in the name of climate change, the constraining role of public opinion must be borne in mind. Policymakers need to pay attention to the cost-effectiveness of policies they implement. The risk of not doing so is that rising costs lead to growing public resistance and less decarbonisation is achieved in the long run. Convincing the public that a) climate change is a serious threat which we must deal with and b) that Government is dealing with it cost effectively are both essential to achieving public support for decarbonisation.

8 Populus for the Times, November 6th-8th 2009

9 Sinclair, M (2009) *The Expensive Failure of the European Union Emissions Trading Scheme* Taxpayers' Alliance

10 Ipsos MORI (2010) Issues Index: Trends since 1997

11 Ipsos MORI (2010) Issues Index: Trends since 1997

12 Ibid.

Markets and government

The policy challenge for climate change is about finding a response to the environmental risks which minimises economic and social costs. In a context of a range of uncertainties, achieving this requires processes good at revealing, disseminating and responding to new information. Well-functioning markets have demonstrated their ability to do these things better than single decision makers, such as government, across the economy.

When it comes to climate change there are things government alone can do, such as set the rules by which markets operate, including for example establishing a carbon price, or providing support for promising early stage technologies. But government interventions should aim to harness the power of markets – not replace them – to deliver under conditions of uncertainty and poor information.

> "Government interventions should aim to harness the power of markets – not replace them – to deliver under conditions of uncertainty and poor information"

Establishing a price for carbon in one way or another – so that lower carbon options are preferred – is an important way in which government can set a framework, within which a market may then operate to deliver energy supplies with lower carbon.

There are two ways to do this – setting the carbon price or limiting the quantity of carbon. The carbon price may be set explicitly using taxation on carbon emissions, or implicitly through a subsidy to lower carbon solutions. The quantity setting approach is exemplified by a cap-and-trade scheme which creates a valued property, the right to emit which can then be traded in the market, thus establishing a carbon price.

Section 2, discusses the choice between taxes and cap and trade approaches. Section 1 of this report looks at a range of existing carbon reduction policies in the UK, selected because they explicitly or implicitly price carbon.

Approaches to Climate Change Policy

Other than APD and Fuel Duty, the policies examined in this report have all been introduced since 1997 as part of the Labour Government's climate change programme. The CCL and RO are well-established, though the RO has undergone numerous amendments, while the CRC and FiTs came into operation only in 2010.

The previous government's programme combined increasingly ambitious targets for decarbonisation, and other objectives, with more intensive intervention in key sectors. At the start of the programme, the CCL targeted energy-intensive industrial users in a bid to improve energy efficiency (not directly reduce absolute carbon emissions) while the RO sought to promote the deployment of renewable energy generation. With the introduction of the EUETS, which covers many firms in the CCL and the generating companies affected by the RO, policy instruments started to layer up with multiple instruments affecting the same activity. For example, a manufacturing firm will pay CCL on electricity it uses, which has its price inflated by the RO to cross-subsidise renewable generation, and for which the generator will have to have permits under the ETS. While the costs may accrue several times over, any carbon dioxide emission reductions count only once.

While the policies looked at in this report all price carbon in one way or another, many of them are focused on specific technologies. Government does indeed have a role in supporting research, development, demonstration and, in some case, early stage deployment (RDD&D), to drive low carbon technologies down the cost curve, where such government intervention is needed. But going beyond this, for example through setting technology-differentiated carbon prices, or subsidies, for mass deployment carries real risks. This may restrict the ability of the market to reveal new information and develop the best approaches, with substantial implications for cost.

The Stern Review focused on three strategies for mitigating climate change: pricing carbon emissions, research and development and behaviour change.[13] The policies covered in this report can be sited within these three categories, with some sitting across more than one strategy. The pure pricing policies are the EU Emissions Trading Scheme (EUETS), Air Passenger duty (APD), Fuel Duty and the Climate Change Levy (CCL), although only the EUETS is solely a carbon pricing instrument. The Renewables Obligation (RO), Feed-in Tariffs for micro-renewables (FiTs) and the Renewable Heat Incentive (RHI) all implicitly price carbon and are focused on mass deployment with technology support objectives. Only the CCS demonstration levy appears to be a focused technology-support policy. Finally, the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) is mainly about behaviour change, although it has a pricing element in its cap-and-trade scheme, and the Climate Change Agreements (CCAs), part of the CCL package, seek to change behaviour in energy-intensive industry.

The Stern Review chapter on technological innovation recognises the dominant role of the private sector in R&D and technology diffusion, although it does call for the level of support for research, development and demonstration projects to be raised in both the public and private sectors.[14] It also calls for deployment support to bring forward a portfolio of technologies. This is in recognition of the lack of information about which technologies will be first feasible, and second, most economic in addressing climate change.

Deciding which technologies to support for deployment – or to exclude – draws in arguments about 'technological lock-in'. The argument runs that, by permitting coal or gas-fired power stations to be built now, the long life of these assets means that we will be 'locked in' to a high-carbon power generation portfolio for decades to come. This leads to calls for action: "the nature of the product and markets structure requires government intervention to overcome technology lock-out in the energy sector".[15] But ensuring that technologies are not locked out (by market barriers or distorting subsidies) should not lead one to lock-in to something else instead; rather, it should seek to enable competition between all technologies, with all relevant externalities (carbon) priced in. This does not preclude support for early-stage research, development and demonstration – or even some support for early deployment – but it does demand that policy doesn't simply replace one set of rent-seekers with another. In addition, early 'stranding' of assets has been – and is likely to continue to be – a feature of environmental policy. For example, the EU's Large Combustion Plant Directive (LCPD) has required the early retirement of many coal-fired power stations. This is not necessarily an inefficient approach.

13 Stern, N (2006) *The Economics of Climate Change* Cambridge University Press, Cambridge

14 Ibid., p393

15 Neuhoff, K (2005) Large-scale deployment of renewables for electricity generation, Oxford Review of Economic Policy, p.89

It is important to note that, in addition to the range of climate change strategies, the Government's policies in this area go beyond climate change objectives. There are significant industrial policy objectives, with forecasts of half a million 'new' jobs in the UK in renewable energy by 2020.[16] Britain leading the world is a common thread – as well as setting the most ambitious targets[17] there are ambitions to lead the development of almost all low-carbon technologies, including offshore wind[18] and CCS[19].

Regional policy objectives are also evident, with the Department for Energy and Climate Change (DECC) under the previous government seeing a role for Regional Development Agencies (RDAs) in "supporting the growth of sectors which will underpin low carbon growth… and leading regionally specific activity on low carbon innovation, research and development."[20] Designating Yorkshire and the Humber as the UK's first low carbon economic area for CCS can only be a regional policy – the Humber is only one of a number of plausible areas for a CCS cluster in the UK.

Revenue-raising is another relevant government objective. APD and Fuel Duty raise significant revenue for government without seeking to substantially alter behaviour.

Where should we go from here?

This report focuses on a set of climate change related policies which explicitly or implicitly price carbon. The report attempts to quantify their (implied) carbon prices, and also undertakes qualitative analysis to explore which policies are most cost-effective. It makes recommendations for changes to the overall policy framework as well as to individual policies.

Assessing these policies brings several things into question. The design of each policy is important – is it actually primarily intended to address climate change, raise revenue or support new industries? Does it interact with other policies and if so what effect does this have? The actual outcome is even more important: has each policy reduced emissions as much as intended? Has it delivered value for money? Has it proved vulnerable to lobbying by special interest groups?

Each policy is analysed according to eight key questions. These are split into 'design' and 'effects' issues and are used to draw out the key advantages and problems with each policy.

Design:

a. What is the policy meant to achieve?
b. How much of the economy does it cover?
c. Which other policies does it overlap with?
d. Is it technology neutral?

Effects:

e. What are its costs and benefits?
f. Does it have any distortionary effects?
g. How vulnerable to lobbying is it?
h. What is its implied carbon price?

16 DECC, (2009) Low Carbon Transition Plan p112

17 http://www.actoncopenhagen.decc.gov.uk/en/ukaction/ngos/10-10-launches

18 http://www.decc.gov.uk/en/content/cms/news/LordHunt_Day3/LordHunt_Day3.aspx

19 HC Debs 23 April 2009 col 389

20 DECC, *Low Carbon Transition Plan*, p129

The implied carbon price is particularly important since it allows some comparison to be made between the policies. If one policy prices each tonne of CO2 significantly higher or lower than the others that might suggest that the policy is either poor or good value for money, or has another goal within it which is inflating or depressing the price.

These carbon prices are not perfectly comparable but do give a guide as to the cost of each tonne of CO2 mitigated. The different types of policy tend to lead to different approaches to establishing the price. For example, taxes on energy and fuel (CCL, APD, Fuel Duty) use the rate of duty and the carbon content of the fuel involved to reach a price. The analysis of the EUETS and CRC simply uses the prices at which carbon is traded in those schemes. For the RO and FiTs, the price is actually the average cost of abatement under the scheme.

Costs and prices are not exactly equivalent and should not be treated as such; however, very large differences in the figures can be taken to indicate excessively expensive policies. That the RO is nearly ten times more expensive than the EUETS is hugely significant regardless of whether or not the figures are perfect – the scale of the difference is the important point. There are a range of reasons why costs diverge, including raising revenue or supporting technologies at some point in their development. This taken into account in the analysis.

The analysis in this report covers a broad set of policies, and relies on published data. More established policies have independent data from academic sources, the National Audit Office and others. But for newer policies, Government RIAs are the main sources of data. These may be optimistic and, in any case, the lack of independent analysis should make us place less reliance on the numbers presented for newer policies than for the more established ones.

2
The EU Emissions Trading Scheme

Policy 1. The EU Emissions Trading Scheme (EUETS)

Design

a. What is the policy meant to achieve?

The EUETS is a cap-and-trade scheme to reduce CO2 emissions and is the EU's principal carbon reduction policy. It was established in 2005 following on from the Kyoto Protocol, which established a target of 8% emissions reduction from 1990 levels for the then EU-15. Broadly, the policy establishes a limit or 'cap' on emissions from the EU, within the sectors covered, and allows participants to trade permits to emit within that cap.

The EUETS is the outcome of choosing a strategy to fix the quantity of greenhouse gas emissions, rather than fix the price. Since the aim is to reduce emissions, this makes intuitive sense, although there are also good arguments for a price-based approach (see page p40 now for more detail on this).

The major benefit of a cap-and-trade scheme is that it allows businesses maximum freedom to choose how to decarbonise their own emissions – or whether to buy their carbon allocation from others who make reductions, if that is more cost-effective. In the UK the previous Government relied on the EUETS:

> *"[It] is the single most important policy to reduce UK emissions (covering about half of the UK's carbon dioxide emissions) and is expected to deliver emissions reductions from the power sector and heavy industry of 22% on 2008 levels by 2020."*[21]

The implementation of the EUETS sought to avoid severe impacts on business. Permits to emit were initially allocated to existing polluters ("grandfathered") rather than auctioned, in a bid to smooth the introduction of the scheme. This had the political benefit of mitigating competitiveness effects on the major energy users, and potentially the increase in energy prices, but allowed the possibility of windfall profits for those receiving permits for free which they could, in some cases, sell on at a profit.

b. How much of the economy does it cover?

The EUETS covers around 43% of UK greenhouse gas emissions, in energy intensive industries and electricity generation.[22] It does not cover transport, domestic energy use or non-energy intensive industries. Indirectly, every business and householder is affected by the EUETS in as far as it raises energy prices. The power sector accounts for 71% of emissions covered by the ETS.[23]

21 DECC (2009) *The UK Low Carbon Transition Plan* p57

22 www.decc.gov.uk

23 NAO (2009) *European Union Emissions Trading Scheme* p37

c. Which other policies does it overlap with?

The EUETS has become the centrepiece of UK climate policy, and as such overlaps with many other policies. The industries, outside the power sector, covered by the EUETS are largely also covered by the Climate Change Levy (CCL), being energy-intensive industries.[24] Other policies also affect the power sector, in particular the Renewables Obligation (RO) and also the Large Combustion Plant Directive (LCPD).

An important feature to note is that if a company in the UK reduces its emissions, another company somewhere in the EU can buy excess permits held by the original company. This means that any emissions reductions through UK policies, in those sectors covered by the EUETS, will not be additional carbon reductions a the EU level.

d. Is it technology neutral?

Yes. The design of the scheme means that government has no role in choosing which carbon savings are made. The cap is a measure of carbon emissions, so any technology may be deployed by companies within the scheme.

Effects

e. What are its costs and benefits?

The National Audit Office cautions that:

> *"There are inherent difficulties in assessing the impact of the EUETS. As an international trading scheme, the Scheme's effectiveness can only be properly assessed at an EU level. Assessing the impact of the Scheme by reference to the overall cap set and outturn performance is insufficient, as it fails to take account of the range of economic factors and other policy instruments which may affect companies' operational and investment decisions and resulting performance."* [25]

The sectors covered by the EUETS did, in Phase 1 (2005-7), emit less CO2 equivalent than the cap allowed for – 6,093 MtCO2 compared to a cap of 6,542 MtCO2.[26] However, it is possible that this is due to the overly-generous allocation of permits in the first place across the whole Union. Only four member states – the UK, Spain, Italy and Slovenia – exceeded their allowances for Phase 1, and thus were net buyers of permits.

Qualitatively, there seems to have been little impact. One survey of major European firms found that while they have faced higher electricity prices, there is no directly attributable impact on their bottom line from the ETS so far.[27] Some sectors – notably steel and aluminium – did claim that their competitiveness had suffered from the scheme, and all were wary of future effects. Grandfathering of permits was seen as important to avoiding significant competitiveness effects, although those companies who were already highly efficient may have lost out through the grandfathering process, since it may blunt the competitive advantage resulting from that early efficiency.[28]

f. Does it have any distortionary effects?

There are a number of criticisms of the EUETS, especially around its permit allocations. The decision to go for a cap and trade scheme over a tax is discussed in much greater detail in Section 2, including detailed criticisms of that choice and the EUETS in general.

24 NAO (2007) *The Climate Change Levy and Climate Change Agreements* p11

25 NAO (2009), p6

26 Ibid., p7

27 Kenber, M, Haugen, O and Cobb, M (2009) *The Effects of EU Climate Legislation on Business Competitiveness: A survey and analysis* German Marshall Fund, p8

28 Ibid., p14

The main issue for this section is carbon leakage, with the ETS raising costs within the EU but not outside of it. Leakage occurs where industrial production is relocated outside of the ETS and the products imported (so that the greenhouse gas emissions have also been outsourced). This could in fact increase global emissions associated with particular goods, if the new producing country's energy mix is more carbon intensive and shipping-related emissions are factored in.

Energy-intensive products are more vulnerable to leakage than those for which energy is a small proportion of their production costs. The Carbon Trust has identified steel, cement and aluminium as being particularly vulnerable to the effects of ETS on trade.[29]These three sectors could leak up to 30MtCO2 from the EU, less than 2% of total emissions in the EU.[30] While they represent a small proportion of the EU's emissions, leakage is a major issue for the small number of industries affected.

g. How vulnerable to lobbying is it?

Theoretically, cap-and-trade should be fairly robust against lobbying. In reality, however, the way the allocation of permits is carried out leads to significant bargaining, firstly among governments and subsequently between governments and industry. Within the EU cap there is a significant temptation for national governments to lobby for a more generous settlement for their countries. In the absence of auctioning, the national allocation plan within each country presents a second round of opportunities for lobbying by industry sectors and trade associations.

h. What is its implied carbon price?

The price of a single carbon permit has, as one would expect, risen and fallen according to demand and supply. In Phase 1, the price crashed as its end approached. This has led to the rules being changed to allow permits to be "banked" from Phase 2 (2008-12) for Phase 3 (2013-20). For the last year or so, the price of ETS allowances has been stable, but low by historic standards, reflecting the drop in emissions due to less economic activity than expected pre-recession.

Figure 2.1: Traded price of ETS Allowances

29 Carbon Trust (2008) *EUETS impacts on profitability and trade: a sector by sector analysis*

30 Carbon Trust (2010) *Tackling carbon leakage: sector-specific solutions for a world of unequal carbon prices* p4

Verdict on the EUETS

The EUETS is the most important policy for the UK in reducing greenhouse gas emissions. Its theoretical basis is broadly sound, even if its implementation inevitably falls short of the ideal. There is clear scope for improving it – ideally all permits would be auctioned on a scheme-wide basis rather than grandfathered as part of a national allocation, and there would be much longer-term certainty over the level of the cap – which the British government is well placed to press for. In phase 3, 50% of permits will be auctioned, including 100% auctioning to the power sector in the UK and other EU countries.[31]

Some theoretical criticisms of the EUETS are made in more detail later (see p56). Practical issues with reform of the ETS are also dealt with in greater detail in that section.

Reforming the EUETS to introduce some control over prices has merit, if not least we take seriously widespread arguments that the price is too low and too uncertain. Of course, the price being 'wrong' is a reflection on the factors that set the price – in particular how permits are allocated and future expectations. There are both theoretical and practical arguments in favour of floor and ceiling prices, which would make the ETS a part quantity-setting, part price-setting mechanism. This is examined in detail in section 2.

31 DECC *EUETS Phase III 2013-2020*, www.decc.gov.uk

3
Policies Overlapping the EUETS

The EUETS is important in its own right. But for this report, it is particularly important because it overlaps with many of the other policies examined. The interactions between overlapping policies matter because the complex mix may actually raise the cost of reducing emissions – especially if an extra policy raises additional costs without generating any additional emissions reductions.

The overlap between the Renewables Obligation (RO) and the EUETS is a good example. The power industry is covered by the EUETS, so any savings made by the UK electricity sector through the RO will be savings which don't need to be made by other EUETS participants and other countries. The EUETS should be the most cost-effective way to cut emissions because it allows maximum flexibility to meet the cap. A key test of the RO therefore is whether it achieves carbon savings at a higher unit cost than the EUETS would have on its own, or is simply raising costs.

Depending on how each tonne of carbon saved is ascribed to policy, it is necessary to add the policy costs for each tonne together. Sticking with the RO example, each tonne of carbon saved under the RO is also saved under the EUETS, with costs of both attaching themselves to the same tonne. Throughout the report, implied carbon prices for each policy are given without adding the ETS price.

Policy 2. Renewables Obligation

Design

a. What is the policy meant to achieve?

The RO is intended to enable the UK Government to meet its targets for energy from renewable sources, which are derived from the EU renewables directive. The government faces a target of 15% of all energy consumption (which includes transport and heat as well as electricity) from renewable sources by 2020. At the inception of the RO in 2002, it was aiming at 10% of electricity from renewable sources by 2010;[32] it is now formally aiming for 20% by 2020 having missed by some distance its 2010 target. In practice the previous government was hoping to achieve around 30% of renewable electricity by 2020, in order to meet the EU target.

The Obligation works by requiring the electricity companies to either generate a given proportion of their energy from renewable sources, or failing that, to buy Renewable Obligation Certificates (ROCs) from other generators to make up the shortfall or to buy out their obligation from Ofgem.[33] The buy-out price enables the obligation to be missed but with a penalty, incentivising companies to build

32 DTI (2000) *New and Renewable Energy – Prospects for the 21st Century. Conclusions in response to the public consultation* p2

33 Ofgem (2009) *Renewables Obligation – total obligation levels for 2008-09*

renewable capacity where it is cheaper than the buyout price over time. These buyout payments are then recycled to all participants in proportion to the number of ROCs they present. As a subsidy mechanism it is both generous and complex.

The RO has several different objectives within it. It aims to assist demonstration and deployment of early stage renewable technologies, by subsidising new technologies (e.g. anaerobic digestion) more generously than established or mature technologies (e.g. landfill gas or onshore wind). It also seeks to drive mass deployment of all renewables, to help meet the government's 2020 targets. Finally, it also engages in industrial policy activism, driving development of the renewables industry in the UK in the hope of generating significant numbers of "green jobs".

These multiple objectives have caused significant complexity and severe distortions. A criticism of the early RO was that it supported only technologies which were already close to market, by having a uniform price.[34] This was addressed by the Government introducing 'banding' into the scheme, whereby established technologies received fewer ROCs per MWh than emerging technologies. The four bands are categorised as established, reference category, post-demonstration and emerging.

Table 3.1: ROCs banding[35]

Generation type	ROCs/MWh
Landfill Gas	0.25
Sewage Gas; Co-firing of Biomass	0.5
Hydro-electric; Onshore Wind; Energy from Waste with CHP; Co-firing of Energy Crops; Co-firing of Biomass with CHP	1
Offshore Wind; Co-firing of Energy Crop with CHP; Dedicated Biomass	1.5
Wave; Tidal Stream; Tidal Impoundment (Lagoon or Barrage); Solar Photovoltaic; Geothermal; Gasification / Pyrolysis; Anaerobic Digestion; Dedicated Energy Crops; Dedicated Biomass with CHP; Dedicated Energy Crops with CHP	2

b. How much of the economy does it cover?

It covers all generators of electricity. The costs are passed onto all electricity customers, so are indirectly borne by the whole economy.

c. Which other policies does it overlap with?

Energy companies paying for the RO will also have to pay for ETS allowances for their carbon-emitting generating plant, meaning that electricity prices are pushed up by both permits and renewables deployment. Electricity from renewables is exempted from the CCL.

d. Is it technology neutral?

Not at all. The RO is explicitly designed to promote renewable deployment over other means of reducing the carbon intensity of generation. On top of this, banding distinguishes different levels of support for different types of technologies. On the face of it, the RO values a tonne of carbon saved by wave generation eight times greater than a tonne saved by using landfill gas to generate electricity.

34 Mitchell, C and Connor, P (2004) R*enewable energy policy in the UK 1990-2003* Energy Policy 32 p1940

35 DECC.gov.uk

Clearly, the policy's objective of supporting early stage technologies is relevant. But by trying to deliver several goals in a single policy – including early stage support and mass deployment – the policy risks supporting some expensive means to carbon reduction.

Effects

e. What are its costs and benefits?

The most recent Regulatory Impact Assessment (RIA) quotes a range of net costs from £18.5 to £45.7 billion to 2030, with renewable proportions of overall electricity generation varying from 24% to 32%.[36] The RIA for the Renewable Energy Strategy as a whole considers several options, all of which show net costs in the range of £53-£66 billion over 20 years (table 3.2).

Table 3.2: Cost/benefit of various renewables scenarios over 20 years[37]

Scenario	Costs (PV)	Benefits (PV)	Net costs (NPV)[38]
29% large scale electricity, 12% by heat, 10% transport, 2% small scale electricity	£60 billion	£5 billion	£56 billion
32% large scale electricity, 8.5% by heat, 8% transport, 3.5% small scale electricity, small STP scheme	£69 billion	£4 billion	£66 billion
29% large scale electricity, 12% by heat, 10% transport, 2% small scale electricity; trading	£57 billion	£4 billion	£53 billion

The benefits of the policy are largely framed in terms of hitting targets for deployment of renewable electricity generation (and broader energy targets) rather than in terms of carbon savings. The proportion of electricity generated in the UK from renewable sources was 5.5% in 2008. Almost all of recent growth has come from wind – in 2008 of the 1,102 MWe renewable generation capacity installed, onshore and offshore wind accounted for 66.9% and 17.4% respectively.[39]

The RO has been described as the second most-expensive form of support for large renewables anywhere in the world – only Italy's is more expensive.[40] The RO is very expensive because it combines several policy goals: rapid mass deployment, support for early stage technologies and industrial policy goals. It is very unlikely to be cost-effective decarbonisation in the short or long term.

f. Does it have any distortionary effects?

Very significant. By forcing energy companies to generate from renewable sources, the RO pushes up the cost of that decarbonisation significantly. Competition between EU member state governments as to who can produce the most generous subsidies has produced the situation were "the biggest influence on wind power deployment is the nature of the policy instrumentation rather than even the resource base for wind power."[41]

36 DECC (2009) *Impact Assessment of proposals for a UK Renewables Energy Strategy – Renewable Electricty* pp2-5

37 DECC (2009) *Impact assessment of the UK Renewable Energy Strategy* pp3-4

38 The figures do not quite match due to technical differences between present value (PV) and net present value (NPV)

39 DECC (2009) *Digest of UK Energy Statistics* pp185-6

40 Helm, D (2009) *Credible Energy Policy, Policy Exchange,* London

41 Meyer, N (2003) *European schemes for promoting renewables in liberalised markets* Energy Policy 2003 pp665-7

When we bear in mind the role of the EUETS this is even worse: the RO replaces cost-effective decarbonisation under the EUETS with very expensive renewables deployment.

g. How vulnerable to lobbying is it?

Very, because it is so complex. Responding to BERR's consultation, the EEF described how the

> *"increasing complexity of the Renewables Obligation (RO), and banding represents a step-change in an already complex policy. The introduction of an increasing number of distortions and adjustment mechanisms to the pseudo-market represented by the RO – e.g. banding and a ski-slope mechanism – adds complexity and uncertainty from the perspective of potential investors."*[42]

This complexity is at the heart of the RO's vulnerability to lobbying, and perhaps the best example of this is the RO banding. The British Wind Energy Association (BWEA, now renamed Renewables UK), in its response to the consultation on reforming the RO, was very supportive of the reforms which help its members. They welcomed banding (as long as wind retained its current levels of subsidy) and lobbied for more generous ROC banding for micro wind generation (possibly the least cost-effective technology available), as well as much more generous support for wave and tidal.[43] Over time, the renewables lobby has been extremely effective at extracting support for its members from government – seen in both the decision to band and the generous support for microgeneration discussed later.

It is quite possible to foresee calls for future bands to be introduced, to resist technologies moving from "emerging" to "post-demonstration" bands or for more generous allocation of ROCs to existing bands. New technologies are very appealing to politicians (witness the current enthusiasm for anaerobic digestion) and all come with trade associations lobbying hard. While we should not criticise Renewables UK or other trade associations for doing their job, we should criticise the policy which makes rent-seeking so easy. Climate change is a tough challenge as it is; policies which invite rent-seeking only make it harder.

h. What is its implied carbon price?

The cost of the RO is calculated by taking the overall obligation for each year (in MWh) and the buyout price (in £ per MWh) and multiplying them. In 2008-09, the buyout price was £35.76/MWh, while the overall obligation was 28,975,678 MWh.[44] This produces a cost of the obligation of a little over £1 billion in 2008-09.

Taking the number of MWhs for which ROCs were issued (18.5 million) and the average carbon emissions saving from renewable generation (0.43 tCO2/MWh, the grid average for electricity) we reach a carbon saving of 7.95 million tCO2.[45]

Putting together these numbers (£1 billion for a saving of 7.95 million tCO2) we get an average cost per tonne of £130.25/tCO2 for 2008/09. This is not strictly equivalent to a carbon price, but the disparity between the RO's £130.25 and the EUETS (approx) £12 demonstrates that they are an order of magnitude different.

42 EEF (2007) *RO 'Banding' Consultation Submission* p1

43 BWEA (2007) *BWEA response to the consultation "Reform of the Renewables Obligation"* p2 and 12

44 Ofgem http://www.ofgem.gov.uk/Media/PressRel/Documents1/9832-r8_1feb05.pdf and http://www.ofgem.gov.uk/Media/PressRel/Documents1/15438-Ofgem44.pdf

45 Ofgem http://www.ofgem.gov.uk/Sustainability/Environmnt/RenewablStat/Pages/RenewablStat.aspx and various sources for the grid average (e.g. http://www.decc.gov.uk/Media/viewfile.ashx?FilePath=Consultations%5CRHI%5C1_20100129161127_e_@@_RenCHPmodellingreport29Jan10.pdf&filetype=4 and http://www.decc.gov.uk/Media/viewfile.ashx?FilePath=Consultations%5CRenewable%20Energy%20Strategy%20Consultation%5CRelated%20documents%5C1_20090501125320_e_@@_NERARenewableHeatPhaseIIReportFinalrev.pdf&filetype=4 which take 0.43 as the grid average carbon emissions for electricity from all sources.)

Verdict on the Renewables Obligation

This analysis of the RO suggests it is very expensive – making the same level of 2020 carbon reduction which would have been secured under the EUETS much more costly to achieve. By combining three goals – demonstration and early stage deployment, mass deployment/carbon reduction and industrial policy – it inflates the cost of achieving each goal. The RO raises the cost of meeting the UK's greenhouse gas emissions targets.

Support for low carbon demonstration and early stage deployment is very important, including in relation to renewables, as well as other technologies. But this policy is not focused on promoting promising early stage technologies efficiently. Mass deployment of lower carbon technologies is needed as part of meeting UK and EU carbon targets. This should be driven by technology-neutral carbon pricing, including through the EUETS.

Industrial policy is even less justifiable. The history in the UK of subsidising industries to 'create' jobs is not good.[46] Much of the renewable generating plant will continue to be imported from Germany, Denmark and other countries, so there is a substantial risk of UK industrial policy ending up subsidising other countries' manufacturers.

Policy 3. Climate Change Levy (CCL) and Climate Change Agreements (CCAs)

Design Issues

a. What is the policy meant to achieve?

The purpose of the CCL is to "specifically encourage energy efficiency in business, agriculture and the public sector, and to reduce emissions of greenhouse gases from these sectors."[47] It is effectively an energy tax on non-domestic users (except charities), with the revenue from the levy being nominally recycled in the form of a discount on employers' National Insurance Contributions.

The CCL was established following the Marshall Report in 1998, which reported that there was a role for economic instruments such as trading schemes and taxes in tackling greenhouse gas emissions, as long as they were carefully designed to minimise any harmful impact on competitiveness. He specifically recommended that any tax be levied downstream on industrial and commercial customers, based on the carbon content of fuels.[48]

For particularly energy intensive industries which would be severely affected by greater taxation on energy, Climate Change Agreements (CCAs) were introduced. These are agreements between the then DTI and its successors and industry sectors which set energy efficiency targets in exchange for an 80% discount on the CCL. If a sector failed to meet its target, individual businesses within it were analysed to separate out those which had met the target and could keep the discount from those which had failed.

The CCAs were introduced as recognition of the unequal cost or benefit of the NICs reduction – energy intensive industries would face a large net cost whereas service sector businesses would benefit significantly. The CCAs were available to those industries covered by the EU Integrated Pollution, Prevention and Control (IPPC) Directive (e.g. energy, chemicals, minerals and metals), before being broadened to other industries with high levels of energy intensity but which were outside the scope of the IPPC (e.g. textiles, horticulture, packaging).[49]

46 Willman, J, ed. Evans, N (2010) *Innovation and Industry*, Policy Exchange, London

47 HM Treasury (2000) *Regulatory Impact Assessment* – Climate Change Levy p2

48 HM Treasury (1998) *Economic instruments and the business use of energy* p2

49 National Audit Office (2007), *The Climate Change Levy and Climate Change Agreements* p20

The CCAs were introduced as recognition of the unequal cost or benefit of the NICs reduction – energy intensive industries would face a large net cost whereas service sector businesses would benefit significantly. The CCAs were available to those industries covered by the EU Integrated Pollution, Prevention and Control (IPPC) Directive (e.g. energy, chemicals, minerals and metals), before being broadened to other industries with high levels of energy intensity but which were outside the scope of the IPPC (e.g. textiles, horticulture, packaging).[49]

In the initial Regulatory Impact Assessment (RIA) it was estimated that the CCL and CCA package would save at least 5 MtC per annum by 2010 (=18.3 MtCO2) through a combination of the price effect of the levy, the exemptions for renewables and CHP, energy efficiency measures and the CCAs. The greatest contribution (2.5 MtC/9.2 MtCO2) was from CCAs.[50]

The package was designed to be revenue neutral, with additional energy efficiency projects making up industry's net loss from the NICs and levy costs. Table 3.3 shows the different amounts different sectors were expected to pay and receive, and the energy efficiency spending which was used to end up with a round zero for net cost to each sector.

Table 3.3: Initial estimated costs of the CCL and CCAs excluding energy efficiency measures[51]

	1. Cost of the Levy	2. Employer NICs rebate	Impact of Levy and NICs (2-1)	Energy Efficiency measures
Industry (all)	£405 million	£285 million	-£120 million	**£120 million**
Industry subject to IPPC	£265 million	£170 million	-£95 million	
Industry not subject to IPPC	£140 million	£115 million	-£25 million	
Services	£450 million	£430 million	-£20 million	£30 million
Public sector	£150 million	£285 million	£135 million	
Impact on public finances	£1000 million revenue	£1000 million rebate	0	£150 million cost

The 2010 Conservative Manifesto explicitly stated plans to "reform the CCL to provide a floor price for carbon".[52] The commitment to a floor price remains in the coalition agreement, albeit without an explicit link to the CCL. However, it is clear that reform of the CCL will be part of the government's programme.

b. How much of the economy does it cover?

The CCL and CCAs cover electricity, coal, gas, coke and Liquid Petroleum Gas (LPG) used as an energy source by businesses. Transport and domestic energy sources are exempt. Fuel for electricity generation is not taxed as the electricity produced is taxed when it is sold to business or public sector customers. Renewables and "good-quality" CHP are exempt as a means of supporting their deployment. Conversely, nuclear-generated electricity is not exempt despite its lack of greenhouse gas emissions. The CCL is not a tax on greenhouse gases but on energy use.[53]

50 HM Treasury (2000) Regulatory Impact Assessment – Climate Change Levy pp6-7

51 HM Treasury (2000) *Regulatory Impact Assessment – Climate Change Levy* p 9

52 Conservative Party (2010) *Invitation to join the Government of Britain*, p31

53 National Audit Office (2007) Op Cit., p13

c.Which other policies does it overlap with?

The CCL interacts with other policies involved in energy supply (EUETS, RO) and non-domestic energy efficiency (CRC). The electricity used by a business is taxed under the CCL as well as having its price increased indirectly by the ETS and RO. Businesses affected by the CRC already pay the CCL, although in many cases they will not be aware of it as it is levied through their energy bills which are relatively small (by definition of being within the CRC, see chapter 4 in this section).

d. Is it technology neutral?

The CCL has exemptions for a variety of renewable and other energy types: good-quality CHP, some waste-related processes and Waste LPG. That there is no exemption for nuclear demonstrates the arbitrary nature of the exemptions – regardless of its lack of emissions, nuclear still pays. At the point of introduction, gas in Northern Ireland was also exempted to support the development of a competitive gas market there.[54]

In addition, the CCL is not neutral between the different fuels that it does tax: it is an energy tax with non-uniform (with regard to carbon) rates.[55] The various different fuels under the CCL have different rates because it is levied on the energy, not carbon, content. The CCL rates for coal produce a carbon price less than half of that for electricity (£5.03/tCO2 compared to £10.93/tCO2, 2009/10 rates). It has been suggested that this reflects the political background of the coal industry in relation to the Labour Party rather than sound policy.

Effects

e.What are its costs and benefits?

The main effect of the CCL was an "announcement effect". Drawing on the work of Ekins and Etheridge, both Cambridge Econometrics and the NAO found that the effect of Government introducing the CCL was a permanent step-change in energy efficiency. The NAO found that the price effect is now declining for non-energy intensive businesses and that it is "no longer seen as a major driver of new energy efficiencies."[56]

The carbon emission reduction attributable to the CCL/CCAs have been estimated as 3.7 MtC compared to the reference case, which is less than the 5 MtC expected in the RIA from the overall package.[57] The NAO found that CCAs have underachieved, largely due to their poor design – individual businesses can fail to meet their CCA targets and still retain the CCL discount if their sector as a whole meets its CCA target. The CCA targets are themselves undemanding – and much of the energy savings would have happened anyway without them.[58]

Cambridge Econometrics estimated that GDP in 2010 would be 0.06% higher had the CCL/CCA package not been introduced.[59] They found that only one sector in one year ("Other industry" in 2008) would the CCA agreement have been missed had no CCL ever existed.[60]

The CCL and CCAs have differed from their expected impacts quite significantly. In terms of revenue neutrality, they have consistently over-recycled, paying back between £296 million and £531 million more in employers' NICs than was received through the Levy.

54 Ibid.

55 Martin, R, de Preux, L and Wagner, U (2009) *The Impacts of the Climate Change Levy on Business: Evidence from Microdata* p4

56 NAO (2007), p19

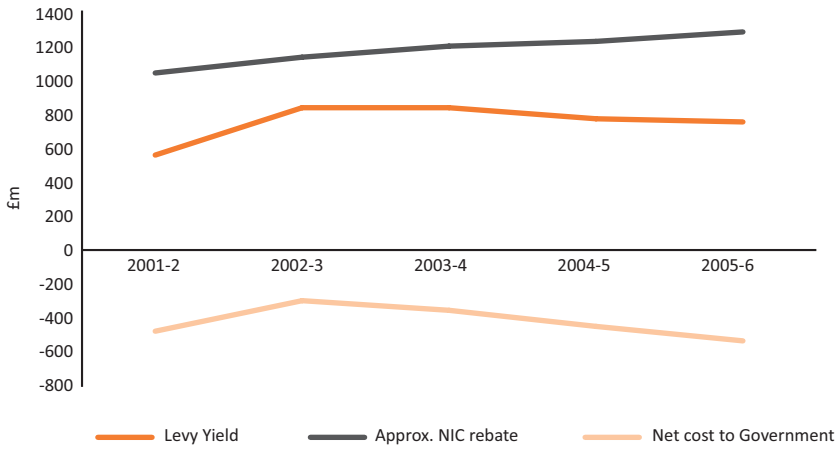
57 Cambridge Econometrics (2005) *Modelling the Initial Effects of the Climate change Levy,* p61

58 NAO (2007), p5

59 Cambridge Econometrics (2005) p8

60 Ibid., p73

Figure 3.1: Levy Yield and NICs discount[61]



f. Has it had any distortionary effects?

The RIA for the CCL declared that the policy aimed to achieve "fair competition between fuels" following on from the 1998 Review of Energy Sources for Power Generation.[62] The hidden incentives protecting coal, within the CCL, combined with the Labour Government's moratorium on new gas-fired power generation in 1998 implied that the motive to protect the remainder of the coal industry for historic and ideological reasons may have been a major factor in the design of the policy.[63]

The CCL has had the perverse effect of raising the carbon intensity of energy used in the sectors covered, because of the increase in coal-fired generation of electricity on site and gas being replaced by coal, electricity and oil.[64] This demonstrates the problem of loading multiple objectives into single policies, especially when the objectives of protecting the coal industry and the environment are diametrically opposed to each other.

g. How vulnerable to lobbying is it?

The CCL's rates are set in the Budget and have been remarkably stable since introduction: in the 2001 budget the rates were 0.43 p/kWh for electricity and 0.15p/kWh for gas – rates which have barely changed since (0.47 p/kWh and 0.16p/kWh respectively).[65] While the initial preferential treatment for coal has been retained, new exemptions have not been added since those for renewables and CHP were included at the start of the policy. While plenty of lobbying took place – in particular to reverse the strange lack of an exemption for nuclear power – the policy has hardly changed since being introduced.

h.What is its implied carbon price?

Calculating the implied carbon price of the CCL is based on the rates levied on the different fuels and the carbon content of the fuels. For electricity and gas, the CCL is levied on a kWh basis while coal and other fuels are levied on a weight basis.

61 NAO (2007), p12

62 HM Treasury (2000) *Regulatory Impact Assessment – Climate Change Levy* p4

63 Pearce, D (2007) *The political economy of an energy tax: the United Kingdom's Climate* Change Levy Energy Economics 28, p155

64 Cambridge Econometrics (2005) p61

65 HM Treasury (2001) *Budget 2001* p107

Verdict on the CCL

The CCL has the lowest carbon price of any policy covered in this report.

The CCL acts as an additional carbon price over and above the EUETS price. In common with the other policies examined in this chapter, any additional carbon savings made by the CCL/CCAs cannot be double-counted with the EUETS, since they enable carbon savings not to be made elsewhere in the EU.

The main design problems are CCL's differential rates (in relation to carbon) for different fuels and rather arbitrary exemptions. It could be significantly improved with reform into a proper carbon tax – discussed in detail in Section 2.

The CCAs, which sought to mitigate the impact of the CCL on energy-intensive industries succeeded in doing that. Only in one sector in one year would the CCA target not have happened anyway under business-as-usual. What effect the CCAs had appears to have dissipated, and as part of any reform of the CCL they should be phased out.

Policy 4. Feed-in Tariffs for microgeneration

Design

a. What is the policy meant to achieve?

Since April 2010, the Government has offered a feed-in tariff for some forms of microgeneration. This policy is meant to support the deployment of small scale renewables through a subsidy.

A feed-in tariff is an above-market rate paid for electricity generated from a preferred technology to encourage take up of that technology. Feed-in tariffs have been highly effective in Germany among other places at ensuring the deployment of renewable technologies, albeit at high cost. Feed-in Tariffs (FiTs) are analogous to the RO in their underlying goals of selectively supporting the deployment of certain technologies, but they set the price rather than quantity requirement for renewable generation.

In the UK the scheme has been branded "Clean Energy Cashback" and covers only small-scale generation (<5 MW) across a variety of technologies, mainly solar PV and wind.[66] The length of tariff is at least 20 years, except in the case of a pilot of micro-CHP. The coalition agreement promises the establishment of a "full system of feed-in tariffs" with the maintenance of banded ROCs for larger renewables – signalling an intention to retain the system.

b. How much of the economy does it cover?

It covers a very small part of the energy sector. Owners of microgeneration equipment, either domestic or business, will receive a subsidy for each KWh their equipment produces. The cost is passed onto all consumers' energy bills, leading to an average increase of £8.50 per year up to 2030.[67]

c. Which other policies does it overlap with?

Microgeneration is a part of generation, although it covers parts of the generation sector not covered by the RO. Since carbon savings are made in the EUETS sector it also overlaps with that policy – generation under FiTs replaces generation in the part of the generation sector covered by the EUETS.

66 www.decc.gov.uk

67 DECC (2010) *Impact Assessment of Feed-in Tariffs for Small-Scale, Low Carbon, Electricity Generation*, p2

Microgeneration is also seen by some as part of the solution to domestic energy efficiency and fuel poverty, although given the costs involved this is probably only true for isolated properties off the gas grid.

Some recent installations (more than 50kW but less than 5 MW, completed before 15th July 2009) which are registered for the RO will migrate onto FiTs. The tariff they receive will be equivalent to the subsidy under ROCs.

d. Is it technology neutral?

No. It explicitly chooses to subsidise micro renewable generation, and gives more generous subsidies to certain technologies and scales of technology within that category. The Government chose to set the tariffs on a "rate of return basis", which seeks to equalise the return on investment across all installed capacity.[68] The subsidy level thus varies significantly across different technologies, and is roughly in inverse proportion to their cost-effectiveness. This means that small (less than 4 kW) retrofitted solar PV receives 41.3 p/kWh, while large (up to 5MW) wind and hydro receive 4.5p/kWh.[69] This very significantly reduces the importance of cost-effectiveness as a criterion for a household or business in choosing a technology.

This is consistent with the policy being a subsidy for early stage deployment of promising technologies, in order to get them down the cost curve, rather than for cost-effective carbon reduction.

Effects

e. What are its costs and benefits?

The Regulatory Impact Assessment estimates the costs at £8.6 billion Present Value (PV) over 20 years, while the benefits amount to £420 million PV over the same period, a net cost of £8.2 billion.[70] This has been described by George Monbiot as "the definitive example of a great green rip-off".[71] The RIA justifies its cost thus:

> *"carbon abatement under FITs is significantly more expensive than carbon abatement under the EU emissions trading scheme. ... However, other objectives of the policy including community engagement are also important"*[72]

This appears to be an extraordinarily weak argument for a policy costing £8 billion Net PV.

f. Does it have any distortionary effects?

FiTs scheme provides most support to technologies which are least cost-effective, and in that sense is distortion of the market. That of course is the point of the scheme. Given a limited amount of public willingness to spend on renewables, diverting funds from more cost-effective approaches to ones which are less so is extremely counter-productive.

g. How vulnerable to lobbying is it?

Like the RO, feed-in tariffs for microgeneration give an opportunity for the microgeneration industry to seek subsidies for its products. There is also a perverse incentive to over-estimate costs to maximise subsidy given a fixed rate of return, offering plenty of scope for game-playing.

68 DECC (2010) *Impact Assessment of Feed-in Tariffs for Small-Scale, Low Carbon, Electricity Generation,* p1

69 DECC (2010) *Table of Tariffs up to 2013*

70 Ibid.

71 Guardian, "Are we really going to let ourselves be duped into this solar-panel rip-off?" 1st March 2010

72 DECC (2010) I*mpact Assessment of Feed-in Tariffs for Small-Scale, Low Carbon, Electricity Generation,* p27

h. What is its implied carbon price?

According to the Government's own figures, the carbon cost-effectiveness is £460/tCO2. This makes it the policy with the highest carbon price in this report, with the possible exception of the RHI.[73]

While the scheme is intended to get early stage technologies down the cost curve, this extremely high level of subsidy raises questions: Can these technologies be part of the solution to the global problem of climate change in the foreseeable future? What climate change measures are we foregoing by diverting £8 billion of resources to public subsidy of microgeneration?

Verdict

Microgeneration has a part to play in reducing household carbon emissions, particularly for those who can afford the costs of installation. The question is whether deployment of microgeneration should receive substantial public subsidy. The feed-in tariff for microgeneration is one of the most expensive policies for reducing carbon emissions. The Government's subsidy is estimated to cost £460 per tonne of carbon saved.

Nevertheless there could be a case for significant public support for deployment of early stage microgeneration technologies, if there was an expectation that such technologies could be a significant part of the future solution to the global problem of climate change. It is unclear to us that the currently very expensive technologies being supported by feed-in tariffs could become sufficiently cost-effective to be significant in combating climate change in the foreseeable future. A number of the technologies are already fairly mature.

> "The funding for microgeneration adds to all electricity bills, alongside other climate change mitigation measures, and there will be a limit to the public's acceptance of bill increases"

Even if these technologies could in future play a role, the costs of public support for them now needs to be weighed against alternative uses for the funding. The funding for microgeneration adds to all electricity bills, alongside other climate change mitigation measures, and there will be a limit to the public's acceptance of bill increases.

The recently implemented feed-in tariff support for microgeneration is expected to cost a net £8 billion NPV. It would appear to us that there are a number of alternative uses for this funding which could have a far greater impact on tackling climate change, including demonstrating CCS, and installing energy efficiency measures in households and businesses.

Any public support for microgeneration should be scaled-back to supporting those households and businesses which have few other options, so that cost-effectiveness is greater. This is particularly the case for islands, remote rural areas, or possibly even in an international development context. The bulk of the funding would be better deployed on other climate change measures, or left in consumers' pockets.

Policy 5. CCS Levy

Design

a. What is the policy meant to achieve?

In the Energy Bill (2010) there is provision for a CCS levy. Ed Miliband described the rationale behind the levy:

73 DECC (2010) *Impact Assessment of Feed-in Tariffs for Small-Scale, Low Carbon, Electricity Generation*, p26

> *"Even with the right regulation, though, if we leave the funding of CCS simply to private companies, it will not happen in time. To make CCS financially viable, our proposed Energy Bill contains powers to introduce the levy announced in the Budget by the Chancellor to support demonstration and, responding to points made in the consultation, the levy will also be available to support the move to 100% retrofit of CCS."*[74]

This is potentially significant support for a specific technology, funded by a levy on all consumers' electricity bills. The levy will be used to fund the demonstration plants in the Government's competition as well as the eventual retrofit of CCS onto other plants.

This is a scheme with relatively focused goals. CCS is in need of demonstration support and, subject to successful demonstration, may justify support for early stage deployment .

b. How much of the economy does it cover?

The levy will be paid by all consumers' through their electricity bills. The initial competition will cover up to four demonstration plants.

After 2020 it is anticipated that no new coal fired power station will be built without CCS, potentially covering a large portion of new generation capacity after that time. This of course depends on the success of the demonstration programme.

c. Which other policies does it overlap with?

As another measure raising energy costs, it interacts with the EUETS and RO and for business customers also the CCL. In other respects, it supports a technology not in receipt of other subsidies.

d. Is it technology neutral?

No – it supports a selected technology. The demonstration programme is intended to test pre and post-combustion CCS technologies.

Effects

e. What are its costs and benefits?

The levy will raise £7.2-9.5 billion over ten years and will fund up to four demonstration plants.[75] At the time of writing, only two projects (one by Shell and Scottish Power, the other by E.On and RWE Npower) were still bidding in the competition to build the first demonstration plants.

f. Does it have any distortionary effects?

As a subsidy for one form of generation over others, it does tilt the market towards CCS. But the scheme is more clearly focused on demonstration, rather than mass deployment, so distortion is limited.

Given that CCS is mainly in competition with renewables and nuclear for the long-term future of UK energy supply, it means that only nuclear is unsubsidised.

g. How vulnerable to lobbying is it?

The competition process could be open to lobbying, although with only two entrants for four projects it hardly seems necessary. However, a competition may be less open to rent-seeking than some other approaches, e.g. the RO. Once the

74 HC Deb 9th November 2009 col. 32

75 DECC (2010) *Impact Assessment of Coal and Carbon Capture and Storage requirements in 'A framework for the development of clean coal'* , p4

demonstration projects are complete there will be ample space for lobbying for preferred technologies and sites for CCS projects, subsidies for deployment and for retrofitting unabated power plant.

h.What is its implied carbon price?

While the cost of the levy is known (£7.2-£9.5 billion), the competition is still ongoing leaving significant uncertainty around the amount of carbon emissions saved from the policy. Depending on a) how many projects finally go ahead and b) how successful they are, some carbon savings will be made from the demonstration plants. However, the major purpose of the scheme is to demonstrate a new technology. Major carbon savings from it would accrue following successful demonstration.

Verdict

CCS, if successfully demonstrated, is likely to be a key part of the UK's decarbonised energy future. The value for money of the CCS levy will depend largely on how well focused it is on driving down the cost of the technology, and thus eventual deployment. A well-designed, robust framework for pricing carbon over the long term should aid the deployment of CCS once it is demonstrated.

The levy is more problematic. There is no obvious reason why CCS demonstration should be funded by its own ringfenced levy any more than any other RDD&D spending by the government. It may well be good spending but a badly-designed tax.

4
Policies Outside the EUETS

For policies acting on carbon emissions inside the EUETS carbon savings may displace carbon saving elsewhere in the EU. Layering of multiple policies may raise costs.

There are also several climate change relevant policies that target parts of the economy which are largely not covered by the EUETS – such as non-energy intensive businesses, transport or heat. These offer carbon savings on top of those secured within the EUETS. However, their savings may well be indirectly within the scope of the EUETS, especially where they cause energy efficiencies causing reduced demand for generation within the EUETS.

Policy 6. Carbon Reduction Commitment (CRC) Energy Efficiency Scheme

Design

a. What is the policy meant to achieve?

The CRC has emerged from the recognition that much of the rest of climate change policy tended to focus on big, energy-intensive industries. This overlooked those parts of the economy which, although not energy intensive, do in aggregate generate significant carbon emissions. The policy was based on a Carbon Trust report which sought ways to overcome barriers to energy efficiency among those businesses for whom energy costs are not a significant proportion of their costs, but who could still make cost-effective energy efficiencies.[76]

The CRC is aimed at those using more than 6,000 MWh per year of electricity on half-hourly meters. Registration for the scheme required the fitting of automated meter readers uses reporting and a league table, as well as a cap-and-trade scheme to "raise the profile of the prevailing carbon price" which the Government sees as too low for the sectors covered.[77] It is intended both to raise board-level attention on energy efficiency and improve data available to companies.

The scheme has started with an introductory phase, where companies are required to register and submit data. A league table will be created, based in part on 'early action metrics' to reflect the different starting points of different organisations, although the impact of these will diminish over time. Once the scheme is fully operational, organisations will buy allowances equal to their emissions. The revenue from all allowances will then be recycled to participants in proportion to the reductions they make, rewarding organisations which make reductions both financially and, through the league table, in terms of their reputation. This is effectively a complex, small-scale cap-and-trade scheme.

76 Carbon Trust (2005) *The UK Climate Change Programme: potential evolution for business and the public sector,* p3

77 DECC (2009) *Final Impact Assessment on the Order to implement the CRC Energy Efficiency Scheme* p2

b. How much of the economy does it cover?

The CRC was estimated by NERA to cover 7,295 organisations.[78] These account for around 10% of UK carbon emissions. By March 2010 – one month prior to the scheme's start – the number of organisations affected was still unclear, with up to 30,000 potentially affected by decisions over the rules.[79] By July 2010, 738 had registered for the scheme, with registration open until the end of September.[80]

The CRC covers both public and private sector organisations, over the 6000MWh threshold. This includes a very diverse range of organisations from supermarkets and retailers to NHS trusts, local authorities and even the London Fire Brigade.

c.Which other policies does it overlap with?

The Regulatory Impact Assessment (RIA) for the CRC notes that the CCL price is insufficient for delivering energy efficiency in this sector.[81] The CRC is intended to provide an incentive on top of the CCL (and, indirectly, the costs of the EUETS and RO) to business. The cap and trade element of the CRC has a "safety valve mechanism, in the form of a "buy only" link with the EUETS" which will place a ceiling on the CRC price.[82]

The overlap between the CRC and other policies may give opportunities for gaming the system. For example, some organisations affected by the CRC will also be investors in renewables, and may change their behaviour to optimise their CRC league table position. The London Fire Brigade, for example, has solar PV generation worth around £10,000 per year in ROCs, which it does not at present sell but counts against its carbon targets, set by the Mayor.[83] For them and any organisations in a similar position, there is a potential strategic decision as to whether to sell ROCs or count them against the CRC, potentially introducing some element of game-playing between the two policies.

d. Is it technology neutral?

Yes – the CRC measures energy efficiency and does not reveal a preference for any technology over any others.

Effects

e.What are its costs and benefits?

DECC projects that the CRC will create benefits of the order of £290 million per year across the economy. Of these, half are savings from energy efficiency, 40% from carbon reduction and 10% air quality improvements.[84]

This compares to costs of £34 million per year. Of these, half are estimated to be administrative, while the other half are expected to be costs of controlling emissions. In addition to its administrative burden, the level of uncertainty about whether businesses are affected is causing "consternation among small to medium-sized businesses, thousands of which may be unaware of the new restrictions they face" according to the Financial Times.[85]

The CRC is forecast to save 1.3 MtCO2 per year in 2015, rising to 3.2 MtCO2 per year in 2020. The net benefit to society from the CRC works out at £197 per tCO2 saved, based on the RIA figures. This is not the same as the carbon price in the cap-and-trade scheme, but does reflect the potential savings from energy efficiency available.

78 Ibid., p16

79 Financial *Times Business Attacks on legal environment countdown,* 7th March 2010

80 Environment Agency, List of Registrants, http://www.environment-agency.gov.uk/business/topics/pollution/117652.aspx

81 DECC (2009) *Final Impact Assessment on the Order to implement the CRC Energy Efficiency Scheme* p2

82 Ibid., p14

83 London Fire Brigade *Carbon Reduction Commitment* 16th November 2009 p3

84 DECC (2009) *Final Impact Assessment on the Order to implement the CRC Energy Efficiency Scheme* p2

85 Financial Times *Businesses face emissions law shock* 5th March 2010

Despite the RIA's forecast of high net benefits of the scheme, even on the basis of energy cost savings alone, it is perceived as burdensome by many of the organisations is impacts. It is certainly an administratively complex scheme, with both league table and cap and trade aspects. The scheme bites on all affected organisations regardless of whether they will be able to reap energy savings which outstrip administrative costs.

f. Does it have any distortionary effects?

The CRC covers a very wide range of organisations – and will rank them all in a league table which will then be used to redistribute revenue from the sale of allowances. It is certainly possible to envisage perverse outcomes – an already energy-efficient taxpayer-funded public service ending up rewarding an energy-inefficient private sector company, for example. This could happen if a hospital or council had already taken steps to save all the 'low hanging fruit' of emissions and therefore struggled to make additional savings while a private company which had not made any energy efficiencies and found new savings easy. Over time, the public sector organisation would lose out financially in the scheme while the private company would gain as it made efficiencies. The same effect could happen in the opposite direction between public and private as well, of course.

It is an extremely complex piece of legislation for what is a very small balance sheet item for businesses. One public sector organisation recounted how their finance director considered the sums to be too small to be worth their consideration, whereas political pressure in the shape of targets had for some time been effective at driving that organisation to take action on their energy efficiency and carbon emissions.

One of the drawbacks is that the league table will eventually penalise those organisations which have already made significant energy efficiencies. Those who have picked all the "low-hanging fruit" are likely to start at the top of the table and gradually drop as less energy-efficient organisations do easy and cost-effective efficiencies they have not already done.

g. How vulnerable to lobbying is it?

Given the complexity of the CRC, there seems to be potential for lobbying in the future. For example, the rules of the league table and recycling payments present grounds for interested parties to seek to shape it in their interests.

h. What is its implied carbon price?

The initial price paid by participants in the scheme is set at £12/tCO2 for the first three years, after which the price will be allowed to vary.

Verdict on the CRC

The aim of the scheme is to focus organisations' management on their energy use, even though it may be a relatively small cost to them. From our roundtable discussions with a range of organisations affected by the CRC, the key driver of action (and thus carbon benefits) appeared to be reputational risk. This arose from the league table, and in particular the recycling of revenue from poor to good performers. Some saw any net revenue loss being seen as a 'fine'. The bad publicity from such an outcome appeared to be far more important than the financial cost. One public sector organisation said that their finance director

considered the financial sums to be too small to be worth consideration, but political pressure in the shape of targets had – even ahead of the CRC – been effective at driving that organisation to take action on their energy efficiency and carbon emissions.

Measures to encourage large but non-energy intensive users of electricity to make energy efficiencies are sensible and welcome, especially where they lead to significant financial as well as carbon savings for moderate costs. The requirement to install automatic meter readers, increase reporting of emissions and the threat of future reputational risk have already led to organisations making savings.

However, the scheme is administratively complex and potentially burdensome. It is not clear, for example, that the cap-and-trade scheme is necessary to achieve the management focus sought, on top of the reporting and league table requirements which already appear to be successful drivers of action. While cap-and-trade is generally an economically efficient approach, it relies on a price effects, which are not likely to be strong in the non-energy intensive sectors covered by the CRC. Since the companies and public sector bodies in the scheme are, by definition, those for whom the price effect is unlikely to cause any behaviour change, there seems little point in adding more complexity. The scheme could therefore be significantly simplified by cancelling the cap-and-trade element, leaving the league table and reporting requirements.

Policy 7. The Renewable Heat Incentive (RHI)

Design

The RHI was put out to consultation in February 2010, with a target date for coming into force of April 2011. The scheme is designed to encourage the deployment of renewable heat technologies, as part of meeting the UK's contribution to the EU 2020 target on renewable energy consumption.

The proposed scheme resembles the feed-in tariffs for microgeneration. The previous government's argument for the scheme is almost identical:

> *"It will be the first of its kind and will demonstrate to the world the UK's commitment to tackling climate change head on. The scheme will enable us all to play our part in reducing our emissions and ensure our energy supply is secure. This investment will help stimulate the renewables industry, encourage further innovation and bring down the cost of renewable heating technology."*[86]

While the measure is still out for consultation, the outline of it is clear. Like the FiTs, the subsidy level is set to provide a target rate of return of 12%.[87] As with most recent climate change policies, it looks likely to be funded through taxing other energy consumers' bills.[88]

The proposed incentive level for the RHI appears to be even higher than for the microgeneration feed-in tariff, which as we have seen has the highest cost per tonne of carbon saved of any other policy examined in this report, and by a long way. The consultation states:

> *"we concluded that higher rates of return would be required than the rates proposed for the Feed-in Tariffs. The rates of return for renewable heat need to reflect that we will need high growth on renewable heat."*[89]

86 DECC (2010) *Renewable Heat Incentive: Consultation on the proposed RHI financial support scheme*, p2

87 Ibid., p38

88 Sunday Telegraph *Tax surcharge casts shadow on the future of British refineries,* 1st May 2010

89 DECC (2010) *Renewable Heat Incentive: Consultation on the proposed RHI financial support scheme*, p39

The Regulatory Impact Assessment, says that "0% of the carbon savings projected to occur through the RHI are cost-effective."[90] Increasing the proportion of renewable heat to 12% presents a NPV cost of £7.7-£12.2 billion over twenty years, while raising it to only 8.5% would present a (more encouraging) range between a cost of £1.1 billion and a benefit of £2.2 billion over the same period. The preference for 12% is justified on the grounds that "Even though the RHI measures do not meet the CE test implementation of the policy it is crucial in enabling the UK to meet its legally binding EU target of 15% of renewable energy by 2020".[91]

Under the RHI, emissions avoided are outside the EUETS, and therefore these expensive carbon savings at least do not displace cheaper savings made elsewhere.[92]

The RHI could, like the RO and FiTs, present a great opportunity for rent-seeking, and for preferential treatment for specific technologies. As the RHI is still out to consultation an exact carbon price is difficult to produce with any confidence. It would, however, be likely to be very high.

Verdict on the Renewable Heat Incentive

The RHI is designed to encourage people to install certain types of renewable heat equipment which are highly cost-ineffective even under a feasible carbon price, by heavily subsidising them. The levels of subsidy may exceed even those on offer for microgeneration.

Like Feed-in Tariffs for micro-generation, this can be justified if it is an efficient way to bring promising early stage technologies down the cost curve. The key question is whether this is an efficient approach, particular whether it can be justified in spending £7-14 billion extra on securing 12% rather than 8.5% renewable heat by 2020.

The starting point for the RHI – and in particular the proposed 12% target – is not how best to develop renewable heat technologies but to meet an arbitrary 2020 renewables target.

The policy should be implement to achieve 8.5% rather than 12% renewable heat. This would save £7-14 billion, which could be much better used elsewhere.

Policy 8. Air Passenger Duty

Design

APD was introduced in 1994 by Ken Clarke to "raise revenue, but to do so in a way which does least damage to the economy."[93] The design of APD was a product of significant constraints on taxing air travel. EU member states have agreed to zero-rate VAT on travel between members, although some impose it on domestic flights.

The Emergency Budget in June 2010 raised the possibility of reforming APD into a per-plane duty. This has considerable theoretical attractions from an efficiency perspective, especially if it brings freight within the tax regime. However, the Chicago Convention (1944) places severe restrictions on taxing aviation, which may prevent this being legally possible. Previous proposals to levy APD per plane rather than per passenger have led to the US Government threatening legal action, arguing that it would breach the Convention.[94]

90 DECC (2009) *Impact Assessment of proposals for a UK Renewable Energy Strategy – 91 DECC (2010) Renewable Heat Incentive: Consultation on the proposed RHI financial support scheme*, p12

91 DECC (2010) *Renewable Heat Incentive: Consultation on the proposed RHI financial support scheme*, p12

92 DECC (2009) *Impact Assessment of proposals for a UK Renewable Energy Strategy – Renewable Heat,* p3

93 HC Deb 30 November 1993: Columns 933-4

94 The Times, *United States says air tax is illegal*, May 11th 2008

Clarke doubled APD rates in his 1996 Budget. Under Gordon Brown APD was banded, effectively halving the rate for economy passengers in 2000. In 2009, a new banding, based on distance and class flown, was introduced, which doubled APD for many passengers' journeys.

The current rates reflect distance in four bands (0-2000 miles, 2001-4000 miles, 4001-6000 miles and 6001 miles and further) with two rates, for economy and non-economy fares.

Table 4.1: 2010 APD rates

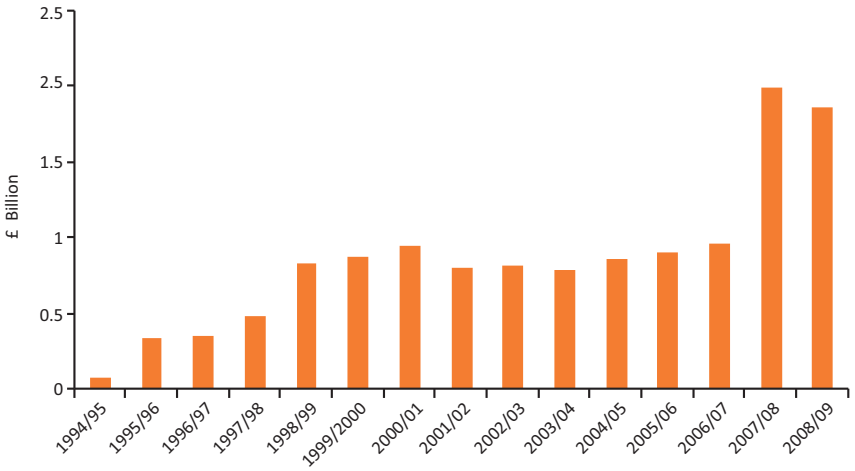
	Economy	Standard
0-2000 miles	£12	£24
2001-4000 miles	£60	£120
4001-6000 miles	£75	£150
6001 miles +	£85	£170

Effects

What are its costs and benefits?

APD has raised significant revenue for government – nearly £2 billion in 2008/09. Whether there has been a corresponding impact on carbon is unclear.

Figure 4.1: APD revenue 1994-2009



The 2009 changes have significantly increased the rate at which the duty is levied on longer flights. Unsurprisingly, the aviation industry is not keen on taxes increasing further, with BALPA, the pilots' union, describing the change as regressive, badly-structured and badly timed.[95]

However, the impact on flights appears to be limited. The 2009 changes are expected to have their greatest impact, in terms of number of flights taken, on flights in Band A – those on which the tax is lowest. Indeed, government forecasts no difference at all in Bands B, C or D as a result of the raised duty.[96] Air travel is relatively inelastic.

95 BALPA (2008) *Air Passenger Duty* http://www.balpa.org/News-and-campaigns/Campaigns/Air-Passenger-Duty.aspx

96 HC Deb 22 Jun 2009 : Column 578W

The new government is reviewing whether or not to change APD again, to levying it on a per-plane rather than per-passenger basis. Theoretically this is very attractive, since it encourages efficiency by operators. As mentioned above, the Chicago Convention may make this legally difficult.

What is its implied carbon price?

It is hard to calculate an implied carbon price for APD since it is only indirectly a tax on carbon. Illustrative rates using government estimates for emissions of 0.11 kg/passenger kilometre for long haul and 0.15 for short haul flights are in table 4.2.[97]

Table 4.2: Implied Carbon Prices for APD[98]

	Carbon price for economy flights	Carbon price for non-economy flights
0-2000 miles	£25 to £218	£50 to £320
2001-4000 miles	£85 to £169	£169 to £339
4001-6000 miles	£71 to £106	£141 to £212
6001 miles +	£64 to £80	£129 to £160

The carbon price for Air Passenger Duty varies between £25/tCO2 and £339/tCO2.

Verdict

APD is first and foremost a revenue-raising measure rather than an environmental tax. It is not closely related to carbon emissions and offers little incentive for airlines to reduce emissions. Any more directly carbon-related tax is likely to be subject to a strong legal challenge under the Chicago Convention. Aviation will enter the EUETS in the future, so will in large part be more subject to carbon-based incentives at that point.

APD, at politically acceptable levels, is not particularly effective at changing behaviour since there are few viable alternatives for many flights, and it does not price people out of flying. It is, however, an effective raiser of revenue. Any reforms to introduce a broad carbon tax, as discussed in Section 2, could have an effect on air duty.

Policy 9. Fuel Duty

Design

Petrol Duty was first introduced in 1909 at a rate of 3d per gallon. It was abolished after World War I, effectively replaced by the introduction of road tax, although it was reintroduced in 1928 at 4d per gallon.[99] It is a revenue-raising duty.

In the 1993 Budget Norman Lamont sought to "combine revenue raising with tax reform" in significantly increasing fuel duty.[100] This was additionally justified by reference to carbon dioxide emissions from transport, perhaps the first "green tax":

> *"The largest contribution to the growth in United Kingdom carbon dioxide emissions in the coming years is expected to come from the transport sector. I therefore propose to make clear today the Government's long-term intention on road fuel duty. We intend to raise road fuel duties on average by at least 3 per cent a year in real terms in future Budgets, in addition to the increase I have already announced for this year."*[101]

97 Defra (2005) *Guidelines for Company Reporting on Greenhouse Gas Emissions Annexes updated July 2005 Annex 1 – Fuel Conversion Factors*

98 For the shortest journeys, the minimum distance (and thus the highest price per tonne is for flying 500km, approximately London to Paris. For the longest journeys, the maximum is taken as 12,000 km, the distance from London to Buenos Aires.

99 http://www.politics.co.uk/briefings-guides/issue-briefs/economy-and-finance/road-fuel-duties-$366624.htm

100 HC Deb 16th March 1993 col. 177

101 HC Deb 16th March 1993 col. 182-3

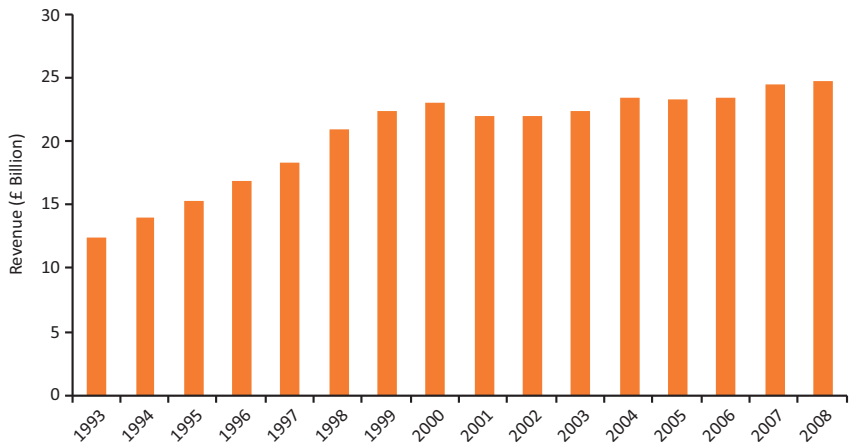
Fuel Duty, along with VAT on fuel and Vehicle Excise Duty are sometimes seen as about paying for roads and road transports other costs, including carbon emissions. In reality these are simply revenue-raising measures. Given the relative inelasticity of demand for travel, it was an easy tax to raise until the Fuel Protests of 2000 forced the Government to abandon the escalator. It has since increased more slowly, with the latest increase staggered over the year.

Effects

As a revenue-raising measure, the principal effect of fuel duty is raising substantial sums for the Treasury. The Fuel Duty Escalator drove a fast increase in revenue yield, until it became politically unsustainable. Fuel duty is nevertheless reasonably proportional to the carbon emissions of road transport.

As demand for road travel is relatively inelastic fuel duty is an effective revenue raiser but not necessarily good at changing behaviour.

Figure 4.2: Revenue from fuel duty



What is its implied carbon price?

While we can calculate the implied carbon price, it must be borne in mind that the tax is not designed to deal with the environmental externalities from travel. The duty has an important function in raising revenues, including for road transport spending. It is thus not surprising that the apparent 'carbon price' is high. Taking the carbon content of petrol (2.3 kgCO2/l) and diesel (2.63 kgCO2/l) and the rates of duty for 2010-11 (57.19p/l for petrol and diesel, 10.99p/l for "red" or agricultural diesel) the carbon prices for the various fuel duties are £41.79/tCO2 for red diesel, £217.45/tCO2 for diesel and £248.65/tCO2 for petrol.[102]

Verdict

Fuel Duty is first and foremost a revenue-raising measure rather than an environmental tax. Fuel duty, at politically acceptable levels, is not particularly effective at changing behaviour. This is in large part because there are few alternatives to using petrol for personal transport. Any reforms to introduce a broad carbon tax, as discussed in Section 2, could have an effect on fuel duty.

102 HMRC (2010) *Hydorcarbon Oils: Duty Rates* and Defra (2005) *Guidelines for Company Reporting on Greenhouse Gas Emissions Annexes updated July 2005 Annex 1 – Fuel Conversion Factors*

5
Conclusions on Section 1

This section has examined climate change policies which implicitly or explicitly price carbon in the UK. Climate change policies themselves vary significantly in their goals, approaches and apparent cost-effectiveness. But some clear messages have emerged from our analysis.

Many of the policies overlap with the EUETS, the principal carbon reduction policy, including the Renewables Obligation (RO) and feed-in tariffs for microgeneration (FiTs). Carbon savings made by these policies may result in cheaper carbon reductions elsewhere in the EU not happening, since all emissions are under the ETS cap. These policies cannot therefore aim to result in additional carbon reductions by 2020, but they can aim to make emissions reduction cheaper, by lowering the cost below the EUETS price. The key question is, do they?

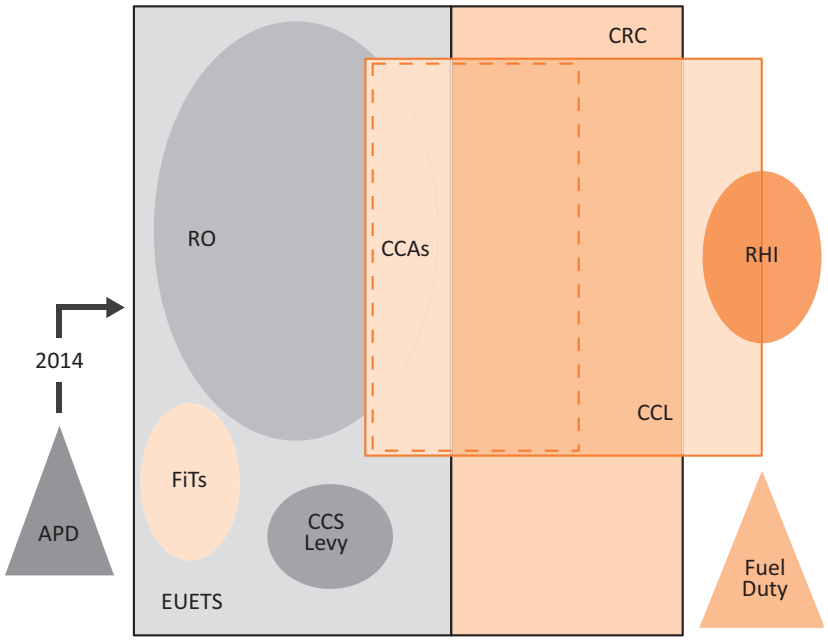
> “These policies cannot aim to result in additional carbon reductions by 2020, but they can aim to make emissions reduction cheaper, by lowering the cost below the EUETS price. The key question is, do they?”

The carbon prices used (either actual prices of implied from the costs of schemes) give an indication of relative cost-effectiveness. That the RO and FiTs are an order of magnitude more expensive per tonne of carbon than the other policies is striking. Clearly the possibility of these policies reducing the cost of climate change mitigation can be ruled out.

Complexity within and between policies

Complexity, and in particular the overlap between policies is a key part of the problem. Overlaps create confusion in incentives – for instance, energy companies face several incentives to do different things at the same time – as well as simply increasing administrative burdens for all. Adding overlaying instruments blunts the incentive from carbon pricing – the most efficient way to decarbonise. Complexity also adds opportunities for gaming the system and rent-seeking. All of these factors mean that the complexity and overlapping nature of the current set of policies is almost certainly raising the cost of decarbonisation. Figure 5.1 (below) is a simplified diagram of the overlaps, which is already extremely complicated.

Figure 5.1: Overlaps between policies (simplified)



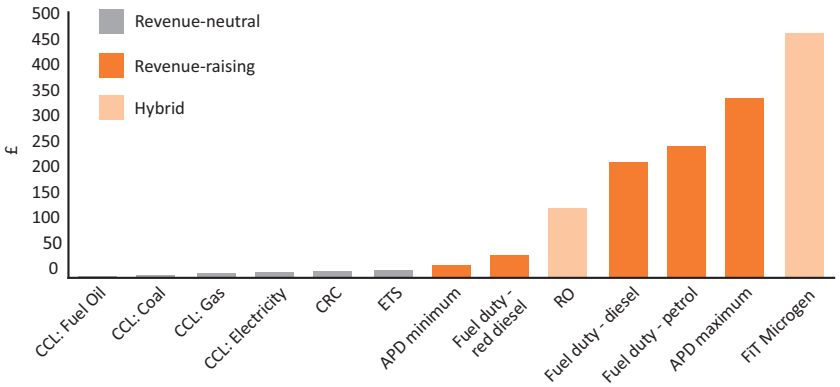
Cutting back the complexity of the current set of policies should be a key aim, either through abolishing some of the current policies and simplifying others. Simply removing some policies – FiTs and CCAs – and scaling others back – the RHI – removes some complexity as well as two of the most expensive policies. Focusing technology support policies better would also help to minimise complex interactions between mass deployment policies such as the EUETS and RDD&D policies – and therefore the inflated costs associated with these policies.

The introduction of a carbon tax offers a way to replace some of these policies – the CCL most immediately, but also others which might become redundant over time.

A number of such expensive policies were in part justified by the previous government as supporting demonstration and early stage deployment of promising low carbon technologies, in order to get them down the cost curve. Such policies include the RO, FiTs, Carbon Capture and Storage (CCS) levy and the proposed Renewable Heat Incentive (RHI). The goal is a very important one. But to justify policies with such substantial costs, it needs to be reasonably clear that the policies are focused on achieving this goal in an efficient way. That includes targeting support on technologies likely to be a significant part of the solution to climate change, and designing policies so that they maximise the technology cost reductions for the subsidy committed. This seems clearer in the case of the CCS levy than for the other relevant policies.

A key problem for these other policies, including the RO, FiTs and RHI is that they are 'hybrid' policies. They combine more than one goal, in these cases helping early stage technologies down the cost curve and meeting carbon targets through mass deployment of certain renewable technologies.

Figure 5.2: Implied carbon prices for revenue-neutral, revenue-raising and hybrid policies



Who pays and how?

The main sector affected by these policies is electricity generation, which has to comply with the EUETS and RO and through whose bills FiTs and the CCS Levy will be paid for. Given how fundamental this sector is for the economy, the high cost of some policies on this sector is concerning.

It is important to understand where costs of these policies actually fall for both economic and political reasons. The EUETS, RO, FiTs and CCS Levy all raise the cost of energy bills for all consumers, including domestic customers. The CCL raises costs for industrial and commercial businesses, which are ultimately passed on. The CRC is more ambiguous, since it is likely that energy savings made will outweigh administrative costs and thus improve competitiveness in some sectors. APD and Fuel Duty are the only two which are directly paid for by consumers, and are therefore the most politically awkward – as demonstrated by the fuel protests.

Table 5.1 Implied Carbon prices of our policies

Policy	Type	Price (£/tCO2e)	Who pays and how?
CCL: Fuel Oil	Revenue-neutral	3.26	Business customers through energy bills
CCL: Coal	Revenue-neutral	5.03	Business customers through energy bills
CCL: Gas	Revenue-neutral	8.63	Business customers through energy bills
CCL: Electricity	Revenue-neutral	10.93	Business customers through energy bills
CRC	Revenue-neutral	12 (fixed for three years)	Large but non-energy intensive businesses through complex scheme
EUETS	Revenue-neutral	14 (approx, variable)	Power companies and other industry, passed through to all customers
APD	Revenue-raising	25 – 320	All passengers, on ticket
Fuel Duty – Red Diesel	Revenue-Raising	41.79	Agricultural businesses
Renewables Obligation	Hybrid	130.25	Power companies, passed through to all customers
Fuel Duty – Diesel	Revenue-Raising	217.45	All drivers, at pump
Fuel Duty – Petrol	Revenue-Raising	248.65	All drivers, at pump
Feed-in Tariffs for Microgeneration	Hybrid	460	Consumers through bills
Renewable Heat Incentive	Hybrid	Not clear: very high	Consumers through bills
CCS Levy	Technology subsidy	Not clear	Consumers through bills

They tend therefore to end up lavishing huge levels of subsidy in attempts to mass deploy some technologies earlier than is efficient, not waiting for technologies to prove themselves nor develop down the cost curve. The EUETS cap alone ensures the emission reductions needed to meet the 2020 carbon targets much more cheaply, as a result of being technology neutral and enabling trading. Support for early stage renewable and other technologies is essential but the existing policies are very expensive approaches.

Another key message is the need for simplicity and minimising administrative burdens of policies. The Carbon Reduction Commitment (CRC) is a good example of a policy which could achieve most or all of its benefits at lower cost and with much less complexity.

The current set of policies contains some good, some bad and some which, with suitable reform could contribute more efficiently to the goal of reducing the UK's carbon emissions. Cost-effectiveness must be central to this agenda. There are limits to the public's willingness and ability to pay additions to their energy bills. If those limits are reached through inefficient spending, then the goal of tackling climate change will suffer as a consequence. That means rethinking and number of existing policies and designing future policies to be as cost-effective as possible. Our specific recommendations are set out below.

Policy Recommendations from section 1

1. The feed-in tariffs scheme for microgeneration should be abolished. Its £8 billion cost cannot be justified by comparison with other options for tackling the problem of climate change. It largely subsidises well-off households, to achieve massively costly carbon reductions. Any alternative public support for microgeneration should be narrowly focused on those technologies likely to be a significant part of the solution to global carbon reduction, and should not be about supporting mass deployment. There are areas where targeted support for microgeneration makes sense – in particular in isolated rural communities or even as part of international development – but not at the scale envisaged under the current scheme.

2. The Renewable Heat Incentive should be scaled back from aiming for 12% renewable heat by 2020 to aim for 8.5%. The £7-14 billion net cost of the additional 3.5% of renewable heat cannot be justified by comparison with other measures to tackle the problem of climate change.

3. The Carbon Reduction Commitment should be simplified, by cancelling the permitting and cap and trade parts of the CRC scheme. The CRC has the potential to be an effective policy. But the burdens from the permitting and cap-and-trade elements of the scheme are unnecessary and burdensome. They are unlikely to be effective where energy is a minor cost to businesses, on top of the reporting and league table requirements which already appear to be having successful in driving management focus and action on energy efficiency.

4. The UK Government's approach to meeting the EU renewable energy target should be reviewed. The RO and RHI are tremendously expensive schemes, both as innovation and carbon reduction policies. They are driven by the Government's commitments under the EU Renewable Energy Directive. Government has a role in supporting research, development, demonstration and early stage deployment of low carbon technology. But its current policies for doing so are extremely expensive and very poorly targeted. A review should identify the full costs to the UK of meeting the 2020 EU renewable target and identify approaches to reducing those costs, while meeting carbon reduction targets, including for example trading with other countries and efficient support for RDD&D. Policy Exchange will explore these issues in more detail in future work.

At a Minimum: **5. The CCL should be reformed so that it taxes carbon.** The preference for coal built into the CCL when founded is illogical, while the effects of the policy have long since dissipated. The CCAs have been ineffective and, along with a wider reform of the CCL, should be abolished.

Recommendations 1 to 4 can and should be implemented whatever is decided about direct taxation of energy or carbon; they will avoid costly mistakes and improve the existing policy mix. Recommendation 5 is the minimum reform to carbon taxation that this report recommends. The second half of this report, by Dieter Helm, discusses various proposals for a broad carbon tax. Improving the approach to establishing a carbon price, such as through a carbon tax, is one key part of an overall more cost-effective carbon reduction policy landscape.

After discussing the theoretical arguments for taxes over trading, section 2 argues that while in practice the EUETS is likely to be a part of the policy landscape for the foreseeable future, a well-designed carbon tax could in part act as a floor price and would improve its functioning – and perhaps replace it eventually. It also offers an opportunity to rationalise the policies discussed in this first half – for example the CCL would be replaced and could be an opportunity to reform the RO.

Section 2 also argues for a border tax adjustment for carbon. This would address more closely carbon *consumption* and help counteract the challenge of 'leakage.' It would need very careful implementation to avoid charges of protectionism.

Section Two

The Case for a Carbon Tax

Dieter Helm[103]

103 Discussions with Cameron Hepburn, Robert McIlveen and Simon Less and detailed comments from Robin Smale are gratefully acknowledged. All errors remain unfortunately mine.

1
Introduction

Over the last two decades the case for a carbon price has been largely won. A carbon price provides an incentive to both the demand and the supply sides of markets, changing the relative prices of fossil fuels and low carbon energy sources. It is a necessary – but not sufficient – component of an efficient decarbonisation strategy.

A price of carbon is however a threat as well as an opportunity, and once it was accepted that there would be a price, there followed an intense battle to capture the income effects – the economic rents – that would follow. Here, the case for permits broadly won over the case for carbon taxes. Europe adopted the EU Emissions Trading Scheme (EUETS), fixing the quantity of carbon permits and letting the market determine the price.

That victory now looks somewhat pyrrhic: the EUETS has turned out to be volatile, short term and to deliver a low price. It has also demonstrated that it is wide open to lobbying and capture by vested interests. It has proved highly profitable to financial institutions, and delivered windfall profits to incumbent polluters (Helm 2010).

Unsurprisingly this disappointing outcome from the perspective of the public rather than private interests has in turn led to a rethink, and the case for carbon taxes has gradually clawed its way back onto the policy agenda. Indeed, across Europe, it is gaining acceptance, with a number of countries now pursuing this route. The more modest attempts to introduce a floor price of carbon have also gained traction in the policy debates.[104] The comeback has been driven in part by a recognition that current policies are both expensive and ineffective, and in part because the economic crisis has induced a wider search for new tax revenues. Countries need to minimise the costs of decarbonisation, and they also need the money.

This section sets out the reasons why carbon taxes are, in principle, well-suited to the carbon problem and, in particular, better suited than emissions trading (chapter two), and why the basis should be on carbon consumption rather than on carbon production (chapter three). Nevertheless, given so much political capital and so many powerful lobbies (including the European Commission) supporting the EUETS, it is not going to go away any time soon. It is therefore pragmatic to consider how the carbon tax might be grafted onto the EUETS as a floor price (chapter four). The carbon tax and the floor price can be levied on a number of different tax bases, from modifying the existing Climate Change Levy (CCL), to extending the proposed Carbon Capture and Storage (CCS) levy in the 2010 Energy Act, and new taxes on electricity generation, the EUETS permit base,

104 See Helm (2008), "Caps and Floors for the EUETS: a practical carbon price".

upstream fuel inputs, and on carbon imports (chapter five). The choice of tax base is conditioned by practicalities and administrative costs, as well as revenue yield, and a hybrid system has considerable merits. Credibility matters too, and in particular the process of decarbonisation is a long term one, requiring some certainty over future tax levels and the direction of travel. This in turn requires a degree of cross party consensus and consideration of institutional design (chapter six). Finally, the paper concludes with a summary of practical steps forward (chapter seven).

2
Taxes Versus Permits

Since intervention is driven by market failure, it is natural to think that the choice of instrument should be driven by the type of market failure. But this is only correct in a narrow and partial sense. Market failures can be "solved" by either setting the price or the quantity. Under perfect information, either will suffice.

So it is imperfect information and uncertainty which drives the choice of instrument, and the informational problems affect not only the nature of the market failure, but also the nature of government failure. As we shall see, most of the literature concentrates on the former: too little takes seriously the nature of government failure and the ways in which the choice of instrument bear upon the scope for rent-seeking, capture and lobbying by interested parties.

Price or quantity

The classic analysis of the choice between prices and quantities – and in our case, between carbon taxes and emissions trading – was set out by Weitzman (1974). He focused on the slopes of the damage and cost functions. Applied to climate change, the policy maker needs to consider the slope of the climate damage function (whether slightly more emissions make much difference to the damage) and the slope of the cost function (whether costs rise sharply for a small reduction in emissions).

The Weitzman approach then asks a simple question too often ignored by policy makers: what happens if the price or the quantity picked is wrong? On the one hand, if the damage function is fairly flat (a bit more carbon emitted will make little difference to the stock of carbon in the atmosphere), then if the quantity is wrong it will not make much difference to global warming. If however the cost function is steep for a small reduction in emissions (say by building expensive offshore wind farms), then to get the price wrong will have seriously detrimental consequences. On the other hand, if the damage function is steep (there are sudden catastrophic increases in temperature for small increases in emissions) and the cost function is flat, then it is better to fix the quantity, since then at least we can be certain of the limitation of the damage.

What sort of problem is climate change? Where do the uncertainties lie? As is so often the case in public policy, we cannot be sure. Some scientists predict sudden switches and catastrophe. They emphasise the 6°C upper bound of the distribution of possible temperature increases by 2100, and rule out any significant benefits from increased carbon concentrations and temperatures.

Others point to the lower bound and a smooth process of increases. Finally, a few expect feedback mechanisms from increased humidity and temperatures to beneficially affect plant growth, rainfall and cloud cover.

On the costs side, if anything, the scope for disagreement is even wider. There have been a number of studies which suggest that the mitigation costs are low, and indeed tackling the problem may actually be net present value positive. These studies tend to *assume* costs for specific technologies exogenously, and then transpose these onto the economy. The Stern Report's single short chapter and annex is of this form, and unsurprisingly it predicts that the costs will be low – with a mean of 1% annual global GDP.[105]

These cost approaches are only as good as the assumptions that go into them. These can be, unfortunately, far from objective: the numbers themselves tend to be produced by those who have a vested interest in their use, they are accompanied by further assumptions about how the costs will fall over time, and often these learning and technical progress assumptions are not carried across to the rival fossil fuels (whose costs are assumed to rise on the basis of highly questionable "peak oil" theories and a failure to take account of non-conventional gas). These are classically "garbage in, garbage out" models. Worse still, amazingly they tend *to assume no policy costs at all* – in other words, no government failures. The (assumed) least cost functions will be seamlessly transposed into the economy. The Stern Report makes this mistake and its cost estimates are therefore wrong.

It is increasingly accepted that government failure plays a significant role in the design of climate change policies. Even Stern doubled his cost estimation once his omission of all policy costs was pointed out. Given the scale of the interventions, there is correspondingly a very large "climate change pork barrel" (Helm 2010) with vested interests searching out the economic rents thereby created.[106] Lobbying and manipulating information are used to advance their particular activities, from promoting particular technologies to trading. Examples include the wind lobby, which has succeeded in capturing the policy process to promote very large scale deployment of (very expensive) offshore wind, and the City of London which has captured the trading profits.

Taking this very imperfect evidence on damages and costs, on the Weitzman analysis, carbon taxes are probably to be preferred to tradable permits. Permits should only be chosen if the cost optimists are right, and great weight is placed upon the small probability of catastrophic outcomes – what Weitzman later called the "fat tail" (Weitzman 2007). In the former case, the cost optimists lack credibility. In the latter case, such drastic action would be needed that permits are unlikely to be sufficient.

This sort of uncertainty may be partially resolved by further scientific research, but unfortunately waiting for greater certainty is not a luxury that can be afforded, because if global warming indeed turns out to be catastrophic, by the time the information has improved sufficiently strong to adjudicate on the choice of instrument, it will be too late.

Weitzman's analysis is not however the only way to think about this issue. There are at least three further arguments in considering the relative merits of taxes and permits: the scope for capture of the instruments; the scope for international transfers; and the politics.

105 Stern, N. (2006), The Economics of Climate Change: The Stern Review, Cambridge: Cambridge University Press.

106 Helm, D. (2010), Government Failure, Rent Seeking, and Capture: the design of climate change policy, *Oxford Review of Economic Policy*, Vol 26 No 2, 2010, forthcoming.

Scope for capture

It is easy to establish that government failures drive up the costs of mitigation. What is less frequently recognised is that different kinds of instrument create different scope for rent-seeking and capture activities. In the climate change example, setting a price for carbon creates large income effects relative to the substitution effects in the short run. Given that the capital stock takes time to turn over (power stations for example last for decades), in the short run there is little than can be done to change behaviour as the relative price of carbon is increased. Over time, substitution takes place and the substitution effect is therefore correspondingly bigger relative to the income effect. The short run is probably at least a decade – in other words the substitution effect will really kick in powerfully only *after* 2020, not before (which is one reason why the EU 2020-20-20 climate change package is so badly flawed).[107]

> "Given that the capital stock takes time to turn over (power stations for example last for decades), in the short run there is little than can be done to change behaviour as the relative price of carbon is increased"

A big income effect attracts rent-seeking vultures. In the case of the carbon tax, the revenues go to government, and hence rent-seeking is focused on three variables: how the tax base is defined; what the tax rate is; and what the monies collected are spent on. As we shall see below in the discussion of the design of a carbon tax, there is likely to be a scramble for a tax base which suits each lobby group; rent-seeking in respect of the tax rate; and a scramble to get the revenues hypothecated to the particular vested interest's benefit.

The case of the permits scheme is much worse. The income effect is explicitly capitalised in the value of the permits: they are valuable economic assets. Rent-seekers focus on ensuring that they are grandfathered rather than auctioned (so that they, not the government, capture the value) and that the rules for new entrants and the restriction of the number of permits over time are favourable. Where the scheme is EU wide, each member country has a clear incentive to better its own relative position. Such a scramble for rents was observed in December 2008 in the setting of the EUETS framework for 2012-2020.

Scope for international transfers

A second argument deployed in defence of permits is that they create the scope for international trading, and in practice allow developed countries to pay for emissions reductions in developing countries, without the need for government-to-government transfers. The Clean Development Mechanism (CDM) is the means to this end. This "below the radar" argument is then contrasted with carbon taxes, which would require explicit government-to-government transfers, with all the politics this might entail.

There are several ripostes: international trading takes time to develop and requires fungibility (in practice between the EU and US, and ultimately between the US and China); the projects need to be of sufficient scale and additionality to make a difference; they need to be genuine, in a context within which rent-seeking is very attractive; and, in contrast to the governmental transfers, the transfers from permits are likely to be quite small.

107 Helm, D. (2009), "EU Climate-Change Policy – a Critique", In: Helm, D. R. and Hepburn, C. eds. (2009), *The Economics and Politics of Climate Change,* Oxford University Press, October.

The case for the EUETS rests in part on the assumption that the US will develop its own US ETS and that the two schemes will then merge into a global trading market. The attempt to introduce cap-and-trade legislation in the US has been fraught with difficulty, as it has in Australia, where discussions have been deferred to at least 2012. In both cases major concessions (rents) will have to be granted to specific vested interests to try to make progress, with the result that each scheme will be unique. Trying then to merge these schemes together will take time, and involve a further round of negotiations and concessions. This is at least a decade away. In the meantime the prices in various schemes are likely to be low, reflecting the concessions. Thus if the case for permits is that the damage function may be steep relative to the cost function, the permits approach will tend to delay action rather than accelerate it. Hence the urgency of the climate change issue on these grounds counts against the permits-based approach.

Finally, at Copenhagen, the importance of creating funds for developing countries was apparent. The CDM was not the main focus of debate. Rather, the focus was direct government funding. Permits trading might make some contribution to transfers, but it does not get round the political problem of requiring governmental direct funding.

Politics

The third argument for relying on permits is politics: it is argued that voters will resist taxes because they are explicit, and hence the permits approach is a politically easier way of establishing a carbon price. Over the last decade this may well have been true. Indeed, voters outside Europe resisted both taxes and permits. Even in Europe, the EUETS proved politically possible only by grandfathering the permits and allocating sufficient numbers to limit the price. The EUETS has, as a result, produced a low price which is short term and volatile (we return to this below in section 4).

Thus, the political argument in favour of permits over taxes turns out to be little more than an argument against carbon pricing at anything other than a negligible level. Once it is proposed that the permits should be auctioned, and that the cap is significantly tightened, then the anti-permits politics is likely to become much more hostile – as indeed the US and Australia proposals illustrated in 2009.

The context of the last decade has now changed dramatically. The economic crisis has driven governments to unprecedented levels of borrowing , and fiscal deficit reduction is now an imperative in almost all developed countries. A consequence is that most will have to raise tax revenues substantially. The choices are narrow: VAT, income taxes, capital gains taxes, duties and corporation taxes. Given the limitations imposed by international corporation tax competition, governments now face a much more politically unpleasant set of choices compared to the last decade. In this context carbon taxes have a role to play. They may be unpopular, but perhaps less so than income taxes. They come with a "green" wrapping, and voters may have the illusion that since the taxes will be levied on companies (the formal incidence), they, the voters, will not be greatly affected (the economic incidence).

In the search for revenue, auctioned permits might be even more attractive – since they capitalise what would have been an equivalent carbon tax over time. But here practicalities come to bear: the political resistance from industry, forced to borrow large sums in the short term, would be very great. Only a limited phased auctioning would be practical. This politics too, points towards carbon taxes.

Summary

The case for carbon taxes over permits rests upon two broad considerations: the relative shapes of the damage and cost functions; and the relative scope for rent-seeking and capture by vested interests. The case for permits rests on the "fat tails" argument – putting lots of emphasis on climate change catastrophe – and cost optimism. On the former, the jury is out – and the Copenhagen negotiations demonstrated that there is no appetite for drastic short term action amongst the major polluters. On the latter, the exclusion of policy costs and the ignoring of the impacts of rent-seeking and capture point to much higher short run costs.

It is therefore reasonable to conclude that there is a strong case for using carbon taxes rather than (or at least, as well as) permits, and that there is a serious inconsistency between arguing on the one hand for permits on grounds of catastrophe, and on the other hand, recognising that getting a functioning international merged emissions trading scheme, including the EU, the US and Australia, with a high enough price over the longer term, is decades away. If climate change is urgent, then taxes are much faster and more immediately effective than permits. Furthermore, as we will see below, they can in practice be crafted with sufficient flexibility to meet a quantity target. It does not follow that a quantity target requires a quantity instrument.

But before we look at the EUETS and consider the reform options, given the political and commercial interests in persevering with such a flawed policy, we need one more building block. Emissions may be caused by production activities, but it is the consumption of these products that determines the path of the resulting emissions.

3
Consumption Versus Production

The Kyoto approach, reinforced in the debates at Copenhagen, sets targets for the *production* of carbon in each capped country. The idea is that if each and every country limits the quantity of its emissions within its geographical boundaries, then the aggregate global level of emissions will be correspondingly limited.

The trouble with this argument is that there is almost no chance that all countries will accept such absolute caps. Those that will not include some of the greatest polluters (notably India and China) and amongst those that do, few have credible policies to achieve them. At Copenhagen, this came down to an argument between China and the US (with Europe on the sidelines). The US argued (as it had previously done in respect of Kyoto) that China should accept a cap too; China insisted that as its *per capita* emissions were low, it had a right to develop, and the current concentrations of carbon in the atmosphere were largely the US (and Europe's) responsibility.

Inevitably the argument comes down to fairness: whether, and how much the US (and Europe) should pay the developing countries to reduce their emissions, and how radical the cuts in developed countries should be to accommodate the developing countries growing *per capita* emissions. There is additionally the fear in the developed countries that big cuts in their own countries will drive up their relative costs, thereby leaking jobs and production to the developing countries.

The facts are not hard to establish. *Per capita* emissions are much lower in China and India than in the west. Historic emissions are largely of US and European origin. But without a cap on Chinese and Indian emissions, there is little chance of mitigating climate change. Both are likely to add 1 billion to their populations by 2050, and at around 7% GDP growth per annum, each doubles the size of its economy every decade.

It looks like a showstopper, and at Copenhagen it was. But amongst the reasons for this *impasse* are the ways in which the problem of emissions is described, and responsibility assigned. Kyoto is based on *production*, not *consumption*, and it has a great attraction to developed countries in Europe and (eventually) the US in that it flatters their emissions data. Europe in particular has gradually been de-industrialising relative to China: instead of making energy intensive products within its geographical boundaries (and which would therefore count against the Kyoto production targets), these industries have gradually been migrating to cheaper labour in developing countries. Steel, ship building, chemicals, refining, cement, metallurgy, manufacturing and so on form the basis of the growth miracles of China and India. Instead of producing these things, Europe (and the US) import them from the likes of China and India. So whilst production of

carbon (and the energy and carbon intensities) has been reduced in Europe and the US, the consumption of carbon has not.

An example illustrates the point. Between 1990 and 2005, UK carbon production went down by over 15%, and the UK will almost certainly coast through its Kyoto target of emissions reductions by 2012. But how has this been achieved? The UK has de-industrialised and switched from coal to gas in electricity generation (for reasons which have little to do with climate change policies). Indeed policy has made almost no difference to the emissions path. So when the production numbers are translated into carbon consumption by adding back carbon imports and also aviation and shipping, the UK's emissions went up by around 19%.[108]

Generalising this observation supports a rather less attractive story for the developed countries: much of the emissions in China are for us, not the Chinese. The emissions are produced in China, to be consumed in Europe and the US – whose economies together equate to around 50% of world GDP. The obvious implication is that we should pay for our emissions, wherever they are produced.

The focus on consumption is reinforced by a more general feature of climate change. Looking through to 2050 – the date by which substantial decarbonisation has to be achieved if the scientific consensus is correct and the aim is to limit warming to two degrees – the wall of forthcoming consumption needs to be addressed head on. By 2050 the world's population is predicted to rise by about 3 billion to 9 billion. Roughly a 1 billion increase in each of China, India and Africa. These extra people will require energy, food and water. By that time the Chinese and Indian economies will have quadrupled. Add in growth in the developed countries of say 2% per annum, and it is immediately obvious that the sheer scale of the increased consumption dominates the climate change problem.

Focusing on consumption rather than production not only changes the way we should think about Copenhagen and subsequent attempts to replace Kyoto, but it has an immediate policy implication. If the price of carbon is to provide an appropriate incentive to decarbonise, it needs to be targeted at consumption. It should not discriminate between the geographical origin of the emissions, but rather focus on the consumption decision. It does not matter from a climate change perspective whether the emissions are in China or the UK. Indeed under Kyoto-type arrangements (and the Copenhagen Accord) there is a built-in incentive to switch production of carbon intensive industries out of the capped countries into the uncapped ones, and then to import back the goods produced. Add in the lower energy efficiency of production in China and India, and the carbon costs of shipping too, and the net result may actually be worse than in the absence of the Kyoto caps. This is indeed one reason why Kyoto has made almost no difference to the concentrations of carbon in the atmosphere.

The implication for the choice of instrument is rather stark too. The permits regime as a method of implementing the caps relies on the mapping of production targets onto permits. But as long as it is accepted that the caps will not be applied to major polluting countries like China, the "leakage" problem remains. The Clean Development Mechanism (CDM) is unlikely to plug the gap. However if a carbon tax were to be applied to consumption on a geographically neutral basis, the location of carbon intensive industry is not distorted. Furthermore a carbon tax on consumption aligns the incidence of the tax with responsibility. We pay for the

108 Helm, D. R., Smale, R. and Phillips, J. (2007), "Too Good to be True? The UK's Climate Change Record", December.

emissions we cause through our consumption, regardless of whether they are produced in China or the UK. Carbon consumption in China and India would also need to be addressed, but the fairness issue is easier to address once the export component has been dealt with through a carbon border tax.

Taxing consumption rather than production is therefore powerfully supported by arguments from both efficiency and equity. Border taxes in principle therefore have a lot going for them. The objections relate to the claim that they are protectionist, and therefore go against free trade. This is nonsense: to have production caps in some countries and not in others distorts relative prices and hence distorts trade. Border taxes based upon carbon consumption improve the efficiency of trade. The problem is not the *principle* of border taxes. It is their *application* – to which we turn in section 5 below.

4

The EUETS – and the Case for a Floor Price

So far we have established in principle that carbon taxes are to be preferred to permits, and that consumption, not production should be taxed. However, we start from the polar opposite: the EUETS exists, it has immense political and lobbying support, and it is production based. It is not going away, so the practical question is: how can taxes be introduced alongside the EUETS, in a manner that improves overall efficiency and which enables a broad consumption base to be taken into account?

The starting point is to recognise the flaws in the EUETS. The next step is to consider hybrid approaches with both taxes and permits running alongside each other. The third step is to look at the ways in which a hybrid system might evolve.

The EUETS was introduced with much fanfare by the European Commission. It built on the experience of the UKETS and the experiment with sulphur trading in the US. It was intended to map the Kyoto targets into permit limits and thereby to create a new market which would gradually expand to incorporate more sectors of the economy and to provide a European-led step towards a global carbon market. This fitted into the broader political aim of Europe showing global leadership – an ambition rudely pushed aside at Copenhagen by the US and China.

The EUETS rightly began as an experiment, with a trial period for 2005-2008. This revealed a number of difficulties – some practical, such as data and information provision, and some about principles, such as grandfathering and windfall gains. In 2007, the Commission produced its climate change package, around the political spin of 2020-20-20 – a short-term (2020) emissions reduction target of 20%, and associated 20% renewable generation targets and energy efficiency (Commission of the European Communities 2008).[109] The EUETS permits were to be increasingly auctioned rather than grandfathered, the sectors included widened, and the caps for 2012-2020 were to be tightened up.

There followed an intense lobbying campaign by companies and national governments to moderate the scheme to their particular interests. The result was to water down the proposals considerably, and to, in effect, let aviation off its carbon hook by including it inside the EUETS where it could buy its way out of its pollution. By the EU summit in December 2008 under the French Presidency, the EUETS had been largely captured (Commission of the European Communities 2009).[110] The result was an EUETS which displayed three main characteristics – it was short term (to 2020) in the face of a medium to long term problem; it was

109 Commission of the European Communities (2008), "20 20 By 2020 – Europe's Climate Change Opportunity", Brussels, January 23rd, COM (2008) 30 Final.

110 Ref needed – Commission... 2009

volatile in the face of a need to build stable carbon prices into investment decisions; and the price level was low and looked like staying low, and well below any reasonable estimate of the social cost of carbon (Tol 2009).[111]

Aside from the obvious but politically impractical suggestion to scrap the scheme, consideration was given to how it might be shored up – in particular by placing a floor under the carbon price, and a cap on top of it. There was indeed a theoretical rationale for this sort of approach. The Weitzman framework discussed above was based upon simple damage and cost functions, and a consideration of their relative shapes. Roberts and Spence suggested that the relative shapes might differ over different segments of the damage and cost functions.[112] Hence, for a certain range, a quantity-based scheme was appropriate, but above and below it a price-based instrument might be more appropriate.

To this theoretical argument, more practical considerations can be added. Above a certain price, the politics of the EUETS might prove very difficult. If the price moves up sharply, there would be immediate consequences to industry and consumers. They might resist – indeed given the resistance to even weak permit allocation proposals in the US, Australia and at the December summit in 2008 in Europe, such resistance might kick in at relatively low price levels. More importantly from the climate change perspective, there is a case for a floor – a minimum price which can underpin low carbon investments.

> “Above a certain price, the politics of the EUETS might prove very difficult. If the price moves up sharply, there would be immediate consequences to industry and consumers”

The problems of incorporating ceilings and floors in the EUETS are not trivial. The ceiling can be dealt with by issuing more permits once the price threshold has been reached. The implication however is either that the overall carbon target from which the permit allocation was derived is thereby breached, or some other instrument would need to be tightened up. The floor is even more difficult: governments would have to buy back permits to hold up the price, and that would involve revenue loss to Treasuries. In ordinary circumstances, this would be a difficult item of public expenditure to manage: in the current financial crisis, it would be almost impossible.

Therefore the floor at least would have to be set outside the EUETS whether or not the total carbon price was net or gross of the EUETS level. There are several ways of doing this. One method is that facilitated by the 2010 Energy Act in the form of a CCS levy. Though the Act does not specify the precise mechanism, the guaranteed minimum price could be derived on the basis of a contract for difference with the EUETS price. There is therefore linkage in that the total price of carbon is net and not gross of the EUETS price. It is, however, technology specific. A better method is to have a carbon price floor as a carbon tax outside the EUETS. The tax would be paid in addition to the EUETS permit price by polluters who are covered by the EUETS domain. It could be levied only on the EUETS covered companies, but it need not be so. There could be a carbon price floor – a tax – on the economy more generally. In other words the tax base – to which we shortly turn – could be left open.[113]

Whilst a carbon tax on its own would be preferable to a hybrid scheme, the sheer weight of political and commercial interest in the rents from the EUETS

111 Tol, R. (2009), “The Economic Effects of Climate Change”, *Journal of Economic Perspectives*, Volume 23, Issue 2, May 2009, Pages 29-51.

112 Roberts, M. J., and Spence, M. (1976), “Effluent Charges and Licenses Under Uncertainty”, *Journal of Environmental Economics and Management*, 5, 193–208.

113 Another option is to tax only those outside the EUETS. The carbon tax in Ireland is an example.

make it impractical to simply close down the EUETS immediately. The floor price approach leaves the options open. On the one hand, the EUETS could turn out to be the precursor of a global scheme. The US in particular could move quickly to its own cap and trade regime, and then merge with the EUETS. On this approach the floor price would continue to be beneficial, providing certainty to investors, but as confidence in the EUETS grew, it could remain a bit-part player. On the other hand, if the problems in the EUETS continue to be manifest, then the floor carbon tax could gradually take up the strain. The combination of the inherent weaknesses of the EUETS and especially the exposure to rent-seeking and capture make the latter the more likely outcome, but the floor price approach has the merit of sorting out the immediate problems with the price level and volatility, and if a commitment is made never to lower it, then the post-2020 carbon price minimum is known, partially addressing the short term aspects of the EUETS too.

5
The Choice of Tax Bases

What sort of carbon tax should there be? What should be taxed? Assuming that the objective is efficiency in the first instance (we consider fuel poverty implications below), the tax should be designed to correct the market failure, having regard to the administrative costs and capture issues. The market failure is pervasive and general – and therefore the tax should be too. Above, we established that the tax should take account of consumption rather than production. Yet it is immediately apparent that calculating the carbon composition of each and every consumption good would be practically impossible, and hence the best that can be achieved is to choose some proxy, and coincidentally take account of carbon imports. The carbon tax should therefore combine a domestic proxy for consumption and a border tax.

Of the domestic options, there are broadly three: a tax on EUETS-covered plants; a tax on electricity generation by fuel type; and a tax on primary fossil fuels. Whether the tax is upstream or downstream is of course important, but secondary. To any and all of these options a border tax can be added. Given we already have the CCL and a proposed CCS levy, it is appropriate to consider how well these approximate the options, and whether they could be modified accordingly.

An EUETS based tax

The EUETS is the obvious target, and for several reasons. It already exists, and hence is a ready-made tax base; it is intended to be the principal instrument for establishing a carbon price, and hence a carbon tax associated with it can be viewed as reinforcing its role and significance (the floor price); and it covers heavy polluters, notably including the electricity generators.

The disadvantages are derived from the partial nature of the carbon coverage given by EUETS plants and the nature of the EUETS itself. So far, the EUETS covers less than half of total carbon emissions.[114] It excludes energy efficiency from the rest of the economy, notably buildings, has no coverage of the domestic sector, and leaves out aviation (at the moment) and much of the transport sector. Agriculture is excluded too. The EUETS – built upon Kyoto – is production and not consumption based, and therefore adding a carbon tax to it would exacerbate the carbon "leakage" problems identified above. The case for this narrow tax base is therefore that it is the only one that continues to make the EUETS the centrepiece of climate change policy, reinforcing it rather than undermining it.

114 Wagner, M. (2004), "Firms, the Framework Convention on Climate Change and the EU Emissions Trading System", *Working paper,* Centre for Sustainability Management, Luneberg University.

An electricity generation tax

The second option is to go even narrower – to focus on electricity generation. The argument here is that it captures most of what the EUETS base would include, but not those industries that are vulnerable to "leakage". It would be simple to collect, emissions are easy to measure, and it would focus the incentive to decarbonise on the sector where the investment decisions are most serious and immediate in carbon terms. It would reinforce the incentives to build renewables, aiding the achievement of the renewables target, accelerate the switch from coal to gas, and provide a boost to the economics of new nuclear.

The disadvantages are, however, considerable. The obvious one is that it narrows the tax base further and hence perpetuates existing distortions for the non-included activities and introduces an additional distorting substitution between electricity generation and other energy forms. For example, coal burnt directly in industry would be excluded as a fuel source, whereas electricity would be taxed. The revenue yield would be correspondingly smaller, and hence the tax would have to be higher for a target tax yield. Finally, given the composition of electricity generation, given the design of the market (NETA), and given the substantial plant retirement on age and other environmental grounds in the coming decade, a high and focused carbon tax would accelerate the closure of existing coal plants, bringing down the capacity margin, thereby inducing high and volatile electricity prices, and, at the limit, inducing serious security of supply concerns. In the next decade, the substitution effects within the electricity sector are limited, and since electricity as a whole is inelastic in demand, the tax would largely be about raising revenue rather than substitution.

An upstream fuel tax

A third option is a fuel tax levied on coal, gas and oil weighted according to their carbon content. Such a tax has a number of advantages. It captures all the fossil fuel carbon emissions (including aviation and shipping if these are incorporated within the tax base); it is relatively easy to target, based upon a price per tonne of each fuel; the administrative costs are low; the tax base is wide so proportionately it can raise a lot of revenue; and, to the extent that consumption is targeted by its carbon inputs, it is a proxy for a carbon consumption tax.

A number of drawbacks remain. It does not include a number of sources of carbon emissions, such as from agricultural land use and deforestation. It encourages "leakage" as with the two narrower options above insofar as other countries do not follow suit, and in the short run it impacts on coal most forcefully, thereby also raising the concerns about security of supply of electricity discussed above.

The tax would not be implemented in a vacuum: there are already a variety of energy taxes in place. These bear most intensively on oil and petrol. Transport attracts fuel duty, and upstream oil and gas has attracted a range of taxes on North Sea oil and gas production. The former is already an implicit quasi-carbon tax, and the introduction of an economy-wide carbon tax provides an opportunity not only to get the pricing of carbon right, but also to improve the efficiency of the transport sector by getting its taxation into a more targeted form.

Carbon taxation and transport

The most radical approach to transport in the context of a fuel-based carbon tax is to abolish fuel duty and replace it with road pricing. The carbon tax on upstream oil takes the place of fuel duty, so petrol is taxed on the basis of its carbon pollution. Charging for road usage then makes up the revenue shortfall and this may be tailored to traffic flows and congestion. The car driver therefore pays a carbon tax, plus a congestion charge plus a charge for the creation and maintenance of the road asset.[115] It has been argued that current fuel duty exceeds the implied carbon cost, and hence the net result on the price of petrol would be somewhat lower, but the road fund licence (which would be abolished) is arguably lower than the cost (and hence now the price) of congestion plus road provision and maintenance.[116]

Such a radical reform of both carbon and transport pricing would, of course, require a careful phase-in, and the political constraints would be considerable. However, bearing in mind that the carbon tax component is likely to be lower than fuel duty – and hence lead to a fall in the final petrol pump price — there would be scope to introduce the changes in two phases: first, to replace the fuel duty with a carbon tax, increasing road fund licence fees to make it revenue neutral; and then, second, to gradually replace the road fund licence with road pricing, starting with major cities.

The carbon tax would also provide an opportunity to tidy up some of the other tax distortions in the electricity sector. Differential VAT rates could be phased out, and the subsidies to some technologies could be adjusted downwards or removed as the carbon tax took the strain of signalling to the low carbon technologies. In particular, it would enable the subsidy to wind to be lowered, perhaps initially by reducing the number of ROCs per unit of output – first for offshore wind back to one, and then for onshore to below one. Feed in tariffs which may augment, or even replace ROCs could be net of the carbon tax.

The design of the tax needs to take account of the implicit carbon price which comes through the market prices of oil, gas and coal. The oil price is distorted by market power, and it makes both economic and political sense to consider indexing it inversely to the carbon price. This generalises the policy proposal currently being debated of inversely indexing fuel duty to the oil price.

The border tax adjustment

The border tax component of a comprehensive carbon tax is extremely controversial.[117] The case for free trade has been hard fought for at least two centuries, and the free rider temptation of protectionism has seduced many governments over the same period. Thus any measure that targets specific imports is regarded with deep suspicion, and carbon import taxes have unsurprisingly fallen under this suspicion. The fact that France has recently advocated them adds to the distrust.

Yet, as argued above, in principle a border tax on carbon imports has the merit not only of making the real polluters – developed country consumers – pay for the emissions they cause overseas, but also of improving the efficiency of trade by removing the distortion caused by differential carbon pricing. Generalising an externality tax on a global public bad is unambiguously an efficiency enhancing

115 Glaister, S. and Smith, J. (2009), "Roads: A Utility in Need of a Strategy", *Oxford Review of Economic Policy,* Volume 25, pp368-390.

116 Newbery D. and Santos, G. (1999), "Road Taxes, Road User Charges and Earmarking" *Fiscal Studies*, 20:2, pp 103-132

117 See for example Grossman (1980), McKibbin and Wilcoxen (2008), Veenendaal and Manders (2008) and Gros (2009).

measure, including making trade itself more efficient. Not pricing the carbon externality is a distortion; pricing it differentially in different countries is distortionary too. The border tax ensures that there is a degree of consistency. It improves efficiency, though does not of itself create optimality. So the objection cannot be one of principle, but rather must turn on the practicalities – whether what purports to be a carbon tax is, in fact, disguised protection.

The protectionist argument arises in the context in which border taxes are applied either as a generalised import tariff to reduce imports in aggregate or selectively with the aim of deliberately distorting the composition of trade. Thus what matters are the practicalities – whether the border tax is focussed exclusively on carbon and carbon content and on a similar basis to the domestic carbon tax. (Domestic carbon production taxes in the absence of a border tax is an implicit import subsidy).

The practicalities are daunting. As with a domestic carbon consumption tax, measuring the carbon content of each and every import is not feasible. There have to be some simplifications. These come in two forms – restricting the goods to which the border tax is applied; and making approximations for the carbon content of those goods to which it is applied. In both cases there is a trade off between efficiency and simplification, although it is almost always the case that *some* border tax is more efficient than none since the tax goes in the right direction of the externality.

Starting with the restriction of the scope of the goods covered, the obvious base is the equivalent industries to those covered by the EUETS *on the one hand*, and outside the EUETS and hence the EU *on the other*. This is where in principle the maximum carbon "leakage" takes place – both from the EUETS itself and the carbon tax.

> "The border tax therefore not only makes consumers pay for the production of carbon on their behalf overseas, but also it gives an incentive to the producing country to increase its competitive position by switching to lower carbon technologies and to introduce its own carbon pricing regimes"

We could start with a simple list of large-scale energy and carbon intensive industries – steel, cement, chemicals and so on. To each there could be a *pro-rata* carbon assumption applied. This is the simplest methodology. There is then a continuum of complexities that could be added. For example, the country of origin's energy mix for electricity generation could be applied. Another option is to exempt imports which can demonstrate renewables electricity as the energy source. These steps are all more straightforward than the project-based complexities of the CDMs which require, in addition to the project carbon savings, a counterfactual to be applied, with all the certification bureaucracy which goes with this process. Initially the border tax rate could be low, in order to allow time for adjustments.

As other countries adopt their own carbon taxation systems – or cap and trade regimes — exemptions can be created. The border tax therefore not only makes consumers pay for the production of carbon on their behalf overseas, but also it gives an incentive to the producing country to increase its competitive position by switching to lower carbon technologies (to gain specific exemptions) and to introduce its own carbon pricing regimes.

The border tax would apply to imports. But what about exports? Where these go to countries which are also taxing carbon (or at least have a permits scheme) the problem is a limited one. A significant proportion of British exports go to the EU. There remain

other markets – notably the US and the Far East where no carbon prices apply yet. The problem – and the solution – is similar here to that posed by the EUETS: in the absence of similar measures in these countries, special treatment applies. There would need to be some adjustment for these markets. The problem is not new or specific to the carbon tax. Again the adjustment is a trade off between simplicity and optimality.

Preferred tax base

Considering the various options above, there is a clear choice between three domestic tax bases. This choice matters because it is not easy to migrate from one base to another over time. The EUETS tax base is the simplest, supports the EUETS as a floor price and can be expanded over time as more sectors come within the EUETS. It is superior to the very narrow option of electricity generation. It also allows the floor price of carbon to be net rather than gross of the EUETS.

The upstream fuel tax is however much more comprehensive, and approximates the carbon consumption from domestic production. It also has two other crucial practical advantages – it enables transport carbon pricing to be rationalised (which the EUETS current substantially exempts), and it would raise more revenue for a given carbon price. As we shall see below, the latter has a further benefit: it could be introduced at a lower rate initially for the same revenue yield.

Current Proposals

The Conservative energy policy paper (Conservatives, 2010a) proposed that the existing CCL would be replaced by a levy on carbon.[118] This is a long standing suggestion, and has its origins in the fudge in the original design of the CCL which protected the coal industry.[119] At the time of the Marshall Report, the Labour Government was dealing with the expiry of the legacy coal contracts in 1998, and indeed went so far as to place a moratorium on new gas CCGTs in the White Paper *Energy Sources*.[120] Changing the definition of the CCL to reflect carbon weightings for the fuels is an obvious step. It was a proposal which found its way into the Conservative manifesto.[121]

The CCL does however have problems as a climate change policy instrument (see p30). Its tax base is confined to businesses, and it has an associated series of "climate change agreements (CCAs)" which are bureaucratic case-by-case arrangements between the government and companies, which provide for lower CCL rates to apply if various measure (mainly energy efficiency) are carried out. It suited the then DETR, lead by Prescott, and had many of the features of capture associated with this sort of administrative bargaining.

The Conservative / Liberal Democrat Coalition Agreement states that the government will seek to introduce "a floor price of carbon" (p.16), but is careful not to focus this on the CCL.[122] It therefore opens the way to the wider tax bases outlined above, yet leaves open the fate of the CCL – whether the floor price would be an *additional* measure or replace the CCL.

Finally, there is the problem of the CCS levy – tailored to specific technology. The Energy Act 2010 provides the power to impose the levy, but does not require it. Whilst a case can be made for the special financing of the CCS R&D, it is not an appropriate carbon pricing instrument.

118 Conservatives (2010a), "Rebuilding security: Conservative energy policy for an uncertain world".

119 See Helm (2004) p. 353-357.

120 Department of Trade and Industry (1998), "White Paper: Conclusions of the Review of Energy Sources for Power Generation and Government Response to fourth and fifth Reports of the Trade and Industry Committee" (Cm 4071), 8 October.

121 Conservatives (2010b), "Invitation to join the government of Britain – the Conservative manifesto 2010".

122 HM Government (2010), "The Coalition: our Programme for Government", Cabinet Office, May.

6
Implementation and Institutions – Making the Tax Credible

It is never politically easy to introduce a new tax, and there are typically unintended consequences. Even the proposal to raise the VAT rate on domestic fuel in the 1990s proved extremely painful. Not only are voters generally resistant to higher energy prices, but there is a direct fuel poverty implication. Energy bills currently comprise over 10% of the household budgets of around 4 million homes. The costs of renewables and energy efficiency measures, together with the CCS levy, can only add to this number.

For this reason, governments have been shy to introduce carbon taxes, preferring the less visible EUETS, and where energy has been taxed, as in the CCL, governments have been careful to promise hypothecation. There are also problems of compliance with EU directives which, in the case of tax harmonisation, has created barriers to particular carbon taxes, notably the upstream tax preferred above.

Reasons for a carbon tax now

There are however three compelling reasons to move to a carbon tax now. The first is that it is likely to be cheaper than the alternative measures for decarbonisation. To date, some of the most expensive options have been chosen first – notably offshore wind. As these come on stream, electricity bills will be driven up sharply. The Labour government's estimate in its Low Carbon Transition Plan (Department of Energy and Climate Change, 2009) that these increases would be offset by lower demand, as a result of the assumed success of its energy efficiency measures, is not credible. Carbon taxes are efficient – and hence their main rationale is that they will achieve the same results as other policies at lower costs. There is therefore a direct implication for the politics of climate change mitigation: carbon taxes are a cheaper option.

The second reason is that governments now have little choice but to raise taxes. The budget deficits in all developed countries are now serious and in some cases perilous. The choice is not whether to have a carbon tax, but rather whether to have a carbon tax or raise income, VAT, corporation or other taxes. The carbon tax not only improves efficiency, whereas income tax reduces it, but it is also politically more understandable to the electorates (provided, of course, they accept the climate change policy imperatives).

The reason for a border tax now is the collapse of the negotiations at Copenhagen, and the recognition that China and India are not going to accept a

meaningful cap on their emissions any time soon. Hence as Europe implements its (very poorly designed and expensive) 2020-20-20 climate change package, the carbon "leakage" will go up as its competitiveness is further eroded. And even on the protectionist argument, it has to be borne in mind that China's refusal to allow its currency to revalue to an appropriate level is, in effect, a policy of competitive devaluation, and hence a policy of generalised protectionism.

Phasing in a carbon tax

Political and public resistance to a carbon tax will be influenced by the level at which it is set. Although there have been numerous estimates of the social cost of carbon, the range of uncertainty is very great, and it has to be recognised at the outset that the capital stock is fixed.[123] Thus, in the very short term, the carbon tax will have a big income effect and a very small substitution effect. Therefore, the efficient level of the tax starts (very) low, but rises over time, consistent with the time frame of the capital replacement cycle, particularly of the energy sector. Put simply, what matters is a credibly high tax *after* 2020, and not a high carbon tax now.

The implication for the tax design is that in the short term the tax should be set at a low enough level to get, if not positive endorsement, then at least political and pubic acquiescence. Since the impact is almost entirely an income rather than substitution one in the short run, the revenue yield can also be a determinant. For in the very short run, given that energy demand is not only met from a fixed capital stock but is also inelastic, a carbon tax is quite close to an optimal commodity tax[124].

The revenue requirement can be driven from considerations of general taxation, and the important trade-offs are in comparisons with the efficiency losses from alternative ways of raising the same revenue. If, as argued above, the upstream fuel tax is used, the tax base is wide and hence for any given revenue yield, the implied carbon tax per unit of energy is lower. If, on the other hand, the EUETS tax base is used, then a higher rate is needed for the same revenue. So if governments need the money, they should go for the broadest tax base – and that conveniently turns out to be the most efficient from a climate change perspective too.

Political and public acceptance of taxes is also influenced by the perception (and reality) of what the money is spent on. This leads to attempts to hypothecate the revenues to specific purposes – in the carbon case, to low carbon technologies, energy efficiency measures and R&D. Yet hypothecation is rarely straightforward. It is not like the BBC licence fee going to the BBC. For in practice all of the low carbon technologies already attract some form of subsidy, and hence the hypothecation of revenues from a ring-fenced carbon tax would be likely to be offset by the reduction of these subsidies. In the more general case of the CCL, which was claimed to be "hypothecated to the reduction of National Insurance (NI) contributions", a subsequent budget *raised* NI again, so that the counterfactual was a moving target. Other than political expediency, there is no good reason to hypothecate the carbon tax revenues any more than those from income tax – raising revenue and subsidising particular technologies should be kept apart. The carbon tax corrects a distortion – the counterfactual is a distorted economy with an implicit subsidy to carbon-intensive industries. As with the

123 Tol, R. (2009), "The Economic Effects of Climate Change", *Journal of Economic Perspectives,* Volume 23, Issue 2, May 2009, Pages 29-51.

124 The optimal commodity tax is one which has the minimum distorting effects for a given revenue, and hence the tax is set inversely to the demand elasticity.

grandfathering of the permits in the EUETS, the income effect is artificially high and hence output from these polluting industries is too high.

Setting the border tax requires a delicate political walk through the protectionist minefield. It would be better if this was Europe-wide rather than a separate tax for each member country, and that some independent body oversaw the simplifications to specific industries, the approximation for carbon content, and the exemptions for imports from countries using renewables, or which are part of a carbon capped regime. We consider this institutional context next.

Establishing credibility and the long term price of carbon

The problem with the EUETS is that it lacks credibility – even in the short term. The price has turned out to be much lower than expected, and investors in low carbon technology have limited confidence in its future level. There is little by way of a forward market, and hence the carbon price cannot be relied upon as part of a project appraisal and its consequent financing. Despite the best efforts of the Commission, the EU Summit in November 2008 undermined its credibility still further.

How then can credibility in the medium to long-term price of carbon be created and sustained? A simple and obvious step at the national level is to get some form of cross-party agreement. Recent experience with the 2008 Climate Change Act and in particular with the setting of carbon budgets and the creation of the Committee on Climate Change (CCC) provides some grounds for optimism.

All the main political parties are agreed on the importance of a carbon price. Two further agreements would be required: one for the introduction of a carbon tax; a second that the tax, once set, will never fall before say 2030 at the earliest. Immediately investors who are focused on post 2020 – nuclear, CCS and second-generation renewables in particular – would have a floor price of carbon to integrate into their investment appraisals, and to use for project finance.

A more ambitious approach would be to pass the setting of the carbon tax to the CCC, analogous to the setting of interest rates by the Bank of England Monetary Policy Committee (MPC)[125]. Given that the CCC advises the relevant Secretaries of State on the rolling carbon budgets, and given that the emissions reductions are now legally binding, the CCC could be charged with a duty to use a carbon tax to meet the budget targets. This would have the merit of making the instrument variable against the target – and hence choosing a carbon price to meet a carbon quantity. In effect, this is rather like the EUETS was intended to be – but clearly for reasons identified above is not.

This would be a radical step, and it is probably only for consideration in the medium term. It assumes that the CCC will continue to garner political support. Since its first report in October 2009 not only reported on progress (as was intended) but stepped well beyond its narrow remit to question the design of liberalised markets and in effect to tell the government how to run its energy and transport policies, this political support should not be assumed. Rather, to make this step of granting powers to vary the carbon tax would first require considerable attention to refining the CCC's remit and its accountability.

There is also a further objection: that the carbon tax is a tax, and as a tax it is the sole responsibility of the Treasury. This is a rule which has considerable

125 This idea was explored in Helm, Hepburn and Mash (2003).

practical merit, and ensures overall coherence to the tax regime, but the concept of a tax is an elastic one, and in practice all sorts of charges and levies are applied across the economy outside the Treasury's direct supervision. The CCL and the CCS levy are recent examples – deliberately called levies, but in effect, taxes.

Some have argued that the carbon tax should not be national at all, but rather be set by the European Commission. Aside from the obvious objection about tax sovereignty, there are two practical objections. First, the Commission is wide open to lobbying by the various vested interests. Member states start in very different positions – France for example has about 80% nuclear generation of electricity and the rest is mostly hydro, whereas Poland is about 95% coal-fired generation. Second, fuel taxes already vary a great deal across the EU, and attempts to harmonise these have had limited success. Despite the control over energy taxes that the Commission has achieved[126], it would have practical difficulties – particularly in the current economic crisis – of asserting its authority over national carbon measures. The best the Commission might do is to try to get agreement about principles and guidelines, and over time to induce some convergence. Furthermore, since the carbon tax is an implicit threat to the primacy of the EUETS, it might spur the Commission to concentrate on making the EUETS more effective.

The Commission might have a greater role when it comes to border taxes. Since the EU is primarily a customs union, this is a natural role for it to play. It would also bolster the Commission's attempt to lead the global climate change debate, notwithstanding the set back it received at Copenhagen. For if the Commission set the border tax, this would be a powerful negotiating inducement to developing countries to adopt more stringent domestic carbon emissions reduction policies. It could also police and administer the exemptions, as an adjunct to CDM accreditation for EUETS external carbon reductions.

Although the Commission could play this role, the protectionist concerns raise the prospect of challenges to the border tax under the General Agreement on Tariffs and Trade (GATT) and action by the World Trade Organisation (WTO). China and India are almost certain to object on this basis to border taxes, and the WTO's involvement is therefore inevitable. This raises two issues: first, why it is acceptable for the WTO to ignore the environmental issues; and second, whether the WTO could be a useful locus for monitoring border taxes.

On the former, the lack of an environmental dimension to trade policy is based upon the economic fallacy that monopoly and tariffs are the only market failures. There is no evidence that this is so: indeed it is at least arguable that environmental externalities are bigger market failures. Correcting for one market failure whilst ignoring others may even reduce efficiency. For example reducing prices of a monopolist who is also a polluter, in circumstances where the pollution is not priced, will increase output and therefore increase pollution. If the latter is of greater economic impact than the former, the intervention exacerbates the overall level of economic inefficiency. It is hard to avoid the conclusion that GATT – and hence the WTO – needs immediate reform if climate change is to be addressed effectively.

On the latter, whilst it is possible that the WTO could take on a climate change role, it is unlikely that it would be effective. It has no expertise on climate change, and the transformation is unlikely to be anything other than messy, with much internal conflict. Some therefore have suggested that there needs to be a new

126 The commission's powers were extended by Directive 2003/96/EC of 27 October 2003 "*Restructuring the Community framework for the taxation of energy products and electricity*". However, the argument about tax sovereignty is fraught, and it is notable that carbon taxes have in fact been developed in a number of other countries – and the CCL was imposed in Britain.

international climate change body – a WTO for climate change. Others see this role as falling to the United Nations (UN). Recent experience at Copenhagen revealed the weaknesses of the UN format, whilst a new body would take considerable time to set up. Hence the border tax issue is probably best left to the EU in the first instance, and if possible designed in such a way as to meet WTO requirements – whilst efforts are made to urgently reform the remit of the WTO.

7
Conclusions on Section 2

The carbon tax's time has come – whether explicitly or as "floor prices" of carbon. Its considerable theoretical attractions over emissions trading have been reflected in the practical experience with the EUETS. The EUETS is short term, volatile and has produced a low price. It has little long-term credibility as a principal driver of de-carbonisation. To this evident need to bolster the carbon price—make it credible over the medium to longer term and give it stability—is added the pressing immediate need for governments to raise money to meet the budget deficits. Carbon taxes are suddenly politically feasible for fear of the politics of the alternatives – raising income taxes, VAT and corporation tax. In practice, the financial crisis is so great that several EU members have already adopted or proposed carbon taxes (or floor prices). Many will be tempted to follow suit. In the recent Irish case, the economic crisis was clearly an important factor in facilitating carbon tax.

This fortuitous coincidence of revenue need and a good economic case should not be missed. The opportunities that crises throw up are typically transient: now is the time to grasp this particular opportunity.

"This fortuitous coincidence of revenue need and a good economic case should not be missed. The opportunities that crises throw up are typically transient: now is the time to grasp this particular opportunity"

The best option for the UK (and indeed for other EU countries) is to adopt an upstream fuel tax as an approximation to a carbon consumption tax, placed upon the main fuels according to their carbon content. There should in addition be a border carbon tax, simplified initially to a few sectors and products, and with exemptions where production can be demonstrated to be from low carbon energy sources or where the country has adopted carbon pricing.

The tax should be set low initially – since the capital stock is fixed – but it should be higher in the future as the capital stock is turned over. Indexing inversely to the oil price has considerable political and economic appeal. In order to ensure this is credible, there should be a cross party agreement that once introduced the tax will never be lowered – or at least not until 2030. More radical methods of gaining credibility – such as letting the CCC set the tax in line with the carbon budgets – are probably a step too far at this stage, but remain options for the future as the politics of climate change evolves.

Though there are obvious dangers of protectionism, the case for a border carbon tax is robust, and indeed the absence of such a tax distorts the location of

production, lets the real polluters – the consumers – off the carbon hook, and undermines carbon mitigation at the global level.

The choice of tax rates is not a matter of exact economic science. Estimating the social cost of carbon is a very inexact exercise and in any event the capital stock is fixed in the short run. Hence if the tax base is broad, then a low initial level enhances the prospects for political acceptability, and since the income effect dominates the substitution effect in the short run, the revenue requirement can determine the initial rates. The broader the tax base, the lower the level for a given revenue.

If the opportunity to introduce a carbon tax in the next few years is missed, then the very great inefficiencies of current climate change policy will be perpetuated, and consumers (and voters) will end up paying more. If the price of carbon is left to the vagaries of the EUETS, then ever-greater intervention at the level of each technology will be required. More support for renewables based on the relatively inefficient ROCs and RO, a special levy for CCS, and more support for nuclear will be the price. Already the UK has a specific policy for each technology, and unsurprisingly rent-seeking and capture are pervasive. The results are more fuel poverty, greater costs, and more carbon "leakage". The problem for the carbon tax is that its formal incidence is explicit, whereas picking winners and the EUETS are implicit in their incidence. But there is no hiding from the economic incidence – which over the coming decade will be revealed. It will turn out that, contrary to the cost optimism of the Stern Review and similar cost estimates – policy costs really do matter. That, in the end, is the political case to support the economic case for a carbon tax.

Conclusions and Recommendations

Robert McIlveen

UK carbon reduction policy has become complex, costly and excessively burdensome. If this is not addressed, it will frustrate efforts to decarbonise, as public resistance and economic costs mount over policies which, simply put, are wasting significant amounts of money. Of the policies examined in this report, Feed-in Tariffs for microgeneration should simply be abolished, while the RHI proposals should scaled back and CRC simplified.

The introduction of a carbon tax represents a major opportunity. Implemented well, with the right strategy to ensure political credibility as well as a predictable price, it could enable a far-reaching tidy-up of policy, promoting more effective, and more cost-effective, decarbonisation.

Carbon reduction policy can be much more cost-effective than it is now. By prioritising simplicity and value for money, carbon reduction policy can achieve more for less.

This report has proceeded on the basis of improving cost-effectiveness in reducing carbon emissions, not on how to meet all targets the UK has, including on renewables. The recommendations made would reduce the cost of meeting our carbon targets by removing expensive distortions. However, they would make meeting the renewables target – the objective of a number of the more expensive policies – less likely, since expensive renewables (such as those under FiTs and the RHI) could be replaced by cheaper, non-renewable emissions cuts (such as fuel switching and energy efficiency measures).

Policy Exchange will be conducting further research into the relationships between carbon and renewables targets, in the light of the UK's legal commitments under the EU Renewables Directive, which will explore these issues in more detail.

Policy Recommendations – Section 1

1. The feed-in tariffs scheme for microgeneration should be abolished. Its £8 billion cost cannot be justified by comparison with other options for tackling the problem of climate change. It largely subsidises well-off households, to achieve massively costly carbon reductions. Any alternative public support for microgeneration should be narrowly focused on those technologies likely to be a significant part of the solution to global carbon reduction, and should not be about supporting mass deployment. There are areas where targeted support for microgeneration makes sense – in particular in isolated rural communities or even as part of international development – but not at the scale envisaged under the current scheme.

2. The Renewable Heat Incentive should be scaled back from aiming for 12% renewable heat by 2020 to aim for 8.5%. The £7-14 billion net cost of the additional 3.5% of renewable heat cannot be justified by comparison with other measures to tackle the problem of climate change.

3. The Carbon Reduction Commitment should be simplified, by cancelling the permitting and cap and trade parts of the CRC scheme. The CRC has the potential to be an effective policy. But the burdens from the permitting and cap-and-trade elements of the scheme are unnecessary and burdensome. They are unlikely to be effective where energy is a minor cost to businesses, on top of the reporting and league table requirements which already appear to be having successful in driving management focus and action on energy efficiency.

4. The UK Government's approach to meeting the EU renewable energy target should be reviewed. The RO and RHI are tremendously expensive schemes, both as innovation and carbon reduction policies. They are driven by the Government's commitments under the EU Renewable Energy Directive. Government has a role in supporting research, development, demonstration and early stage deployment of low carbon technology. But its current policies for doing so are extremely expensive and very poorly targeted. A review should identify the full costs to the UK of meeting the 2020 EU renewable target and identify approaches to reducing those costs, while meeting carbon reduction targets, including for example trading with other countries and efficient support for RDD&D. Policy Exchange will explore these issues in more detail in future work.

At a Minimum: 5. **The CCL should be reformed so that it taxes carbon.** The preference for coal built into the CCL when founded is illogical, while the effects of the policy have long since dissipated. The CCAs have been ineffective and, along with a wider reform of the CCL, should be abolished.

Recommendation 5 is, however, not as thorough or potentially far-reaching as the recommendations outlined in section 2. While it would be an improvement, it would not offer as much opportunity to improve the rest of the policy mix by reforming or abolishing other policies; it would not play the same potential role in shaping climate policy for the long term. This report therefore recommends:

Policy Recommendations – Section 2

1. Introduce an upstream fuel tax as an approximation to a carbon consumption tax, placed upon the main fuels according to their carbon content. This would ideally be net of the EUETS, not additional to it. This would act as a floor price for the EUETS (within the UK) as well as taxing carbon more consistently across the whole economy.

2. The carbon tax should start at a low level and rise over time. This would maximise substitution of high-carbon for low carbon in the future without damaging the economy.

3. The tax must be credible over the long term. The report suggests three options for ensuring this: first, rely on the institutional inertia of the Treasury; second, rely on a cross-party agreement over at least 20 years not to abolish or lower the tax; and third, and most radical, task the Climate Change Committee with setting the rate.

4. A border adjustment to the tax could be used to prevent 'carbon leakage' in vulnerable industries. Assuming this can be designed to be both simple and acceptable under WTO rules, it could approximately level the carbon price paid by all producers, effectively imposing the same carbon price on imported products as domestic production.

Bibliography

BALPA (2008) *Air Passenger Duty* http://www.balpa.org/News-and-campaigns/Campaigns/Air-Passenger-Duty.aspx

Barrett, S (2010) *Negotiating the Next Climate Change Treaty* Policy Exchange

BWEA (2007) BWEA response to the consultation "Reform of the Renewables Obligation" Cambridge Econometrics (2005) *Modelling the Initial Effects of the Climate change Levy* Carbon Trust (2010) *Tackling carbon leakage: sector-specific solutions for a world of unequal carbon prices*

Carbon Trust (2008) *EUETS impacts on profitability and trade: a sector by sector analysis*

Carbon Trust (2005) *The UK Climate Change Programme: potential evolution for business and the public sector*

Commission of the European Communities (2008), "20 20 By 2020 – Europe's Climate Change Opportunity", Brussels, January 23rd, COM (2008) 30 Final

Conservative Party (2010) *Invitation to join the Government of Britain*

Conservatives (2010), "Rebuilding security: Conservative energy policy for an uncertain world"

DECC (2009) *Digest of UK Energy Statistics*

DECC (2009) *Final Impact Assessment on the Order to implement the CRC Energy Efficiency Scheme*

DECC (2009) *Impact Assessment of proposals for a UK Renewables Energy Strategy – Renewable Electricity*

DECC (2009) *Impact Assessment of proposals for a UK Renewable Energy Strategy – Renewable Heat*

DECC, (2009) *Low Carbon Transition Plan*

DECC (2010) *Impact Assessment of Feed-in Tariffs for Small-Scale, Low Carbon, Electricity Generation*

DECC (2010) *Impact Assessment of Coal and Carbon Capture and Storage requirements in 'A framework for the development of clean coal'*

DECC (2010) *Renewable Heat Incentive: Consultation on the proposed RHI financial support scheme*

DECC (2010) *Table of Tariffs up to 2013*

DECC EUETS *Phase III 2013-2020*, www.decc.gov.uk

Defra (2005) *Guidelines for Company Reporting on Greenhouse Gas Emissions Annexes updated July 2005*

Department of Trade and Industry (1998), "White Paper: Conclusions of the Review of Energy Sources for Power Generation and Government Response to fourth and fifth Reports of the Trade and Industry Committee" (Cm 4071), 8 October

DTI (2000) *New and Renewable Energy – Prospects for the 21st Century. Conclusions in response to the public consultation*

EEF (2007) *RO 'Banding' Consultation Submission*

Glaister, S. and Smith, J. (2009), "Roads: A Utility in Need of a Strategy", *Oxford Review of Economic Policy*, Volume 25, pp368-390

Helm, D. R., Smale, R. and Phillips, J. (2007), "Too Good to be True? The UK's Climate Change Record", December

Helm (2008), "Caps and Floors for the EUETS: a practical carbon price"

Helm D (2009) *Credible Energy Policy*, Policy Exchange, London

Helm, D. (2009), "EU Climate-Change Policy – a Critique", In: Helm, D. R. and Hepburn, C. eds. (2009), *The Economics and Politics of Climate Change, Oxford University Press*, October

Helm, D. (2010), Government Failure, Rent Seeking, and Capture: the design of climate change policy, *Oxford Review of Economic Policy*, Vol 26 No 2, 2010, forthcoming

HM Government (2010), "The Coalition: our Programme for Government", Cabinet Office, May

HM Treasury (1998) *Economic instruments and the business use of energy*

HM Treasury (2000) *Regulatory Impact Assessment – Climate Change Levy*

HM Treasury (2001) *Budget 2001*

HMRC (2010) *Hydorcarbon Oils: Duty Rates and Defra* (2005) *Guidelines for Company Reporting on Greenhouse Gas Emissions Annexes updated July 2005 Annex 1 – Fuel Conversion Factors*

Intergovernmental Panel on Climate Change (2005) "Guidance notes for lead authors of the IPCC fourth assessment report on addressing uncertainties"

IPCC (2007) *Synthesis Report*

IPCC (2007) *Summary for Policymakers*

Ipsos MORI (2010) Issues Index: Trends since 1997

Kenber, M, Haugen, O and Cobb, M (2009) *The Effects of EU Climate Legislation on Business Competitiveness: A survey and analysis* German Marshall Fund

London Fire Brigade *Carbon Reduction Commitment* 16th November 2009

Martin, R, de Preux, L and Wagner, U (2009) *The Impacts of the Climate Change Levy on Business: Evidence from Microdata*

Meyer N (2003) *European schemes for promoting renewables in liberalised markets* Energy Policy 2003

Mitchell C and Connor P (2004) *Renewable energy policy in the UK 1990-2003* Energy Policy 32

NAO (2007) *The Climate Change Levy and Climate Change Agreements*

NAO (2009) *European Union Emissions Trading Scheme*

Newbery D. and Santos, G. (1999), "Road Taxes, Road User Charges and Earmarking" *Fiscal Studies*, 20:2

Neuhoff, K (2005) Large-scale deployment of renewables for electricity generation, Oxford Review of Economic Policy

Ofgem (2009) *Renewables Obligation – total obligation levels for 2008-09*

Pearce, D (2007) *The political economy of an energy tax: the United Kingdom's Climate Change Levy* Energy Economics 28

Roberts, M. J., and Spence, M. (1976), "Effluent Charges and Licenses Under Uncertainty", *Journal of Environmental Economics and Management*, 5, 193–208

Sinclair, M (2009) *The Expensive Failure of the European Union Emissions Trading Scheme* Taxpayers' Alliance

Stern, N (2006) *The Economics of Climate Change* Cambridge University Press, Cambridge

Tol, R. (2009), "The Economic Effects of Climate Change", *Journal of Economic Perspectives*, Volume 23, Issue 2, May 2009

United Nations (1987) Our Common Future: Report of the World Commission on Environment and Development

Wagner, M. (2004), "Firms, the Framework Convention on Climate Change and the EU Emissions Trading System", *Working paper*, Centre for Sustainability Management, Luneberg University

Willman, J, ed. Evans, N (2010) *Innovation and Industry*, Policy Exchange, London

Tackling the threat from climate change is one of the most important tasks facing government. Yet in the context of a severe recession and public spending cuts, how can this best be achieved? *Greener, Cheaper* explores current carbon reduction policies, asking whether they are well-designed and how they could be improved. It finds significant complexity, overlap and wastefulness, and makes recommendations to abolish, replace and reform key policies.

The report also contains radical proposals for introducing a carbon tax to price carbon in the long term. It presents a case for taxes over carbon permits, dealing with the political and practical challenges of introducing a carbon tax.

The recommendations in this report propose a better way to deliver the ultimate goal of decarbonising the UK – *Greener* – at less cost – *Cheaper*.

£10.00
ISBN: 978-1-906097-82-0

Policy Exchange
Clutha House
10 Storey's Gate
London SW1P 3AY

www.policyexchange.org.uk