

Climate change mitigation: establishing a credible regulatory framework

**Section on regulation and governance,
ECPR general conference,
Pisa, September 6th-8th 2007.**

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Abstract

There is a strong imperative for significant policies and regulations to mitigate climate change and a wide range of policies across a range of sectors are in operation. However, in public and political debates it is not clear how the myriad micro policies are integrated and connected to aggregate targets. There is a particular need for clear and credible policies that will contribute to aggregate emissions caps set on the basis of the long term targets. This paper focuses on the climate change policy and regulatory regime in Britain and has two main purposes. First, it considers the extent to which the better regulation agenda can contribute to improving the climate change policy regime. Better regulation suggests aspiring to a coherent policy framework with a core policy which sets a carbon price, such as a cap and trade scheme, and the elimination as far as possible of overlapping and inconsistent regulations. However, it is argued that better regulation is often too focused on reducing the quantity of regulation and should be more focused on quality. Better regulation towards climate policy in Britain should shift its preoccupations from seeking and eliminating overlapping and inconsistent regulation towards focusing on the purpose of regulation and explicitly recognising that many regulations do different things and can be complementary and mutually reinforcing. Second, given the apparent shortcomings in the macro climate policy framework, there appears to be scope for learning from another macro policy framework, monetary policy, and particularly the central role of an independent agency. While there are some big differences between climate change policy and monetary policy, important similarities include the crucial need to get it right for the whole of society; the need for long run credibility and commitment; the need for high level clarity and meaningful indicators; the need for a dedicated high level institutional system; and the need for clear political and public communication to ensure the legitimacy of the whole framework. It is argued that although an independent carbon agency can contribute to long run credible carbon reductions, establishing a workable and legitimate whole policy regime is more important. In contrast to the common understanding of modern monetary policy, this requires much more than an independent central agency. The carbon reduction policy regime must include a range of workable and complementary policies and a clear policy discourse and political communication to spread understanding of the regime.

1. Introduction

Climate change is widely seen as one of the greatest threats to the world. Although the science is complex, there is a general consensus that 'dangerous' climate change will occur when the global average temperature rises about 1.5°C to 3°C above pre-industrial levels (the current temperature is about 0.7°C above pre-industrial levels).¹ Indeed the EU has agreed that the temperature rise should be limited to 2°C (Commission, 2007). The significant inertia in the Earth's climate system and resulting time lags in temperature rise mean that we are committed to further temperature rise in the coming century, irrespective of the level of greenhouse gas emissions. To keep the temperature rise below 2°C climate scientists in the UN's Intergovernmental Panel on Climate Change (IPCC) indicate that global greenhouse gas emissions have to be cut significantly (IPCC, 2007a, 2007c). As a result most climate scientists and environmental campaigners, many international organisations, such as the UN and EU, and some governments stress that there is a strong imperative for a significant policy and regulatory response to mitigate climate change by reducing greenhouse gas emissions. In 2007 the EU presidency agreed that emissions 'should' be reduced by about 30% by 2030 and 60% by 2050, though without international agreement it would not bind itself to these targets (EU, 2007).

On the face of it, climate change appears to present a fairly simple policy and regulatory problem. It is to reduce greenhouse gases by levels required to ensure the temperature rise is within the agreed maximum (eg 2°C) required to avoid dangerous climate change. However, there is a vast chasm between the simplicity of the overall objective and the complexity of the practical problems and policy solutions. The policy and regulatory solutions, the practicalities and their impact on established lifestyles and the economy are difficult and highly complex. Climate change therefore appears to be an extreme case of a particular regulatory and policy problem: macro simplicity with micro complexity.

There are a number of reasons for this. First, the problem is dispersed across the economy and society and deeply embedded in modern lifestyles. Greenhouse gas emissions arise from a wide range of industrial, agricultural, business and domestic sectors and processes. The climate change regulatory regime (if a single regime can be so identified) is not a discrete stand alone area; policy and regulation have evolved in a highly fragmented way and are interconnected and nested within other regimes with other objectives such as security of energy supply, energy efficiency and cost effectiveness, better local air quality and biodiversity. This contrasts with more self contained regulatory regimes such as water quality. The climate change regime is thus an extreme case of a regime in which 'hard-won knowledge ... is scattered among multiple organisations and levels of government' (Hood et al, 2001, pp180). This presents distinct problems of effective regulatory assessment which is crucial for policy success. Policies which require a shift in behaviour and attitudes of large sections of society and big changes in many sectors of the economy are 'likely to constitute a severe test in regulatory capacity' (Hood et al, 2001, p182).

¹ There is no one temperature rise agreed to be safe among scientists and different dangerous impacts are likely to occur at different temperature rises (IPCC, 2007b). Nevertheless 1.5°C and 3°C is the range that many scientists consider that dangerous impacts will begin to occur (Schneider and Lane, 2006) and some say that at 2°C substantial impacts will occur (Hare, 2006).

Second, there are a huge number of policies in force and in prospect (perhaps as a result of extent of the problem and the imperative to do something). The wide ranging policy instruments include direct regulation, taxes and subsidies, emissions trading schemes, innovation policies, information and education (appendix 1 summarises the main UK policies which are described in the UK government's climate change programme 2006, Defra, 2006a). Some policies, notably the EU emissions trading scheme, are recent initiatives while some new policies are under consideration. The UK government's draft climate change bill, for example, includes enabling legislation for new trading schemes (Defra, 2007a). Climate change was described as a 'crowded policy space' even before the introduction of the EU scheme and other new policies and ideas (Sorrell and Sijm, 2003, p432). In this space effective policy mix, linking and interaction and analysis is crucial. While the literature is replete with analyses of individual policy instruments or sets of policies within a single sector, comparatively little study has been undertaken of all climate policy mix and interaction (Sorrell and Sijm, 2003; Boemare et al, 2003; Sijm, 2005; Hasselknippe, 2003).

Third, there are different broad policy approaches. At least three can be identified (drawing on Verweij et al, 2006): (i) those in which the market is the main process (individualist). These are mainly tax and cap and trade mechanisms whose basic parameters are set by the state but it is activity in the market from which a carbon price is set; (ii) approaches in which the state is the leading actor (hierarchical). Innovation, infrastructure and planning policies, direct regulations such as product and building standards fall into this category; (iii) approaches in which society and culture have primacy (socio-cultural). In this category there are various forms of information and education designed to raise awareness and change attitudes leading to behavioural change. While the policies within each category are performing different functions, there are significant overlap and close connections. In varying ways, the state, society, individuals and organisations are involved in all. Close connections are evident, for example, socio-cultural change might ease the political legitimacy of introducing policies which result in higher carbon prices; infrastructure and innovation policies might give rise to alternatives to high carbon activities which could reduce the price of carbon. It is quite likely that a coherent policy framework will involve a combination of all three approaches. For example, a macro carbon price policy (such as cap and trade) could be supplemented by complementary micro policies which reinforce carbon price signals and overcome market failures such as information asymmetry.

This huge disparity between the macro and the micro presents particular problems in realising the objectives. Commitment to policy objectives therefore needs to be accompanied by policy credibility. More specifically, macro quantitative targets have to be clearly connected to micro policies. Evidence from the UK's current policies suggests achieving this is difficult. For example, alongside a wide range of micro policies specified in the government's 2000 climate change programme there were macro targets for emission reductions including a target for 2010 but the 2006 programme acknowledged that the targets were highly unlikely to be achieved. The complex micro policy landscape appears to have developed in a highly piecemeal way yet there are dangers in a piecemeal approach (BRC, 2007). Problems include policy overlaps or 'double regulation' (more than one policy/regulation aimed at the same target and purpose)² (Boemare et

² Double regulation is a negative sounding term but there are arguments that it could be positively beneficial. For example, in overcoming problems of free allocation of permits in one scheme and in back-up or supplementary measures required to achieve ambitious targets (Boemare et al, 2003, ppS115-S-116).

al, 2003, pS115), policy underlaps (gaps), and policy tensions and contradictions between different policies and regulations.

The theory and practice of regulatory governance suggests two means by which policy credibility can be established and enhanced: ‘better regulation’ and independent agencies. Better regulation in principle is about regulatory quality; it is concerned with objectives and analysis of problems and policy instruments. Independent agencies are a means of ensuring long term commitment to credible policies. Both therefore appear to be appropriate means to achieve long term commitment to effective micro policies which are clearly connected to macro quantitative targets and overall policy objectives. The objective of this paper is to critically assess these ideas, in particular in the context of climate change policy and regulation and the better regulation agenda and independent agencies which have developed in Britain.

The paper commences with an outline of some of the key problems of climate change policies which a better regulation approach could address. These include the significant policy overlaps that are apparent in the myriad policies and the lack of success and credibility with established and proposed policies. Section 3 shows how a better regulation approach might address these problems by focusing on a core climate change policy, a cap and trade system, and other policies are assessed in comparison with this to check for overlaps and inconsistencies. evaluates this approach and stresses its limitations and that better regulation has to go further. It is crucial for better regulation assessment to explicitly recognise the importance of complementary and mutually reinforcing policies. Section 4 looks at the governance of the climate change regime and particularly considers the possibility of lessons from modern monetary policy regimes and their use of independent agencies to ensure credible long term commitment. Section 5 concludes.

2. Climate change policy and regulation: the credibility problem

Policy proliferation and overlap

Policy proliferation is one of the most distinctive features of climate change policy (Helm, 2005). A complex landscape of micro policies has been developed to address climate change covering a wide range of sectors and deploying a variety of regulatory tools, such as direct regulations, trading schemes, taxes, voluntary agreements, information and education. On the face of it, many of the policies appear to overlap and do similar things. In Britain some of the main existing and possible future policies are:

- EU Emissions Trading Scheme (ETS);
- renewables obligation;
- subsidies for domestic micro generation;
- Climate Change Levy and Climate Change Agreements;
- technology policies for low carbon energy production and consumption;
- energy efficiency measures (domestic and industry);
- information and education campaigns of the Carbon Trust and the Energy Savings Trust;
- regulations (in force and in prospect) such as building standards and light bulbs;
- individual carbon allowances.

Although some overlaps are recognised in the British government's Climate Change Programme, such as the CCA and EU ETS (Defra, 2006a, p49), the general approach is the development of disconnected policies within different sectors. In different ways many of the above policies appear to overlap with the EU emissions trading scheme. That is, the targets and objectives of the EU scheme are ultimately the same as many other policies.

For example, there appears to be a degree of overlap between the EU scheme, the renewables obligation and subsidies for domestic micro generation. The EU scheme is a cap and trade scheme which covers about 50% of total carbon dioxide emissions. The caps are set at national level and approved by the European Commission and it includes electricity generation and many major industries. The scheme creates an incentive on these industries to move to low carbon technologies. This incentive is dependent on the level of the cap (which leads to the price of permits), the costs of moving to low carbon technology, and the scope for and cost of buying permits from developing countries. For the electricity generation industry this creates an incentive to move to renewable generation (though other low carbon generation is possible, eg nuclear power or coal power with carbon capture and storage). There therefore appears to be a clear overlap between this and the renewables obligation. While the government appears to want to move to greater targeting of different types of renewables (by introducing a banding system into the renewables obligation), the energy regulator Ofgem has argued for a long term shift away from the renewables obligation towards the EU scheme which, they argue creates a lower price of carbon (Ofgem, 2007a, 2007b).

Government subsidies for domestic micro renewable generation (normally wind turbines and solar photovoltaic cells) have been in place for some time. This policy can overlap with both the EU ETS and the renewables obligation. The EU ETS resulting in a price of carbon embedded in the electricity price which should incentivise domestic users to seek cheaper alternatives such as possibly micro generation (though at present the cost of micro generation are high and the electricity price would have to rise substantially to make micro generation economic). Also if the renewables obligation included micro generation there would be another price incentive for renewables (by selling renewables obligation certificates).

Similar kinds of overlaps can be perceived between the EU ETS and many other policies. Carbon price signals via the scheme might, for example, induce domestic and industrial energy users to invest in energy efficiency schemes without subsidies or other inducements for conservation such as those information and education campaigns undertaken by Carbon Trust and Energy Saving Trust. Regulations, such as building standards or possible banning of the inefficient incandescent light bulb, might not be required if energy price signals are sufficient to induce such changes.

The fundamental difference between the many policies is between a single carbon price whose signal is dispersed throughout the economy as a whole and approaches which are targeted at specific emitting activities or technologies. As much of climate policy has been built up on a piecemeal basis it is understandable that there are a multitude of highly targeted instruments and a single cross-economy instrument (eg the EU ETS) remains in its infancy. An important debate therefore appears to be about the efficacy of a single carbon price signal dispersed through the economy versus more targeted approaches.

Lack of success and credibility

A second fundamental problem about climate change regulation is that despite the vast number of policies, there is little evidence of success and many policies and regulations lack credibility. Policies and regulations are specified in the government's Climate Change Programme which has been established for a number of years. However, while the UK is on course to meet its Kyoto obligations (due mainly to the shift to electricity generation by gas – more by accident than design), the more onerous domestic targets set for 2010 in the 2000 Climate Change Programme for greenhouse gas reductions will almost certainly not be met by a substantial margin, particularly CO₂ reductions. This is (rather tacitly) acknowledged in the 2006 Programme in which projections for reductions by 2010 have been significantly reduced compared to the 2000 Programme (eg in the 2000 programme the 2010 projection for CO₂ reductions was 19% below the 1990 level while in 2006 it was only about 10% below).

Difficulties in meeting targets have to some extent been recognised by the government in the 2000 and 2006 Climate Change Programmes. Uncertainties in emissions projections (due principally to uncertainties in economic growth and the energy mix) were recognised in the 2000 Programme (DETR, 2000, p127) and in 2006 the lower than expected reductions in CO₂ emissions were ascribed to higher than anticipated economic growth and higher energy prices (Defra, 2006a, p3).

However, it seems that for the emissions reduction programme to be credible it needs to be robust enough to cope with vagaries in the economy and in energy supply. There also needs to be much more evidence-based assurance that the policies in the Programme will actually deliver the predicted reductions. While evidence indicates a modicum of success with some of the policies, the probability of many individual instruments reaching many of the targets is not high. In road transport, for example, reductions from voluntary agreements (by car manufacturers), vehicle excise duty and road fuel taxes are highly uncertain (and are also dependent on other government policies in transport, eg road and airport building and public transport, as well as general trends in the economy, energy and consumer behaviour). Some new measures proposed in 2006, such as the use of smart energy meters, are largely untried, and expected emissions reductions are again correspondingly far from certain.

To be credible and robust, therefore, much more certainty is required that the Programme policies will deliver the anticipated reductions irrespective of such factors as the economy and energy supply (though of course 100% certainty is not possible). A particular problem of credibility is that, with the exception of the EU emissions trading system in which a quantitative cap is specified, quantitative emissions reductions are *not* built into individual Climate Change Programme policies. In effect, micro policies are dispersed and actual emissions reductions in operation are not connected to the aggregate target reductions. Actual levels of reductions are thus highly dependent on actual (and uncertain) performance of particular instruments and on contexts such as economic performance, investments in infrastructure (notably transport and energy) and consumer behaviours and preferences.

The government has recognised some of the limitations of the climate change programme and has proposed a new Climate Change Act which is much more focused on the setting and achievement aggregate targets (Defra, 2007b). A crucial issue concerns the probability of achieving the

aggregate targets for greenhouse gas reductions. What assurance and what confidence is there that the aggregate targets will be achieved? In short, how credible is the Programme and the prospective Act?

There are two key new processes which are proposed in the Climate Change Bill which are focused on compliance with aggregate targets:

- Monitoring and reporting by the new Committee on Climate Change of the Programme's policies and their compliance with the aggregate targets;
- Sanctions applied on the government in the event of the Programme's failure to achieve the aggregate targets within a five year carbon budget period.

The effectiveness of each of these is crucial to achieve the targets. However, both are new, untried and untested in any system of governance. We can ask, for example, what credibility will the Committee on Climate Change establish? While the Committee is expected to work within aggregate targets set by others, there will very likely be controversies about matters such as borrowing allowances from future budget periods and about buying credits from abroad. The Committee will surely have opinions on these which might differ from those of the government. What influence will and should the Committee have over such matters? Will it be sufficiently independent to face down pressures that government might apply to 'massage' the figures if emission reductions do not occur as hoped? Also while sanctions such as subjecting the government to judicial review may not look good for it, what real effect will it have? Will the government be pressurised or legally required to set more stringent targets or more credible instruments to get on track; will it reinforce the Climate Change Programme and strengthen systems of enforcement?

To address the problems of credibility, macro-micro connections, policy proliferation and confusion, possible overlaps and consistency the following sections consider whether better regulation and an independent carbon agency can help.

3. Establishing credible policy: can 'Better Regulation' help?

Better regulation and regulatory simplification

Better regulation in principle is about regulatory quality; it is concerned with objectives and analysis of problems and policy instruments. The notion of better regulation emerged from the deregulatory initiatives of the 1980s (market liberalisation of key economic sectors) and early 1990s and from the increasing modern trend to use regulation and what seems to be the 'unabated construction of the regulatory state' (OECD, 2002, p22). From this emerged an emphasis on regulatory quality, credible commitment to quality and the importance of a 'whole of government level' approach to regulation rather than ad hoc regulatory measures in areas of poor quality regulation (OECD, 2002, p23; Baldwin, 2005). Techniques of better regulation are becoming established in government and the case of climate change regulation seems to be an area in which their application is urgently required. The imperative for effective regulation (the need to meet

macro emissions reduction targets) and the complexity of the policy area indicates that some whole of government and whole of policy area analysis is required.

Better regulation procedures for regulatory decision making include focusing on the problem and regulatory objectives, whether regulation is required and analysis of costs and benefits, and ensuring the purposes of regulation are consistent and transparent to all those on whom it impacts. Principles including transparency, consistency, proportionality, targeting and accountability have been articulated to underpin better regulation and the regulatory impact assessment (RIA) has been developed as the chief tool. Although not specified as principles of better regulation, there is also a case that sustainable development principles such as the precautionary and the polluter pays principles should be included as better regulation principles.

A better regulation approach might be able to address the problems of overlapping and (possibly) redundant regulation, lack of policy credibility and success. What might the better regulation agenda suggest? There are numerous principles of better regulation which stress focusing on the objectives and targeting the problem, simplification, transparency and the removal of obsolete and redundant regulation. Simplification of regulation is a key principle pursued by the UK's Better Regulation Commission.³ According to the BRC two means by which this can be achieved are:

- Consolidation – bringing together different regulations into a more manageable form and restating the law more clearly;
- Rationalisation – using ‘horizontal’ legislation to replace sector specific ‘vertical’ regulations and resolving overlapping and inconsistent regulations.

The BRC's assessment of climate change regulation makes a number of points which clearly follow from these principles. A stress is placed upon developing a climate change strategy, ensuring policies are interconnected and avoiding piecemeal measures. New policies ‘should add value to the existing climate programme and should be clear which market imperfections they are seeking to resolve’ (BRC, 2007, p22). They noted concern that in a short period after the Stern report was published in late 2006 there were over ten separate climate related initiatives by different government departments. The BRC also stress the importance of removing redundant regulation, ensuring the same thing is not done twice and assessing and rectifying existing policy for overlaps, inconsistencies and conflicts (BRC, 2007, pp23-24).

The BRC suggests that emissions trading ‘lies at the heart of mitigating climate change’ (BRC, 2007, p23).⁴ This is clearly a cross-sectoral, cross-economy and international horizontal policy which appears to involve a rationalisation and replacement of sector specific regulations and could resolve overlapping and inconsistent regulation. The BRC recognises that despite the various schemes in operation, emissions trading is still in its infancy and other ‘interim measures’ will be required until a full international market for carbon is established (BRC, 2007, p23). In

³ <http://www.brc.gov.uk/scrutiny.aspx>

⁴ There are important debates between taxation and permit based systems (emissions trading) which point to taxation systems being superior to ‘grandfathered’ (freely allocated) permit systems (Helm, 2003, 2005 and Parry, 2003, 2005). However, the case for taxation against auctioned permits is less strong.

response to the BRC the government has recognised the need to review climate change policies (Defra, 2007b).

Despite the infancy of emissions trading schemes, at the UK national level proposed legislation in the climate change bill could pave the way towards a full economy-wide system. The bill includes powers to enable new trading schemes to be set up with secondary legislation. The documentation accompanying the bill mentions possible new trading schemes (eg personal carbon allowances, a new scheme for medium sized business and industry, and a scheme for agriculture, forestry and land use sectors) and it can be easily conceived that these could be set up to cover all or most of greenhouse gas emitting sectors. Full inter-trading between the schemes would in effect amount to a whole economy carbon certificate-based trading scheme.

There are several reasons to believe that an economy-wide and international emissions cap and trade system will provide the simple, transparent and targeted instrument that better regulation requires. Firstly, compared to the vast array of current policies a single policy with a clear aggregate cap applies across the economy and society. It is true that policy in operation and its effects (price changes dispersed throughout the economy) will be complex, but overall policy can be relatively easily communicated across all society, business and industry. This can also aid its legitimacy.

Second, there is a clear connection between simple quantitative macro targets and the micro policy. In contrast to many policies, quantitative reductions are built into cap and trade schemes thus enabling a clear and quantitative macro-micro connection. There is therefore greater credibility that macro targets will be achieved.

Third, a single core policy provides a clear framework to avoid and overcome inconsistent and overlapping regulation. Analysis can be undertaken to assess where in the supply chain it is best to impose the regulation and ensure that regulation of emissions is only imposed once in the supply chain. Also the rationale for other policies not directly connected to cap and trade but deemed to be necessary can be more clearly delineated.

Limitations of simplification and the importance of ex post assessment

Although such regulatory simplification has advantages over policy and regulatory proliferation, there are limitations of simplification to which the better regulation process needs to adjust. A general limitation is that simplification is often based primarily on ex ante theoretical analysis rather than ex post empirical analysis and adjustment.

One problem is that regulatory simplification requires the abolition of some existing policies yet many of them are embedded, established and to some degree proven. Many established policies have significant stakeholder commitment which might be empirical evidence of the success of policies in achieving their goal, eg increasing energy efficiency or the deployment of renewables. This in itself is not a reason for not questioning them and considering replacing them, nevertheless it presents significant barriers in the way of more rational policies.

New policies are also unproven and their effects are uncertain and unknown. For example, the EU ETS remains largely in its infancy, and questions remain over its efficacy, such as the process

of the setting of emission caps and the scope and efficacy of buying allowances from developing countries using the Clean Development Mechanism of the Kyoto agreement. It is true that extensive econometric analysis has been undertaken about the effects of carbon constraining policies and much of this suggests that the costs of significant carbon reduction are low and much lower than the damage caused by climate change as indicated, for example, by the Stern Report (Stern, 2007). However, it has been argued that there are ‘fundamental problems’ with quantitative cost-benefit analysis of climate policy (or indeed of any economic policy) (van den Bergh, 2004). There are considerable uncertainties in many of the cause-effect assumptions made in econometric models. Quantitative studies can play a role in decision making but in an area of such uncertainty as climate policy, they must be treated with extreme caution. This militates against over-enthusiastic elimination of ‘overlapping’ policies when the policy which is to be retained is largely untested.

This suggests that the importance of ex post assessment of the economic, political and social effects of climate policies and not being over-dependent on ex ante analysis (within RIAs for example). Better regulation techniques, notably the RIA are arguably also too focused on ex ante quantitative ‘econocratic’ analysis rather than ex post review of regime performance (Baldwin, 2005). The limitations of ex ante techniques are all the more significant in complex policy and regulatory regimes such as climate change.

Limitations of simplification and the need to recognise complementary policies

Another limitation of simplification is excessive dependence on price or market-based mechanisms. On the supply side there are, for example, market failures in investment in research and development and in infant technologies and industries. On the demand side there can be market failures in moving towards energy efficiency and lower consumption. Consumers may accept or complain about higher energy prices due the internalising of carbon emissions but not be sufficiently informed or motivated to pursue realistic options to lower consumption or higher efficiency.

This suggests that targeted policies might have a role alongside a price based mechanism. Innovation and technology policies can increase the supply of low carbon technology and reinforce the price signal. Education and information could therefore reduce the demand for high carbon products and services and again can reinforce the price signal. In principle the varied targeted approaches to carbon reduction can be entirely compatible with a carbon price system such as cap and trade. It is therefore important to recognise that policies apparently aimed at the same target can contribute in different ways to reducing carbon emissions; policies therefore can be complementary or even mutually reinforcing. This contrasts distinctly with the emphasis of the better regulation agenda, notably put forward by the BRC (BRC, 2007) which implies that policies aimed at the same target are overlapping, inconsistent and in conflict and that their main justification is as interim measures.

The approaches or policy types of particular instruments therefore need to be identified in order to assess policies for complementarity, overlap or inconsistency. Instruments can be categorised into three broad types or policy approaches which were identified in the introduction. First, economic incentives and a carbon price (individualist). In this approach the market is the main process; the carbon price is set in the market, though the market itself is determined by the carbon

cap or tax set by the government. This focuses on both the supply and demand side. By putting a price on carbon emissions (internalising the externality) it aims to change the behaviour of both producers and consumers. Consumers will be faced with higher prices for carbon intensive goods and services and thus incentivised to shift to low carbon products. Producers similarly are induced to produce goods and services with lower carbon contents. The main instruments are taxation and cap and trade systems. Taxation directly impacts on price and thus is the most transparent means by which a carbon price is set and economic incentive is created. Cap and trade systems also result in a carbon price but indirectly from the setting of the emissions cap.

Second, policies in which the state is the leading actor (hierarchical). This is in the more tradition 'command and control' vein of regulation. Innovation, infrastructure and planning policies, direct regulations such as product and building standards are in this category. Technology and innovation policies are directed primarily to the supply side of the production and consumption. This is normally achieved by subsidy or by a variety of information and education techniques, notably fostering and supporting the networks of expertise and knowledge. There are also more market orientated that can be perceived as technology policy, a significant one of which is the renewables obligation in the electricity sector. The renewables obligation provides a low carbon price signal which appears to perform the same role as an emissions trading scheme which includes the electricity sector (ie the EU ETS). Arguably the renewables obligation operates as a technology policy by overcoming market failures in investment which occur in a broad ranging price incentive scheme such as the EU ETS (Sorrell and Sijm, 2003, p429).

Third, policies in which society and culture have primacy (socio-cultural). The primary focus is on attitudes and awareness and organisations and groups within society play a key role. In contrast to price mechanisms, behavioural change can result from a change in the values and attitudes of consumers and producers. Behavioural change is thus more deeply embedded: it is automatic and spontaneous, rather than contingent on financial incentives. These are not imposed by government diktat or rule of law, nor do they result directly from financial incentives but have emerged over decades of social interaction. Information and education, by raising awareness and knowledge, are the main means by which attitudinal change can be achieved. Increased awareness and knowledge can also increase the acceptability and legitimacy of carbon price approaches. Without this it is not clear that legislators will have the confidence to introduce policies, no matter how rational they may be, which will result in higher price rises for many people.

There are arguments and debates about the suitability of each approach. There is, however, a significant argument that policies are often complementary or even mutually reinforcing and that a synthesis is a more appropriate approach. This is not drawn simply from a 'more is better' view of regulation but from arguments that the policies can and often do complement each other. A better regulation approach therefore needs to be more alert to different kinds of policies and the possibility that multiple policies apparently aimed at the same target are complementary. It suggests that the policy approach of each instrument needs to be identified. Different policies aimed at the same target might not be overlapping. Policies other than those built on the direct price incentive (such as cap and trade or taxation) might be addressing the target problem in a different way, such as by increasing the provision of low carbon technology or lowering consumer demand, and could reinforce the direct price mechanism. This is a crucial step in order to identify whether policies are complementary, overlapping or contradictory.

4. Establishing credible institutions: can an independent agency help?

Credibility is perceived as a common problem in many areas of policy and regulation and an independent regulatory agency is a well established way of achieving ‘credible commitment’ (Helm et al, 2005). The notion of credible commitment is a key feature of modern regulatory governance and appears to be crucial for successful long term carbon reduction. A central feature of this regulatory governance is functional specialisation by an independent regulatory authority; in utility regulation it has become entrenched in Britain and has spread throughout the world (OECD, 2002b, pp54-55; OECD, 2002a, p95). One of the key reasons for delegating powers from principal to agent is the commitment problem which occurs when there is a ‘time inconsistency’. This is when ‘a government’s optimal long-run policy differs from its preferred short-run policy so that government in the short run has an incentive to renege on its long term commitment’ (Majone, 2001). Delegating powers to an independent agent is a means of establishing credible commitment, ie policy makers remain credibly committed to their long-run policy preference (OECD, 2002a, p95).

Current carbon policy in many countries lacks this kind of credibility and can be considered to be weak. In Britain, for example, responsibility for carbon reduction is defused and no single department or agency is responsible setting carbon targets and/or ensuring targets are met in policy and regulatory implementation. There are several government departments which have an input into carbon policy which affects the levels of carbon reduction (Helm et al, 2005, p308). The DTI and the Department for Transport are responsible for energy and transport policy respectively, two of the major contributors to carbon emissions. Defra is responsible for environmental policy while the Treasury has the final say in any environmental tax policies. In addition, agencies such as Ofgem and the Environment Agency play a key role in implementing carbon policies, and other government supported organisations, notably the Carbon Trust and the Energy Savings Trust facilitate shift to lower carbon emissions and energy use.

Credibility and commitment through the use of an independent agency is a particularly important feature of modern monetary policy and might provide some lessons for climate change policy (Helm et al, 2005). Modern monetary policy is primarily based on controlling inflation (to a pre-set target) with the use of interest rates. It is accompanied by a raft of regulations on banks and financial institutions to control money supply and access to debt. Monetary policy is an area in which lack of credibility can impact on the whole economy: wage expectations and price setting processes can mean targets are missed and thus inflation is out of control if policy lacks credibility. Credibility is assured by delegating to independent central banks the primary task of controlling inflation with the instrument of interest rates are widely seen as necessary for rational and effective monetary policy. In Britain this process is achieved by the Bank of England’s Monetary Policy Committee which operates within inflation targets set by the government. The theory and (so far) practice is that the Bank will change interest rates as necessary irrespective of the costs to voters and the electoral cycle.

An analogous institutional set-up and process can be envisaged for carbon targets. An independent carbon agency could be delegated the task to ensure carbon reduction targets are met and empowered to operate the necessary policy levers (eg changing the level of carbon permits available in a cross-economy cap and trade scheme). A carbon (or energy) agency could be

established with a long term target of (say) 60% reduction by 2050; possible duties imposed on the agency include (i) ‘a duty to meet the target by any means it deems suitable’, (ii) ‘a duty to meet the target by setting a carbon tax or emissions trading limit’ or (iii) ‘a duty to monitor the performance of the government in meeting the target’ (Helm et al, 2005, p317). Option (ii) seems the most appropriate; government’s are unlikely to concede the wide ranging powers implied in option (i) while option (iii), though politically most plausible, does not appear strong enough to generate the necessary credibility.

Credible institutions and the need to establish an effective and legitimate regime

While deploying an independent agency to move towards a stronger and more credible policy approach appears attractive, there are limitations which suggest a more sophisticated approach is required to ensure policy success. Care is required for example in directly reading across an institutional framework from monetary policy. Helm et al (2005, p316) note some differences between monetary policy and carbon policy, particularly between the short and long term. In monetary policy the trade offs between inflation and output/employment are generally seen to occur in the short and medium term not the long term, while trade offs between energy prices and emissions are long term. Also in monetary policy key expectations (in price and wage setting) have a period of about 1-2 year while expectations in carbon policy can affect investments which last several decades.

Another important difference is that monetary policy in developed countries, particularly that conducted by independent central banks, has been built up over many decades. Over this time and within certain bounds and in generally favourable economic and political contexts it has proved to be both workable and legitimate (Berman and McNamara, 1999; McNamara, 2002). Legitimacy is crucial. Key stakeholders broadly accept the monetary policy regime, in particular the costs that are imposed on individuals and the economy when interests rates are increased. It is also interesting to note that in many developing countries where political and economic contexts are less favourable and there is less legitimacy attached to orthodox monetary regimes the introduction of independent central banks have proved less successful than in developed countries (Berman and McNamara, 1999; McNamara, 2002). By contrast credible carbon reduction policy remains in its infancy and largely untried. We do not know well how workable it would be nor the costs it would impose on individuals and society, and critically the level of acceptance if and when those costs must rise (evidence from the fuel crisis in 2000 suggests the level of acceptance would be low).

An important related point is that modern macro monetary policy does not exist in isolation. There is a whole raft of other micro policies, notably regulations on banks and other financial institutions, needed to ensure effectiveness. Independent institutions with narrowly defined objectives, responsibilities and policy instruments operate more effectively when they can be clearly separated from other policies and policy objectives. Although monetary policy is not entirely detached from other areas of macro economic policy, in many developed a degree of detachment has been established to enable effective and workable regime. It is not clear that the same can be established for carbon policy. In Britain for example, there are currently several government departments, agencies and other organisations involved in carbon policy (Helm et al, 2005). Moreover, and more problematic, there are multiple and potentially conflicting objectives associated with carbon reduction, such as security of energy supply and cheap energy.

All of this suggests that establishing an independent institution while arguably necessary for credibility is not sufficient. A whole policy regime is required which would include at least a set of complementary policies and regulations to ensure workability and a clear policy discourse and political communication to spread understanding and increase legitimacy. The whole notion of controlling carbon by governmental macro policy instrument is not established and not a central part of the current discourse on climate policy. Much of the discourse is about what can be done in particular sectors, about the hope of particular new technologies, and about trying to inform individuals of their carbon footprint and persuading them to change their behaviour. What it does not include is how it all adds up to macro policy and how macro policy can subsume all these micro initiatives. All of this is required before a strong and independent agency can establish the necessary credibility and legitimacy.

5. Conclusion

The gulf between the simple macro targets of climate policy and the myriad and complex micro policies and regulations is evident. Many micro policies are opaque and in aggregate there is little certainty that they will succeed. The better regulation agenda, with its concerns with regulatory quality, simplicity and transparency appears to provide a means by which to address the problem. In particular, focusing on one core policy instrument – a cap and trade emissions control system – is suggested by the better regulation agenda and appears compelling. It has simplicity and transparency, and it enables a clear quantitative macro-micro connection to be made.

Focusing on a cap and trade system as a single core instrument also enables a framework to be established to assess multiple regulations for overlaps and consistencies. This can be undertaken in two ways. First, a supply chain framework can be set up to assess different cap and trade schemes. This is particularly important given that in Britain there are likely to be several schemes in operation and the new climate change bill proposes enabling legislation to set up new schemes. Assessment can include overlaps (to eliminate ‘double counting’) and consider the extent to which the schemes can be linked and in effect merged into one. Second, and again for policy consistency, the many different types policies other than cap and trade such as taxes, regulations, subsidies, technology support, information and education, can be assessed in relation to the benchmark of the core cap and trade scheme. The recent report by the Better Regulation Commission and the government’s response indicates that the government is considering these issues, at least in part (Defra, 2007b; BRC, 2007).

Better regulation, however, needs to go further than this. It particularly needs to overcome its inherent suspicion of the quantity of regulation the latter manifested, for example, by the stress on the problems of overlap and inconsistency while giving little recognition to the possibility of complementarity. There is also a perception in the UK that in practice the thrust of better regulation is about quantitative reduction rather than qualitative improvement (in particular a reduction in the quantity of classic ‘command and control’ state regulation). For example, some of the work of the Better Regulation Commission seems more concerned with over regulation or regulatory ‘creep’ or ‘inflation’ and reducing the regulatory ‘burden’ rather than improving regulatory quality. Some of their policy documents have stressed that ‘less is more’ and

emphasised ‘alternatives to state regulation’ and a proposal for a ‘one in, one out’ approach to regulation, perhaps the most blatant example of emphasis on quantity over quality.

A key argument of this paper is that many climate change policies are complementary and can be mutually reinforcing. While aimed at the same target they do different things, for example, overcoming market failures in the development of low carbon technology or better informing users about the possibilities of increasing energy efficiency. Better regulation has an important role to play in distinguishing different policy approaches and when and how they can be complementary with the core cap and trade policy.

A second area in which better regulation needs to go further is to incorporate ex post analysis more fully into the regulatory impact assessment (RIA) process, the principal tool of better regulation (Baldwin, 2005). A challenge to the RIA process is ‘to move away from a “single shot design” approach to achieving better regulation and towards processes in which ongoing reviews and adjustments drive regulatory improvements’ (Baldwin, 2005, p508). This is particularly pertinent to climate change policy. Despite the important and laudable attempts at simplification and increasing credibility that better regulation can offer, climate change regulations will remain complex and outcomes uncertain. This is partly due to the uncertainties in ex ante quantitative analysis of climate policy. It is also because policy effectiveness requires compliance and this is as dependent on social and political factors such as equity, fairness and legitimacy, as much as economic efficiency. These are much less susceptible to ex ante rational analysis of the form that tends to predominate in RIAs.

An independent carbon agency might play an important role in establishing long run credible carbon reductions but on its own it is insufficient. This argument draws on analysis of monetary policy regimes which suggests that independent central banks, in contrast to common understandings, are not in themselves a ‘magic’ policy solution for credibility and stability. A workable and legitimate whole policy regime is required. This might include an independent agency but must also include a range of workable and complementary policies and a clear policy discourse and political communication to spread understanding of the carbon reduction policy regime.

Undoubtedly there is a need for more credible policies, particularly a clear connection between the macro and micro. Better regulation and independent agencies might be able to contribute but they need far beyond their ideal-rational basis. Questions have been raised about whether better regulation focuses too narrowly on regulatory craft rather than on policy problems and regulatory regimes, particularly compliance (Hood et al, 2001). This basis often fails to account for uncertainty, conflict and contestation in policy making and regulation and the need to establish workable and legitimate regimes. Creative combination of different policy approaches or ‘clumsy solutions’, rather than ideal rational single dimensional approaches, are more likely to contribute to the required legitimacy (Verweij et al, 2006).

Appendix 1

Climate change mitigation policies: current and prospective UK policy

Current UK climate change policy is aggregated into the Climate Change Programme. The latest version of the Climate Change Programme was published in 2006; an earlier version in 2000.⁵ This is a wider ranging document containing a summary of the science of climate change and the imperatives to reduce greenhouse gas emissions to control temperature rises. It also contains details of climate change mitigation and adaptation policies across all sectors of the economy and society. Climate change policy is to be augmented by the prospective Climate Change Act which involves a scheme to manage emissions reductions at the aggregate level.

The approach to mitigation within the Climate Change Programme consists of a collection of wide ranging micro policies and instruments designed to achieve greenhouse gas emission reductions. It also includes other major policy initiatives, such as the 2007 Energy White Paper and the Waste Strategy. Programme policies vary from the EU emissions system which applies to a number of large industries across the EU (its ambitions are entirely dependent on the aggregate caps set at national level), to significant policies such as road fuel taxes, the promotion of renewable energy, and building and planning regulations (which together with the EU scheme are expected to account for the majority of the emissions reductions), to a large number of smaller scale policies such as the promotion of ‘smart meters’ and information and education campaigns for carbon reductions and energy efficiency (eg by the Carbon Trust and Energy Savings Trust). Broad sectors covered are energy supply, transport, business and industry, the domestic sector, forestry, agriculture and land use, and the public sector.

The main emission reductions schemes

The main climate change policies, ie those that are predicted to account for the majority of the carbon savings, are⁶:

- **The EU Emissions Trading Scheme** covers about 1000 installations in the UK (about 11500) across Europe. It covers electricity generation, oil refineries, iron and steel, cement and chemical installations which produce around 50% of carbon dioxide emissions in the UK (Defra, 2006a, p50). The aggregate cap for the second phase (2008-2012) was predicted to lead to annual savings of 3.0 and 8.0 Mt carbon (between about 2% and 5% of the total from CO₂ emissions in 2004). The EU scheme operates in association with the international ‘Clean Development Mechanism’ in which emissions reductions can be achieved by polluter companies supporting low carbon development in developing countries as opposed to abating their own emissions. The UK emissions trading scheme was a voluntary scheme set up in effect as a pilot scheme to prepare for the ETS. It included 33 direct participants and operated between 2002 and 2006 with participants moving to the EU scheme at the end of 2006;

⁵ DETR (Department of Environment, Transport and Regions) 2000, Climate Change. The UK Programme, Cm4913, November 2000. Defra (2006a) Climate Change. The UK Programme 2006. Cm6764, March 2006.

⁶ Sources are Defra 2006a (The Climate Change Programme) and Defra (2007c) Synthesis of Climate Change Policy Appraisals.

- **Climate Change Levy** is a tax on energy use by business, industry and the public sector, but excludes small firms. It does not include fuels used in transport, electricity generation, energy from much renewable electricity generation and combined heat and power plants. Its purpose is to incentivise organisations to increase energy efficiency and could lead to annual carbon savings of about 3.7 Mt by 2010;
- **Climate Change Agreements** operate alongside the Climate Change Levy. They are voluntary agreements between government and energy intensive firms which provide a substantial discount on the Climate Change Levy subject to meeting agreed targets for energy efficiency and reductions in greenhouse gas emissions;
- **The Renewables Obligation** is a tradable certificate based system which obliges electricity generators to produce a certain percentage of their electricity from renewables. If they are unable to do so they can buy certificates from those who are able to supply renewable electricity in excess of their obligation;
- **Voluntary Agreements** on new car emissions are agreements set at EU level between the Commission and industry on the efficiency of new cars. In tandem with this the UK government introduced a graduated Vehicle Excise Duty to encourage the use and ownership of cars with lower emissions. The difference in the duty between low emission and high emission vehicles has been gradually increased to increase the incentive for lower emission cars;
- **The Energy Efficiency Commitment** is the main policy to increase the energy efficiency of existing houses. The scheme requires energy suppliers to achieve pre-specified levels of efficiency improvements, at least half of which must be in low income households;
- **Building Regulations.** Regulations which specify requirements for the energy efficiency of new houses are steadily being tightened (eg revisions made in 2002 and 2006);
- **Transport fuel taxes.** The fuel duty escalator (annual above inflation rises) was in place between 1993 and 1999. Although the escalator was withdrawn in 2000 (though not the duty itself), it led to a higher duties in the 2000s than would otherwise have been. According to the Climate Change Programme the duty will lead to increased carbon savings;
- **The Renewable Transport Fuels Obligation.** Due to be introduced in 2008, this is a certificate based trading scheme which requires that 5% of all transport fuels come from renewable sources by 2010-11.

Examples of other schemes

There are a wide range of other policies which are expected to make significant though lower contributions. Examples include:

- **The Carbon Trust** is funded by the government and founded in 2001 to help business and the public sector use less energy and reduce carbon emissions. Its activities focus primarily on information, education and advice and aims to assess all aspects of the business organisation including other business activities in the supply chain;
- **The Energy Savings Trust** is funded by the government and private sector and established in 1993 to increase energy efficiency and lower consumption in the domestic sector. Similarly to the Carbon Trust its activities are focused primarily on information, education and advice;
- **Better billing and smart meters.** Improving electricity and gas billing and metering can provide better information to consumers about their energy use and promote energy efficiency. Smart meters, such as those with import-export facilities, are particularly useful to consumers with micro-generation installations. Both the government and the energy regulator, Ofgem, have initiated studies on the potential of smart meters;
- **Micro renewable energy subsidies.** Government grants for the installation of various micro generation systems, such as wind turbines and solar water heating and photo-voltaic panels;
- **Low carbon technology policy.** Government policy to promote and encourage innovation through research and development in low carbon technology. An example is the Low Carbon Vehicle Partnership which is an advisory group from industry, government and other stakeholders to promote a shift to low carbon vehicles. (Defra, 2006a, p66). Another example is government support for carbon abatement technologies in the energy sector.

Possible new policies

A number of new policies have been proposed, notably a range of trading schemes:

- **Extension of EU emissions trading scheme.** Extension of this scheme to include other high emitting sectors, notably aviation, have been proposed (Defra, 2007d);
- **Individual carbon allowances.** A variety of individual cap and trade schemes have been proposed focusing primarily on domestic energy and personal transport use;
- **New upstream schemes** to supplement the EU ETS have been proposed (Defra, 2007a, p41);
- **Carbon Reduction Commitment.** (also referred to as Energy Performance Commitment). This is a proposal for a UK based cap and trading scheme for large organisations including supermarkets and local councils (Defra, 2007d; NAO, 2006, p19; DTI, 2007, p10);
- **Agriculture, forestry and other land management trading scheme.** A scheme has been proposed for trading in emissions reductions from agriculture, forestry and other land management sectors (Defra, 2007a, p24);

- **Ban on high polluting goods.** A more direct and targeted approach than cap and trading schemes is to ban or severely curtail to use of carbon intensive appliances. A notable example is inefficient light bulbs, a proposal has been made to ban them (Defra, 2007d).

The Climate Change Bill

The Climate Change Bill is designed to set a macro framework for the management of greenhouse gas emission reductions in line with the aggregate targets set by the government. Key elements of the bill are:

- **Targets and carbon budgets.**

The bill will establish a clear ‘emissions reductions pathway’ to 2050 setting targets in statute and deploying a series of five year carbon budgets. For longer term certainty it is proposed that three five year budget periods will be set in advance, ie for fifteen years. The five year period allows for an element of annual flexibility;

- **Institutional framework**

The central element of the new institutional framework to manage the emissions reductions strategy is a new independent body, the Committee on Climate Change.

- **Enabling powers**

The bill includes powers to enable the government introduce new emissions trading schemes using secondary legislation.

- **Reporting**

The Committee on Climate Change will be required to report annually to parliament on progress towards the budgets and the targets. The government will be required to respond to the report. The government will also be required to compliance statement on the achievement of the five year budget. The Committee will respond to this by assessing its validity and whether new actions are required in order to meet the overall targets in the legislation.

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