Reframing the Climate Change Policy Challenge

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Final Report from the NESC Secretariat:

Ireland's Climate Change Challenge:

Connecting 'How Much' with 'How To'

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Abbreviations

CDM	Clean Development Mechanism
CFC	Chlorofluorocarbon
CO_2	Carbon Dioxide
CSOs	Civil Society Organisations
ESB	Electricity Supply Board
ETS	Emissions Trading Scheme
EU	European Union
EUA	EU Emission Allowance
GATT	General Agreement on Trade Tariffs
GHG	Greenhouse Gas
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention Control
JI	Joint Implementation projects
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-Operation and Development
R&D	Research and Development
RD&D	Research, Development and Demonstration
UN	United Nations
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organisation

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> In the first two decades of tackling the climate change problem, our chiefs cannot be accused of not trying. World leaders confronted climate change in the early 1990s, and two decades ago signed the UN Framework Convention on Climate Change (UNFCCC). They have made innumerable speeches, attended countless conferences, and spent a great deal of energy customers' and taxpayers' money since then. Two decades on, emissions continue to rise alarmingly. If anything they are accelerating (Helm, 2012: 2).
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> To put this starkly, we must develop a carbon-free energy infrastructure in 50 years that is larger than our entire existing energy infrastructure, which includes all power plants, vehicles, industries and buildings on the planet. Breakthroughs in the cost, performance, and scalability of climate technologies are necessary. The reason is simple—existing climate technologies at current costs and performance cannot meet the demand for carbon-neutral energy. Innovation in all phases of technology development is important, from basic research and development to commercialisation and dissemination (Milford & Morey, 2009: 2-3).

1. Introduction: the Analytical Foundations of Our Three Key Ideas

In its December 2012 report to government, *Ireland and the Climate Change Challenge: Connecting 'How Much' with 'How To'*, the NESC Secretariat argued that three key ideas are critical in framing strategies and policies for transition to a carbon-neutral economy and society:

- Climate-change policy is a loop not a line—in which there is a dynamic relation between 'how much' emissions reduction and policy action governments commit to and their understanding of 'how to' achieve decarbonisation;
- It is necessary to balance the policy emphasis on 'how much' emissions reduction to target with more focus on 'how to' decarbonise the economy and society; and
- The transition to a carbon-neutral economy and society must engage actors at all levels and in all sectors, through a governance system that animates, learns from and pushes networks of firms, public organisations and communities to ever-greater decarbonisation.

These three propositions summarise our attempt to reframe the climate change policy challenge. We derive this reframing and these summary arguments from three elements of our work:

- A hard-headed view of the UN climate-change policy process, the limited impact of the Kyoto Protocol and the reality of EU climate-change policy—which shows that a more credible and effective international approach to climate change is urgently required. It cannot wait for, and may not need, a global agreement on binding targets and timetables;
- A realistic view of the market-based instruments upon which the international process mainly relies—arguing that this seems to be based on an overly-optimistic and theoretical view of the ability of current carbon pricing, emissions trading and existing technology to replace fossil fuels; and
- A rigorous view of the three key analytical or cognitive issues involved in making climate-change policy, showing that: science can *widen* and not only *narrow* policy possibilities; uncertainty about policy and technology is endemic and undermines both predictive policy analysis and the search for an 'optimum policy'; and despite its value in certain contexts, much cost-benefit analysis largely reflects assumptions and normative judgements and has limitations as an agenda-setting and option-generating device.

This background paper sets out the analysis which underpins these arguments and cites the relevant evidence and sources.

Section 2 outlines the dominant framing of the climate change challenge, which reflects a linear relation between science and policy and has inspired the 20 year search for a top-down global agreement on emissions targets and timetables. In Section 3 we list a number of pressures to widen this dominant framing. While the most important of these is, of course, the failure of the dominant international approach to climate change policy, it is significant, and reassuring, that there are a number of other pressures also, and several of these have positive implications.

I then outline in more depth the three bodies of analytical thinking that lead us to attempt a reframing of the climate change policy challenge and that underpin the three key ideas stated above. Thus, Section 4 discusses the nature and impact of the UN and EU approach to climate change policy and reports research on the emergence, and possible advantages, of a poly-centric 'regime complex' below the

level of the UNFCCC. Section 5 considers a most important set of issues in the climate change policy challenge—the ability of carbon pricing, emissions trading and existing technologies to achieve a replacement of fossil fuels. An analytically sophisticated and realistic assessment is important if we are to escape from circular debates and cross-purposes on carbon pricing and emissions trading. While the dominant policy framing seems to rely overly on global emissions trading, and economists often express absolute faith in carbon pricing (if only political authorities would do it), the reframing sees a dynamic mutual relationship between innovation policy, institutional development and carbon pricing/emissions trading.

Section 6 discusses three of the main cognitive issues in the development of climate change policy: the relation between science and policy, the degree of certainty or uncertainty that can be assumed in undertaking policy analysis and the strengths and weaknesses of cost-benefit analysis. In debates on climate change policy, it is still very common to hear arguments that are premised on the linear model of the relationship between science and policy, which assumes that consensus on science will lead to consensus on policy and that science can directly reveal what policy actions to take. Little progress will be made until we get past this. It is for this reason that throughout our work we distinguish between the climate change or global warming challenge (which is best described and analysed with the language and methods of natural science) and the climate change *policy* challenge (which requires, in addition, the social sciences of politics, economics, international relations, organisational studies and sociology). In addition, in thinking about policy it is necessary to take uncertainty more seriously. If we take a rigorous view on the status of our existing knowledge—on issues such as future technology, costs and the impact of various policy instruments—we should abandon most predictive policy analysis and do the kind of analysis that supports adaptive policy. But, a switch from predictive to adaptive policy also has significant implications for the kind of policy institutions needed to deliver effective responses.

Finally, Section 7 shows how the arguments on these three sets of issues—the global approach, carbon pricing and policy analysis—are connected, each promting and reinforcing the other. It then sets out some of the elements of a multi-level polycentric approach that would link the focus on ‘how much’ emissions reduction and policy action to commit to with much greater exploration of ‘how to’ achieve decarbonisation.

2. The Dominant Framing of the Climate Change Challenge

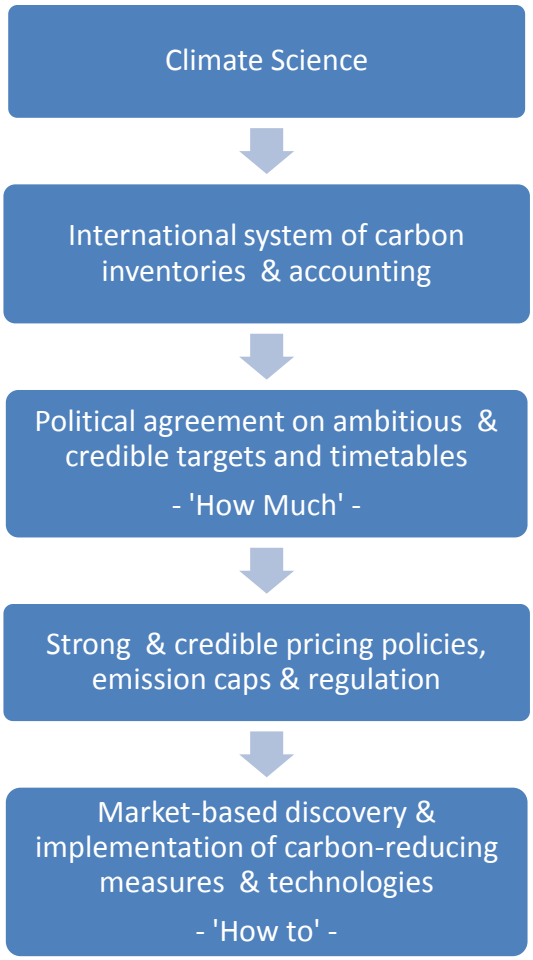
Over much of the past two decades, the climate change policy challenge and approach has been framed in a very particular way at global level. This, in turn, shaped the way the issue was defined at EU and national level. Policy analysis and development has been driven from the UN level, around the UN Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC) and the Kyoto Protocol. Reflecting this, the dominant framing of the climate change challenge has had the following characteristics:

- Building the institutional capacity for shared scientific analysis and international carbon inventory accounting;
- The search for a top-down binding international agreement on emissions reduction targets and timetables;
- Emissions trading as a central policy approach, with significant global elements and the use of international offsets;
- Predictive policy analysis, and the search for an optimum abatement policy;
- Despite the efforts of many scientists, the debate on climate change has, to a significant extent, reflected a 'linear model' of the relationship between science and policy, in which science is seen as narrowing policy options and, indeed, dictating specific policy actions; and
- An 'information-deficit' view of attitudinal and behavioural issues.

This linear framing of the climate change policy challenge is illustrated in Figure 1. The UN has generated a remarkable process in which knowledge and awareness of human-induced climate change has become firmly established worldwide. This is an achievement of historic significance and the IPCC is an important resource. As action on climate change is stepped up in various parts of the world, as it must be, the work of the IPCC in producing periodic analysis will remain of great value. But, together, the characteristics listed above tended to create a fairly dualist and polarised policy sphere, in which support for the kind of binding emissions-reduction targets in the Kyoto Protocol became a litmus test of states'—and, indeed, groups' and individuals'—acceptance of, and commitment to, the climate change challenge. In this context, it became difficult to objectively discuss the success or failure of the

approach; to question its effectiveness or prospects tends to be seen as a challenge to the importance of addressing climate change and linked with climate change scepticism.

Figure 1: The Linear Framing of the Climate-Change Policy Challenge



The central role of inter-state agreement, and the search for binding emissions output targets, meant that the overall approach has a distinctively top-down or hierarchical flavour. The approach of the UNFCCC, from before Kyoto to Copenhagen, is based on premises which are inspired by hierarchical governance: an overall agreement should be prepared by one central organisation (the UNFCCC), agreement should be concluded during a single conference, only a legally binding agreement is a good result and international decision making on climate change governance should be purely governmental (Meuleman, 2010). As we will see below, these gave rise to a fifth premise, also with a strong hierarchical flavour:

policy-relevant knowledge must be authoritative and should have authority over the state parties.

The international approach to climate change policy, centred around the 1997 Kyoto Protocol, was, to a significant degree, modelled on earlier international treaties; it particularly echoes features of the 1987 Montreal Protocol on Chloroflurocarbons (CFCs), the US EPA Acid rain Programme, which established a cap-and-trade regime among electric utilities, and the Strategic Arms Reduction Treaty, negotiated between the US and the USSR between 1982 and 1991.[1] Key features of these treaty processes were replicated in the climate change regime. Thus the climate change challenge was framed around a number of key beliefs. Among these are the propositions that:

- emissions mitigation is a problem of the global commons, requiring the consensus among 168 countries;
- climate change is a relatively discrete problem that can be solved independently of broader development imperatives, although, as we will see below, this has become increasingly contested;
- climate change is a problem of international (inter-state), co-operation and co-ordination;
- increasing scientific consensus will drive actors to converge on agreed abatement targets and actions (Prins & Rayner, 2007a).

These are reflected in other key features of the dominant framing of the climate change challenge, noted here and below.

This global, inter-state, top-down framing of the climate change challenge shaped most aspects of the approach. Among these has been a focus on global average temperature and carbon levels, scientific focus on detection and attribution of climate changes to 'dangerous interference', which puts a high premium on claims to certainty, a concentration on emissions targets and timetables, and much greater focus on (hoped for) direct reduction of emissions than either innovation or adaptation. This framing included the argument that stabilising CO_2 levels can be achieved by deployment of a portfolio of technologies that are currently available and those that are expected to be commercialised in coming decades (Pielke *et al.*, 2008). Conveniently for its advocates, the dominant framing also provides a

[1] Although, as discussed below, the relation between the approach to climate change, such the Kyoto Protocol, and the earlier Monteal Protocol is a complex question.

narrative to explain its successes and, more commonly, the failures of the approach; it is argued that the limited success to date reflects lack of political will to apply known solutions and technologies. Thus, the limited results of the approach are easily and commonly deflected onto the refusal of governments to do the right thing, rather than prompting the advocates to reflect on what the right policy approach might be.

As Hoffman says, 'this initial understanding had consequences, conditioning how we conceive of climate change and its potential solutions to the point that it is a cliché to say that climate change is a global problem that required global solutions. The world's choice of response (multilateral treaty-making) has determined our very understanding of the problem we face (a distinct focus on the global nature of the problem instead of the varied local sources and effects of climate change)' (Hoffman, 2011: 12).

3. Pressures to Widen the Framing of the Issue

In approaching this project the NESC Secretariat tended to share the background assumptions that underpin the dominant framing of the climate change challenge: particularly the idea that climate science mandates certain policy actions, the need for a top-down global agreement on emissions targets and timetables, and the economic advantages and administrative economy of emissions trading as a central approach to climate change policy. But undertaking this work has forced us to think more critically about each of these. A number of factors and lines of thought all seem to suggest that the dominant framing of the climate change challenge is insufficient and needs to be widened. The failure of the existing policy approach over two decades is increasingly prompting reflection and fresh thinking about a number of important methodological and substantive issues.

It is our duty to report and explore this for a number of reasons. The first is that a reframing of the climate change challenge is firmly underway in international analysis and, it could be argued, is implicit in the approach of many states, firms and civil society organisations. Second, we believe that the emerging reframing of the climate change challenge can assist Irish policy development in an area that has been significantly polarised to date. Third, the experience of recent years, and our analysis of climate change policy, force us to abandon our normal assumption that any policy produced by a technically-able and well-intentioned institution, such as the European Commission, and agreed by 27 states (more in the case of UN policy) is likely to be broadly effective and, in any case, the best that is politically possible.

Among the most significant pressures on the dominant framing of the climate change challenge are the following:

- Increasing recognition of the difficulty of achieving a binding global agreement on targets and timetables through the UNFCCC process, the limited impact of the Kyoto Protocol and the reality of EU climate change policy;
- Doubts about the ability of carbon pricing, emissions trading and existing technologies to achieve an early reduction in carbon emissions and stop global warming;
- The need to take uncertainty seriously in analysis and policy;
- Bringing the organisational capability of firms, public bodies and Non-governmental Organisations (NGOs) into the picture;
- The emergence, in the EU and elsewhere, of new styles of regulation, which rely much less on 'command and control' than on setting framework goals and creating a regime of reporting, peer review and continuous improvement;
- A different view on the relation of science to policy, recognising that science cannot dictate policy, and a greater focus on the role of science in *expanding*, rather than *narrowing*, policy possibilities;
- A richer and more realistic view of attitudinal and behavioural issues, which takes greater account of social practices, norms and technologies;
- Recognition of the strengths and limits of targets and timetables for reduction in the overall emissions of each country; and
- Many of these lines of thought converge on the need to switch the focus from 'how much' emissions abatement to aim for to 'how to' achieve a profound decarbonisation of the economy.

Taken together, these pressures do indeed imply significantly different ways of thinking about the issue and, particularly, about policy approaches. But to aggregate them into an alternative view would be to perpetuate the dualism and division that is part of the dominant framing and tends to characterise the politics and policy of climate change at both international and national level. The seeds of more effective policies to address global warming almost certainly lie largely within the range of institutions and processes that have developed over the past two decades:

- The yet-to-be-effective UN process and architecture;
- The substantively similar—but more binding and hierarchical—approach within the EU;
- The many initiatives and practices taking place 'below' and beyond those levels—involving states, firms and civil society organisations; and
- Additional approaches not yet adopted, or not yet adopted on a sufficient scale.

In that context—rather than reject the dominant approach and institutions outright—it seems better to take note of the ways in which the dominant framing has reached its limits, to name the pressures that are already prompting many to *widen* the framing of the problem, and to indicate the direction in which things are moving. Having said that, we do see the pressures on the dominant framing as connected with one another, as we explain towards the end of the paper.

Here, I simply summarise the relevant evidence and ideas. This perspective on climate policy and politics is outlined above is explained in more detail under four headings:

- A hard-headed view of the nature and impact of UN and EU climate policy;
- A realistic view of the potential of carbon pricing, emissions trading and existing technologies to stop global warming;
- A rigorous view of the cognitive and analytical issues involved in doing climate policy analysis that genuinely supports policy making, policy development and learning;
- Some elements of a polycentric, multi-level, approach that links the question of 'how much' emissions reduction and policy action to commit to, with greater exploration of 'how to' achieve long-run decarbonisation of the economy.

This perspective is captured in the three key ideas noted above and these are the core of the analysis presented in the NESC Secretariat's report to government (NESC Secretariat, 2012).

4. The Nature and Impact of UN and EU Climate Policy

One of the most notable features of the dominant framing of the climate change challenge has been the search for a binding top-down global agreement in the UN on defined carbon emissions reductions. One important reason to reframe the problem is recognition that this is not what has emerged and not what is likely in the foreseeable future. A revised view of the reality and possibilities for the international climate change policy process emerges from the work of leading experts on international relations, environmental and energy policy, and transnational governance. This work has an explanatory, a descriptive and a normative dimension. It offers an explanation of the failure of the Kyoto Protocol and EU policy to have a significant effect on the trajectory of global emissions. It describes the emergence of a more-complex, multi-level, governance system. And it argues that a polycentric international governance system can be more effective in addressing the climate change challenge.

This paper opened with a quote from the recent book, *The Carbon Crunch*, by the Oxford economist Dieter Helm, noting that two decades of global diplomacy has done little or nothing to stop the relentless, indeed accelerating, rise in emissions. We could have quoted similar statements from dozens of other experts, highlighting the fact that the Kyoto Protocol has had almost no substantive impact on emissions and, consequently, must been seen as largely symbolic, see (Keohane & Victor, 2011; Hulme, 2009: 332; Latin, 2012). Advocates of the dominant framing find to hard to acknowledge this fact and, as a result, have no option but to use it to simply restate the dominant framing more forcefully—invoking more dire climate trends to call for more stronger political will, demanding targets and timetables, with stronger legal obligations.

4.1 Understanding the Failure of the Global Process and the Kyoto Protocol

What is more important is the explanation of the failure of the UN process to achieve its central goal of a binding global agreement, the limited impact of the Kyoto Protocol, and what this tells us about the EU's approach to climate change policy.

In his important book, *Global Warming Gridlock*, David Victor of the University of California, argues that international coordination on global warming has become stuck in gridlock in part because policy debates are steeped in a series of myths. These myths allow policy makers to pretend that the climate problem is easier to

solve than it really is. As he says, they perpetuate the belief that if only societies had 'political will' or ambition they could tighten their belts and get on with the job. 'The problem isn't just political will. It's the imaginary visions that people have about how policy works' (Victor, 2011: 5).

The first myth Victor calls 'the scientist's myth'. It is that policy will follow scientific consensus. Belief in this myth leads both policy advocates and their opponents to invest heavily in finding scientific consensus (or seeking to undermine it). This reflects the mistaken belief that once the science is in, regulation will follow (see Section 6.1 below for further discussion). The second is the 'environmentalist's myth', that global warming is a typical environmental problem. Although it certainly has major environmental implications, he argues that thinking about climate change as an environmental problem has led policy makers to focus on solutions that don't work. 'That's because the environmental policy toolkit is poorly matched to the central regulatory task in slowing global warming' (Victor, 2011: 50). This branding of the problem has been particularly unhelpful in leading to a focus on universal policy instruments—international treaties open to all countries in the UN. Third, there is the 'engineer's myth', that technological innovation leads directly to implementation. Serious solutions to the climate problem will require profound changes in the industrial economy, but the engineer's perspective is 'deeply naïve about the factors that govern when new technologies actually survive in the commercial marketplace and the rate at which they can diffuse into service' (Victor, 2011: 52). With its emphasis on innovation, the engineer's myth 'leads to an unfounded optimism on how quickly the CO_2 problem can be solved because it focuses on the existence of new technologies rather than the long, hard process of actually testing and installing new technologies in the real world' (*ibid*.).

In this vein, the analysis of the failure of international climate change policy to date focuses on the adoption of a universalist approach and associated attempt to create wide international markets for carbon trading. This was based on the assumption that, because global warming is a global phenomenon, a governance system capable of addressing it must also be global. While the legitimacy that comes from giving all nations a voice can be important, it comes at a cost of much more complicated negotiations that are prone to gridlock (Victor, 2011: 50). Climate change is an immensely complicated problem that does not easily lend itself to global agreement, particularly on national emissions reductions. Indeed, Helm argues that 'it just isn't possible to craft an international agreement that is binding, credible and enforceable on production targets' (Helm, 2012: 9). In this context, the attempt to create wide

international markets for carbon trading—such was done under the Kyoto Protocol and the European Union Emissions Trading Scheme (EU ETS) through the linkage 'flexible mechanisms' has undermined the effectiveness of emissions trading (see Section 5.2 and Box 2). Premature linking of these emissions trading schemes has the effect of lowering prices. 'Countries that want to adopt national policies that reflect a greater ambition to tackle global warming find their efforts undermined' (Victor, 2011: 81). Thus he believes that forcing truly unfettered trade will make every nation's effort highly sensitive to the least ambitious. This effect is reinforced when the offsets allowed include many 'hot air' credits, as was certainly the case in the early years of the Clean Development Mechanism (CDM) and, some argue, may still be cause for concern. As Cole says, 'The Kyoto Protocol is, at once, exceedingly modest and overly ambitious' (Cole, 2011: 5). Modest are its mitigation targets for developed countries, ambitious are its elaborate emissions trading and offset programmes.

What are the implications of this for our assessment of the EU's overall approach to global warming? Helm is scathing about EU claims to be a global leader, suggesting that 'EU policies have achieved at best little. They have probably made things worse in fact—and at great cost' (Helm, 2012: 4). Modest Kyoto targets, combined deindustrialisation in Britain and continental Europe, which involves relocation of energy-intensive industries to Asia, allowed these countries reduce emissions and meet its Kyoto targets, and at the same time have little or no impact on global emissions and hence climate change. Indeed, their increased consumption of carbon-intensive products was causing an increase in global emissions. In some respects, it is hard to dispute Helm's observation that 'Kyoto just made Europe look good and created the illusion of action on global climate change' (Helm, 2012: 69-70). But, as we will see below, and as Helm's analysis also suggests, this is not the whole story, nor the best part, of EU climate change policy.

Indeed, the analysis by Victor, Helm and others suggest that the key weakness in the EU approach arises because it 'overly invested in the UN approach' (Victor, 2011: 24). The analysis suggests that effective international action must 'start bottom-up with national and regional approaches', crafting credible commitments based on 'what each government is willing and able to deliver' (Helm, 2012: 176; Victor, 2011: 243). This suggests that much of what the EU does internally on climate change—as we outline in the NESC Secretariat's reports—is still of value. But it does underline the fact that the weakest part of EU policy is that for which it tends to make the greatest claims to policy and moral superiority. Indeed, examining the prospects for a move

towards a more effective, less universal, club-based, international approach to global warming—involving the EU, US, China, India and Brazil, Victor notes that 'of this list, the EU is probably the most wary because it has invested so heavily in the UN process on climate change, and thus other countries may need to get this rival institution started to demonstrate to the EU that it will advance the goal of slowing global warming rather than just threaten the UN' (Victor, 2011: 255).

One key to understanding the failure of the Kyoto Protocol is the way in which the global approach to climate change was modelled on earlier international treaties on environmental problems and cap-and-trade regimes, particularly the Montreal Protocol which addressed the problems of CFCs and the ozone layer. We discuss this further below. Indeed, this has particular implications for the EU approach, not only at global level, but also for the internal process of goal-setting, monitoring and learning—including the exchange of credits at the end of the 2020 compliance period.

4.2 The Reality of a Polycentric 'Regime Complex'

But, fortunately, the failure to-date of the dominant global approach is not the end of the story. Keohane and Victor argue that 'for two decades, governments have struggled to craft a strong, integrated, and comprehensive regulatory system for managing climate change. Instead their efforts have produced a varied array of narrowly-focused regulatory regimes—what we call a regime complex for climate change' (Keohane & Victor, 2011: 7). A 'regime complex' lies between the extremes of fully integrated institutions that impose regulation through comprehensive hierarchical rules, on the one hand, and a highly fragmented collection of institutions with no identifiable core and weak linkages between the regime elements.

In contrast to the avowed goals and claims of the UNFCCC, there are a wide range of partial forms of cooperation and unilateral approaches. 'Serious international cooperation is emerging "bottom up" because integrated "top down" institutions have been too difficult to craft' (Keohane & Victor, 2011: 16). Indeed, Keohane and Victor see these efforts as 'akin to a Cambrian explosion' in which a wide array of diverse institutional forms emerges. The 'Cambrian explosion' includes the emergence of a large number of partially-linked and partially-fragmented carbon markets. As markets have developed over the past decade, an elaborate set of governance structures has emerged to measure and account for emissions, track permits and, as we discuss further below, address serious concerns about the quality and integrity of offsets. 'It is no longer useful, and perhaps not defensible, to regard

multilateral treaty-making efforts as the dominant mode of responding to climate change' (Bernstein *et al.*, 2010: 168). But this remains largely ignored within the dominant framing of the climate change challenge. As Cole observes, participants in the sequence of global conferences of the parties to the UNFCCC 'seem to be under the misapprehension that they alone make climate policy' (Cole, 2011: 16).

Likewise, Lempert and Schlesinger observe that 'Nominally, the focus of the international political process addressing climate change is on binding targets and timetables for the reduction of near-term greenhouse-gas emissions'. Prediction-based policy analysis, with its intrinsic assumption that there is some optimum level of near-term reductions, is naturally supportive of this emphasis. 'However, the actual political activity in this area more closely resembles an evolving set of actions designed to shape the future political landscape and influence private-sector investments, rather than any firm consensus about the optimum level of emissions reductions' (Lembert & Schlesinger, 2000: 395). Indeed, they note that 'International negotiators often appear to regard the continuation of the process as more important than the particular results at each stage' (*ibid.*). This confirms that the actual international climate change regime differs significantly from its own proclaimed approach and self-understanding.

Research is also revealing the extent to which this activity below the level of multilateral treaty-making involves not only states, but also firms and civil society organisations (CSOs). Hoffman documents a set of practices that he calls the 'other Copenhagen'—including carbon rationing action groups, corporate social responsibility initiatives, cities for climate protection, a range of carbon emissions trading schemes and the Asia-Pacific Partnership for Clean Development and Climate Change and the Major Economies Forum on Energy and Climate (Hoffman, 2011). Each of these three kinds of actors—states, firms and inter-firm associations and civil society organisations—bring different kinds of resources, reflecting their characteristic strengths and weaknesses (Abbott, 2011).

Finally, it needs to be emphasised that, below its high-visibility global role and its blunt national targets and timetables, the EU is probably the most advanced example of climate change policy operating at a range of levels and using a wide spectrum of approaches, as is discussed throughout the NESC Secretariat's reports to government and associated Background Papers.

4.3 The Advantages of a Polycentric Approach

The third element of this analysis is that there may be significant advantages to a polycentric, multi-level, approach to climate change. These advantages can lie in both achieving international agreements and in making them truly effective. The tendency of global negotiations to gridlock helps explain 'why most of the world's most effective international institutions began with large doses of discrimination and inequality—including General Agreement on Trade Tariffs (GATT), the International Monetary Fund (IMF), the UN Security Council and the G8' (Victor, 2011: 50). Beyond this, Keohane and Victor suggest that, in contrast with integrated, tightly-coupled monopoly institutions, regime complexes may be able to adapt more readily—especially when adaptation requires complex changes in norms and behaviour. 'Loose coupling may also be advantaged when the best strategy for institutional adaptation is unclear and thus many diverse efforts should be tried and the more effective ones selected through experience' (Keohane & Victor, 2011: 16; Overdevest & Zeitlin, 2011). The nature, analytical foundations and advantages of a polycentric approach are discussed in Chapter 3 of the NESC Secretariat's final report to government (NESC Secretariat, 2012: 28-30).

None of these judgements on the relative merits of the dominant search for binding global agreement versus smaller-scale and polycentric approaches imply rejection of a UN role. But they do suggest a modification in its approach and role and, perhaps more importantly, a significant change in what states (and the EU) invest in, and expect from, the UN process. Victor says that the 'UNFCCC will remain the umbrella under which many global efforts unfold' (Victor, 2011: 24). Abbott and others emphasise that the 'Cambrian explosion' of transnational climate change governance, whatever its virtues, requires significant 'orchestration' if it is to be effective in innovation, implementation and learning. In contrast to the stated aims, if not the reality, of the dominant international process, orchestration is a non-hierarchical strategy. As such, it is particularly appropriate for an international organisation, such as United Nations Environmental Programme (UNEP), that lacks strong hierarchical authority (Abbott, 2011: 32).

5. A Realistic View of Carbon Pricing, Emissions Trading and Existing Technologies

It was noted above that in the dominant framing of the climate change challenge at international level, emissions trading is seen as the central policy instrument. This reflects a belief that 'market-based' instruments are more cost-effective and flexible than regulation or 'command-and-control' and can incentivise a switch from fossil fuels. It is vital that climate change policy be based on a realistic view of the potential of carbon pricing, emissions trading and existing technologies to achieve the rapid reduction in emissions set out in the policy goals in the UN, EU and elsewhere. There are immensely complex analytical and empirical issues involved in assessing the theoretical, actual and potential effectiveness of carbon pricing and emissions trading. Here I merely summarise reasons to believe that prevailing policy approaches, and much discussion of both existing policy and further policy possibilities, is based on overly-optimistic, theoretical and simplistic views on the potential of carbon pricing, the nature of emissions trading and the availability of technologies to replace fossil fuels.

5.1 Beyond Cross-Purposes on Carbon Pricing

A central element in economic thinking on climate change is the view that the problem arises because GHGs are not priced. Thus, the dominant economic-theoretic approach sees a global carbon price or tax as the 'first-best' policy. Indeed, Stern described carbon emissions and global warming as 'the biggest market failure in history'. As Galiana & Green say, 'for most economists, putting a price on carbon has become the *sine qua non* of an effective climate policy (Galiana & Green, 2009a: 22; Metcalf, 2009; Nordhaus, 2008;, Stern, 2007). The theory is that this would make economic actors internalise the real cost of carbon and alter their behaviour accordingly; this would include substitution away from carbon-intensive energies and technologies and investment in research and development (R&D) to develop new low-carbon technologies

It is generally accepted that the emphasis on pricing as the central policy response to global warming is subject to two sets of qualifications. It is important to keep these qualifications in view and to be clear about their implications, but this is not always done.

The first qualification is that, even if the pricing approach were applied, there would still be a number of factors ('market failures')—monopoly, information asymmetries, externalities, financial and liquidity constraints, coordination problems, pre-exiting policies and actors that do not maximise income or profit—that would prevent the carbon tax having the desired substitution and investment effects. In this context—which we might label *real carbon pricing with residual market failure*—economic analysis suggests that the 'best policy strategy' would combine pricing with 'a combination of complementary instruments' (OECD, 2009). These are seen as making it more likely that economic actors will respond to carbon pricing by switching away from fossil fuels, installing low-carbon technology and investing in R&D.

The second, and probably more important, qualification to the idea of carbon pricing as the 'first best' policy arises when we acknowledge that that there are a range of political and other factors which tend to tend limit the *full application* of the pricing approach. Critically, there has been no agreement to apply a carbon tax or cap-and-trade regime at global level; few countries have adopted a carbon tax and those that have mostly levy it at a low level, especially on trading sectors. In the absence of global agreement on such a tax, almost all governments with ambitions to address climate change opt for 'hybrid' approaches combining relatively low (or no) carbon taxes with a wide range of policies aimed at increased energy efficiency, installation and use of renewable energy sources, R&D etc. Indeed, when governments do adopt an element of the 'economic' or market-based approach advocated by economic theory, they are more likely to create emissions trading regimes than rely on carbon pricing, and often exempt or refund traded and cost-sensitive sectors (Victor, 2011: 72). This combination—which we might label *limited carbon pricing with reliance on other instruments*—is the pattern found in most developed countries that show significant ambition on global warming.

The question is: how should this combination of policies be understood, discussed and evaluated? Despite the clarity of the theory (including the qualifications noted above), much current discussion of carbon pricing is unsatisfactory and frustrating for policy makers, policy advocates and economic analysts alike. On the one side, policies to promote renewable energy and efficiency are criticised—on ground of distortion and cost-effectiveness—and compared unfavourably to simple pricing of carbon. On the other, the many subsidies involved in promoting renewable energy such as wind and solar are often hidden and their effectiveness in really addressing climate change is not sufficiently considered. Those debating policy find themselves

at cross purposes, as discussion tends to flip-flop between theory (which is taken to show that pricing is *the* most cost-effective instrument), and economic and political reality (in which pricing is limited, but a range of other policies are available).

One important reason to reframe the climate change policy problem is to escape from these unsatisfactory policy debates and associated cross-purposes about carbon pricing versus other policies. Indeed, we can identify a number of lines of thought that can help achieve this escape.

First, there is more recognition of the political dynamics at national and international level; economists seem more willing to acknowledge that carbon pricing *at the level most states have adopted to date* has a limited effect in reducing emissions through inducing substitution and adoption of new technologies. Consequently, there may be less tendency for economists to criticise existing policies *as if* the more elegant and comprehensive pricing solution remains easily available and *as if* carbon pricing *alone* would be sufficient[2]. Without significant carbon pricing, the massive market failure of global warming is not addressed. Consequently, on the principle of 'second-best', we should not assess the market for energy efficiency, renewables and R&D by reference to 'first best' criteria. This point is well made in a recent OECD paper: 'If the status quo is, or is likely to be, unsustainable, as in the case of climate change, evaluating expected payoffs from reform against the status quo is inappropriate. Opponents can simply defend the status quo without feeling the need to put forward an alternative' (De Serres *et al.*, 2011: 23).

Second, there is increasing support for the view that a low-carbon economy will require much deeper technological innovation than has been recognised to date (Victor, 2011; Helm, 2012; Pielke, 2010). This is an important part of the perspective of climate policy and politics which informs our work, which we discuss further below. It can help to us to get beyond cross-purposes on carbon pricing in a number of ways. On the one hand, it partly vindicates the economists' view that existing renewable technologies can be an expensive way of replacing fossil fuels—costs which are sometimes hidden or denied (Helm, 2012). By the same token, it suggests limits on the ability of carbon pricing to address climate change. While pricing can be

[2] Although it is disappointing to see an argument of this type still being used by William Nordhaus, the father of the economic analysis of climate change. He says 'Whether someone is serious about tackling the global warming problem can be readily gauged by listening to what he or she says about the carbon price. To a first approximation, raising the price of carbon is a necessary and sufficient step for tackling global warming. The rest is at best rhetoric and may actually be harmful in inducing economic inefficiencies' (Nordhaus, 2008: 22).

effective in inducing energy efficiency and deployment of technologies that are 'on the shelf', the empirical evidence suggests that the price signal created by emissions trading schemes, or politically-feasible carbon taxes, will be ineffective inducements to invest, long-term, in technologies that still require basic R&D (Galiana & Green, 2009a: 18; Blanford, 2009; Hoffmann, 2007; Nemet, 2009; Sandén & Azar, 2005).

Indeed, this provides the basis for a modified approach to—and, indeed, conception of—carbon pricing, which is discussed at the end of this section on the ability of carbon pricing, emissions trading and existing technologies to achieve decarbonisation

Third, in economic theory and analysis it is increasingly recognised that the much-cited propositions about the central role of prices are based on models which assume exogenous technical change and, perhaps more significantly, assume that firms can easily substitute new clean technologies for old dirty ones. Aghion *et al.* argue that 'economists have not tackled this debate very well. Current approaches to green growth are taking place in an over-simplified setting, largely disregarding the innovation factor. Technologies to mitigate climate change are treated as given or as emerging spontaneously, ignoring the fact that the portfolio of technologies available tomorrow depends on what is done today' (Aghion *et al.*, 2009a: 2). De Canio also shows that the representation of production in the prevailing integrated assessment models abstracts from essential features of the phenomena being modelled. 'By treating technology as a constraint on production, rather than a dynamic processof innovation, the consequences of climate policy initiatives have been seen almost entirely in terms of adverse trade offs' (De Canio, 2003: 153). The models that have been used to predict the effects of climate protection policies set up their production sectors 'in such a way as to preclude much of the variation and potential for change that is in fact an essential part of industrial reality in the market economy' (*ibid*: 125). Models which include endogenous innovation in both clean and dirty technologies reach significantly different conclusions on the role of carbon pricing in an optimal policy. Acemoglu *et al.* show that 'optimal policy relies less on a carbon tax and instead involves direct encouragement to the development of clean technologies' (Acemoglu *et al.*, 2012: 133). Romani, Stern and Zenghlis, in their paper 'The basic economics of low-carbon growth in the UK', argue that 'the narrow approach of much modelling of the economics of low-carbon growth is highly misleading in that it simply avoids the economic issues at stake. The failure to address the dynamics of innovation and development is particularly troubling'

(Romani *et al.*, 2011: 5). Indeed, they argue that there are *five* market failures involved in the climate change problem, as summarised in Box 1.

Box 1: Climate Change and Market Failure

When effective responses to climate change are eventually created, they will probably include a significant and increasing price of carbon through a tax and/or tight emissions trading caps. But there are *five* market failures, not one, involved in the problem of climate change:

- The environmental externality arising because the damage of emissions is not priced;
- The innovation market failure, arising because knowledge becomes freely available;
- Network externalities creating 'lock-in' and 'lock-out' of technologies in energy systems;
- A financial market failure, evident in the limited ability of capital markets to manage the risks associated with large investment in new energy technologies; and
- Limited knowledge among economic actors on emissions properties and decarbonising options.

While carbon pricing has a definite role, it cannot be relied on to address all these market failures. Policies that create a visible increase in cost tend to meet political resistance. But beyond that, economic analysis is increasingly taking account of the dynamics of innovation; when this is done it highlights the primary role of innovation and energy policy, and the construction of a new regulatory and institutional landscape, supported by carbon taxes and emissions trading.

Fourth, these considerations, and those concerning uncertainty and cost benefit analysis which are discussed in Section 6, help to clarify what role economic analysis and economists can best play with regard to carbon taxes and their relation to other policy instruments. Rather than seeing carbon tax as the core policy supported by 'ancillary' policies promoting energy efficiency, renewables and innovation, it seems more accurate to see carbon pricing as ancillary to them; and, as argued at the end of this section, in a dynamic relation with those policies, both politically and economically. Furthermore, as De Canio says, 'it is fruitless to attempt to determine the "optimal" carbon tax' (De Canio, 2003: 157). Since neither the costs nor benefits can be known with any precision, just about the only thing that can be said with certainty about the welfare-maximising price of carbon emissions is that it is greater than zero. But economists do have a great deal to say about how to implement a carbon tax efficiently and effectively, about the similarities and differences between a carbon tax and cap-and-trade system, and about ways in which the revenue from a tax of permit system might be recycled. '[A]ny attempt to specify the exact level of the "optimal" tax is less an exercise in scientific calculation than a manifestation of the analyst's willingness to step beyond the limits of established economic knowledge' (*ibid*).

Fifth, it is increasingly recognised that the issue is less a one-off choice from a menu of policy instruments (carbon pricing, subsidies, R&D) than a dynamic and gradual strengthening of policy action on a number of fronts, as we discuss below.

5.2 The Experience and Political Economy of Emissions Trading

In the dominant framing of the climate change challenge a central feature is reliance on the market mechanism of cap-and-trade or emissions trading as the central policy instrument. International trading is the logical extension of a global regulatory system that hopes to achieve strict international emissions caps. The logic of cap-and-trade lies in the economic perspective on environmental problems discussed above. This assumes uncertainty about where and how market actors will find it easiest to reduce emissions; it seeks to create a mechanism that encourages firms and countries that can easily reduce them to do so, allowing others pay for emissions permits and credits, at least initially. The application of cap-and-trade to the climate change challenge draws inspiration from the fact that this 'market mechanism' has been used on several other national and international environmental problems over the past two decades. The most famous is the Montreal Protocol, which successfully addressed the problem of erosion of the ozone layer by CFCs. One of the main reasons for reframing the climate change policy problem is that it is now possible, and necessary, to compare the theoretical appeal of emissions trading with the real-world experience of using it and, based on this, to give careful thought to how it should be applied in the case of climate change. Here I summarise the considerations that seem most important in gaining a perspective on the policy and politics of emissions trading as an approach to climate change.

Given the complexity of the issues, it is not surprising that there is a diversity of perspectives on cap-and-trade and its application to climate change, several of which have some plausibility. It is possible to have a strong bi-polar debate for and against the role of emissions trading in addressing the climate change challenge. While the dominant framing places great faith in international emissions trading, the balance of evidence is that existing global and EU carbon markets have, to-date, had little or no impact in altering the downward path of emissions in the EU and their strong upward trajectory globally. Some of the reasons are identified in Box 2. However, in the spirit of reframing, rather than perpetuating dualist thinking, a debate along these lines should be resisted for a number of reasons.

Box 2: International Emissions Trading: Flexible Mechanisms and Volatile Prices

In considering the real-world experience of emissions trading here, it is appropriate to focus on how such schemes operate at international level. A central feature of such schemes is the inclusion of 'flexible mechanisms'. As well as international emissions trading, the Kyoto flexible mechanisms include Joint Implementation projects (JI) and the Clean Development Mechanism. The EU incorporated flexible mechanism certificates as compliance tools within the ETS, via the Linking Directive. There is no doubt that the global system—encompassing the Kyoto-created market, the CDM and the EU ETS—has succeeded in engaging many buyers and sellers. But the experience of building and using emissions trading schemes has included a range of complexities and difficulties. Among these are:

- the ultimate success of emissions trading depends on the size of the cap and, in the case of all existing carbon emissions trading systems to date, this is both somewhat arbitrary and insufficiently binding to greatly reduce emissions;
- prices are frequently volatile, which can reduce the general incentive effect (for example, to install less carbon-intensive capital equipment) and, as we discuss in the next section, means that emissions trading is likely to be of limited use as a policy instrument to drive investment in the R&D that will create the future low-carbon energy system (see below);
- carbon emissions trading regimes include have to date the kind of flexible mechanisms noted above, and these both limit the effectiveness in reducing global emissions and have displayed a range of other troubling characteristsics, including corruption (Victor, 2011)[3].

One is that emissions trading seems likely to be a significant part of the EU's ongoing approach and, indeed, carbon trading regimes are emerging in many parts of the world, including China. A second is that it is certainly early days in emergence of carbon trading, and this needs to be allowed for. It is, of course, possible to highlight the contradictions in the dominant framing—between much talk of urgent, early, reductions in emissions based on exact targets and timetables, on the one hand, and the de facto weakness of binding agreements, the extensive provision for offsets and construction of emissions trading regimes that could only work gradually. But we should extend to emissions trading more charity than advocates of the dominant framing offer to those who are critical of it.

[3] A high proportion of the CDM credits involve neither CO_2 nor energy production. The largest proportion of credits come from capturing refrigerant gases, which could be reduced much more economically by subsidising developing countries to install the relevant technologies (Wara, 2007).

A third reason to avoid a polarised debate is that we should not ask more of emissions trading than it can reasonably be expected to deliver. While a carbon emissions trading regime, in which the cap is truly tight, can be expected to incentivise firms to find energy efficiencies and to adopt technologies that are 'on the shelf', we should not expect it to create a price signal strong and stable enough to stimulate the most important action necessary to address climate change—long-run investment in R&D on low-carbon energy and construction of the regulatory and business systems needed for its deployment. While the dominant framing tends to underestimate the amount of R&D and innovation that will be necessary to create the future low-carbon energy system, we do not—as we discuss further below. This is less a reason to condemn cap-and-trade than to be critical of over-reliance on it and to seek reforms that might make it more effective in bearing down on emissions.

A fourth reason to avoid a polarised debate is that the advocates and architects of emission trading—who want very much to make it an effective instrument to address global warming—are likely, eventually, to propose and lead a reform process that takes it in a direction favoured by some of those that are more critical of it. Although, to-date, the reforms proposed by the European Commission continue to adhere to the lean logic of trading and pricing, rather than institution building, and, in any case, have fallen foul of the European Parliament.

In outlining the place of emissions trading in a reframed perspective on climate policy and politics, three issues are briefly discussed: the EU ETS, the key lesson from the Montreal Protocol and the associated argument that emissions trading needs to become less global, at least initially, if it is to be effective.

In discussing the EU ETS, we do not intend to dwell on the well-known problems that beset it: over-allocation of allowances, windfall profits, price volatility, low prices, its linkage to questionable Kyoto flexible mechanisms and its possible negative impact on the effectiveness of existing EU environmental regulations, such as the IPPC Directive—some of which are noted in Box 3. Instead, it can be argued that, although there are certainly risks involved in meddling with the ETS, without further early reform there is a risk that the ETS will be irrelevant in the next evolution of international climate policy, threatening the EU's much-cherished self-image as a global leader on climate change. Second, more than anything in this whole policy sphere, the EU needs an effective internal market in energy, regulated in a way that encourages the vast investment in generating capacity and networks that are necessary both for economic and low-carbon reasons, and this probably needs to be supported by a large pan-EU investment programme in networks and R&D. The

question then is: does EU climate policy and the ETS help or hinder this agenda? It is possible that more will be achieved—not only in securing Europe's economic future, but also in moving towards a low-carbon European economy—if the energy and resource efficiency agenda is given the lead role.

Box 3: The European Union Emissions Trading Scheme (ETS)

The world's most developed cap-and-trade market is the EU Emissions Trading Scheme. The most authoritative account of its development is by Ellerman, Convery and de Perthuis (2010). That scheme has proved much more complex, and much less effective on a number of criteria, than was hoped by economic analysts. It has been characterised by the following:

- over-allocation through the issue of too many allowances, resulting in a carbon price that seems too low to incentivize significant changes in firm behaviour;
- windfall profits resulting from the free allocation (or 'grandfathering') of allowances. Since the price of EUAs was often passed fully into prices, it has given rise to massive windfall profits (Sijm *et al.*, 2006);
- significant price volatility;
- because the ETS allows the use of offset credits from JI and CDM projects, the European emissions trading scheme contains some of the strengths and weaknesses of the global trading system, some of which have been summarised above. Indeed, this relates to the most interesting element of learning about cap and trade systems, discussed in the main text below.

There is evidence that the need to buy credits has some effect in incentivising individual firms—such as ESB and other energy utilities—to achieve some abatement in carbon emissions (Ellerman, A. D. & Buchner, 2008; Anderson *et al.*, 2010). However, the net effect of the difficulties listed above lead many to the view that it has not yet had much effect in reducing emissions. Others argue that the ETS has served to undermine the effectiveness of existing EU environmental regulations, such as the IPPC Directive (Gilbertson & Reyes, 2009: 21).

Given the complexity of the issues involved, differences of course remain on whether the problems of emissions trading, noted in Boxes 2 and 3, are fundamental to the cap-and-trade approach or represent teething problems. Ellerman and Joskow argue that views about EU the ETS 'have been heavily influenced by a misunderstanding of what the 2005-7 trail period was supposed to achieve and the limited goals for emissions reduction that were incorporated in the trial period caps' (Ellerman, A. & Joskow, 2008: 45). They point out that the goal of the trial period was to develop the infrastructure and to provide the experience to enable successful use of a cap-and-trade system to limit European GHG emissions in the 2008-12 period and beyond. They also argue that the EU ETS is interesting because it provides some insights into the problems to be faced in constructing a global GHG emissions trading system. It is

hard to argue with that. At both global and EU level existing approaches to climate change policy put great faith in the proposition that these emissions trading schemes can, from now on, be improved in ways that greatly reduce their distortionary elements and greatly increase their effectiveness in reducing emissions.

Because the Montreal Protocol was taken as the template for addressing climate change, analysts are undertaking fresh work its nature and effectiveness. Detailed analysis of the relative success of a range of international environmental treaties, aimed at improving the approach to climate change, is highly informative and relevant. Perhaps the most interesting aspect of the real-world experience of emissions trading schemes has been the discovery that they require the construction of a much more complex administrative and policy capacity than was suggested by the economic theory which inspired them. This is explained in Box 4.

The kind of institutional development described in Box 4 takes an emissions trading regime well beyond the textbook definition of its nature—and conception of its advantages—and transforms it into something more like an experimentalist regime of framework goals, monitoring and learning (Sabel & Simon, 2011). Indeed, where cap-and-trade does have an impact on overall emissions, it seems that it is its regulatory element (the politically-imposed cap) and its institutional features (organisational capacity in public bodies and firms), rather than the trading, the 'market' or the achievement of equi-marginal cost, that does most of the work.

The third point on emissions trading is one that strongly reflects a departure from the dominant global framing of the climate change policy challenge: emissions trading regimes, combined with other policies are, in the next period, likely to be more effective if they are less, rather than more, global. This is discussed briefly when the elements of polycentric approach are outlined, in Section 7.

Box 4: The Montreal Protocol: Institutions for Detailed Performance Review

It is clear that a cap-and-trade regime can only have a significant effect on emissions when the cap or ceiling is felt as tight by at least some members. Victor shows that emission caps and timetables 'worked' so long as it was relatively easy to match promises to policy efforts. Every two to three years governments would ratchet the caps tighter. But, in the case of the Montreal Protocol, 'that process ran out of steam when the ratchet was so tight that governments needed to be sure they had a reliable substitute for every use'. Note the central conclusion which Victor draws from his analysis of what happened when the Montreal Protocol reached that point, and the central lesson from that history for the policy approach to global warming. 'What happened next is instructive, for the challenge that the architects of the Montreal Protocol solved is the one most similar to the problem of global warming today where even a modest ratcheting of the emissions caps and timetables raises severe questions about the credibility of the caps' (Victor, 2011: 222). To make the emissions caps credible, the architects of the Montreal Protocol created an institutional mechanism to assess which 'essential uses' should be exempted from a nation's total allowable quota of ozone-depleting substances:

> as the obligations tighten so must the marriage between the design of regulatory instruments and what governments can actually deliver. In the Montreal Protocol, the most successful international air pollution accord in history, the shift to instruments designed for credibility—in that case, the system of essential uses—has meant, in effect, detailed coordination of national policies and technologies rather than blunt emission caps and timetables (Victor, 2011: 224).

The general lesson, he suggests, is that when governments don't know what they can achieve in advance a large measure of flexibility will be needed.

The history suggests that it is these institutional supports, rather than the choice between legally binding or nonbinding rules or the achievement of equi-marginal cost, that matters. In some cases, especially where there is uncertainty about what can really be delivered, nonbinding approaches worked better. In a range of cases 'nonbinding commitments worked because they were embedded within institutions that could mobilize detailed performance reviews'. Those reviews--akin to the Montreal Protocol's system for expert assessments of essential use exemptions—'helped ensure that the parties narrowed the uncertainties over time and learned which strategies worked best' (Victor, 2011: 227).

This analysis leads Victor to suggest that the absence of any serious enforcement procedure in the UNFCCC 'is a sign that diplomacy is on the wrong track'. The history of GATT and WTO show that as commitments became more demanding and worries about poor implementation rose so did the demand for formal enforcement. Much of what the WTO now regulates concerns so-called 'nontariff barriers' that are much harder to spot and regulate, requiring a formalised system to make enforcement of such obligations easier. Thus, Victor says 'Policy coordination on global warming will look a lot like the efforts to manage nontariff barriers—it will focus on actions that will be hard to enforce through reciprocity and will require a formal, institutionalized system to help governments spot and respond to violations efficiently' (Victor, 2011: 235-6).

The dependence of emissions trading schemes on the construction of elaborate administrative capacity, in both public institutions and private firms, has an interesting implication that we discuss in Section 7.3: it significantly mutes the big difference between 'market mechanisms' and 'regulatory approaches' that was made so much of in economic theory and doctrine—as is still made much of international environmental policy analysis and textbooks[4].

This discussion of cap-and-trade closes with a final observation which is not directly about the EU ETS or conventional emissions trading regimes, but which may be relevant to Ireland and the EU in the coming years. Within the EU system of 2020 targets and timetables governing the non-ETS sectors, there is provision for creation of a new inter-member state market in carbon credits. This is discussed in some detail in Chapter 8 of the NESC Secretariat's final report. Presumably, everything that has been learned over two decades about emissions trading systems (some of which was cited above) will apply to this market also. There is no doubt that the 2020 targets—reflecting the peak of Ireland's GDP and taking insufficient account of the role of agriculture—are tight for Ireland. This raises the question: what system of benchmarking, deliberation and review will the EU and member states create to deal with the outcome and lessons of the 2013-2020 period and assist adoption—and, most of all, implementation—of greater ambition for the post 2020 period?

5.3 Can Existing Technologies Deliver Sufficient Decarbonisation?

Closely related to the effectiveness of carbon pricing and emissions trading is the ability of existing renewables technologies to deliver a sufficient decarbonisation of the economy at an acceptable cost. In the international literature we find increasing anxieties that the dominant approach under the UNFCCC, the Kyoto Protocol and the EU seriously underestimates the surge in global energy use and likely carbon emissions associated with ongoing rapid development. There is increasing evidence that low-carbon energy and transport technologies to meet this demand are not yet available at low enough cost. Hence the statement by Milford and Morey (2009) placed at the head of this paper. The evidence and arguments that major innovation

[4] In his book *Climate Change Policy Failure: Why Conventional Mitigation Approaches Cannot Succeed*, Latin says 'a review of the cap-and-trade literature, for example, would show that the great majority, if not virtually all, of the proponents in favour of this market-based strategy greatly minimise the implementation and political difficulties that cap-and-trade systems must confront, while they adamantly focus on criticisms of competing regulation plans and other economic-incentive approaches' (Latin, 2012: 96).

is needed to create the foundations for the future low-carbon energy system seems compelling (Pielke *et al.*, 2007; Galiana & Green, 2009a, 2009b; Barrett, 2009; Philibert, 2004; Helm, 2012; Aghion *et al.*, 2009a, 2009b).

These assessments of existing technology need to be combined with an understanding of the economics of innovation, especially in the energy sector. As Victor and others argue, neither markets for technology products nor carbon pricing will be sufficient to incentivise actors to undertake the deep R&D necessary to create the low-carbon energy system of the future. This, combined with the evidence and analysis outlined above, has profound implications for how the climate change policy challenge must be framed and approached if there is to be any chance of limiting global warming. It strongly suggest that climate change policy must include major international programmes of state-funded R&D on low-carbon energy technologies and systems. Furthermore, this must include a technology policy that goes beyond R&D to support inventors to take new technologies across the various 'valleys of death'. This is particularly necessary in the energy sector, where network externalities and institutional trajectories create a strong 'lock-in' to existing fossil fuel based technologies and 'lock-out' of new systems (Victor, 2011: 133).

But, troublingly, technology and R&D have to-date occupied an odd position in climate change policy. On the one hand, there is a longstanding consensus opinion among economists and energy experts that there are major barriers that lead to underinvestment in climate technology research, development and demonstration (RD&D). 'Vitually every reputable organisation that has studied clean energy agrees with this list of barriers and gaps, the problem of underinvestment, and the need to overcome the barriers with technology-specific measures in both OECD and developing countries' (Milford & Morey, 2009: 4). At the same time, there is evidence of what Aghion *et al.* call a 'cold start for the green innovation machine'. In both the US and EU public R&D spending targeted at the environment and energy efficiency constitute a very minor share of public R&D spending. And the focus of current climate policy, especially in the EU, is much more on blunt targets and timetables and incentivising the use of existing technologies.

5.4 The Mutual Interaction of Performance Monitoring, Technical Innovation and Carbon Pricing/Emissions Caps

It is clear that the inter-related issues of carbon pricing, cap-and-trade and innovation are critical in thinking about the climate change challenge. A central part of our perspective on the policy and politics of climate change is an integrated view

of these three elements. In particular, we can combine what was said above about the limited impact of global climate change policy on the upward trajectory of emissions, the limited ability of carbon pricing, on its own, to incentivise innovation, the history of the most successful cap-and-trade regime, the working of the Montreal Protocol, and the insufficiency of existing technology. Thus, the relatively limited availability of alternative, cost-effective, clean technologies goes some way to explaining the weakness of international climate diplomacy, the generous caps and offsets in existing emissions trading schemes and the limited level of carbon pricing, even in ambitious states. This is leading analysts to explore the possible mutual interaction between the various policy instruments and approaches. Here we mention two.

Instead of relying on carbon pricing as a first line approach to reducing emissions, Galiana and Green suggest that, in the first instance, carbon pricing be used to finance research and development of effective, scalable technologies and the infrastructures required to deliver them (Galiana & Green, 2009a: 23). This argument 'inverts the usual relationship between carbon pricing and technology, whereby carbon pricing is naively expected to induce fundamental technological innovation' (Galiana & Green, 2009b: 571). In their view carbon pricing plays two ancillary roles in climate change policy in large states and at global level: (a) as a means of raising revenue to finance energy R&D and (b) as a way of sending a forward price signal that will be increasingly powerful as the carbon tax slowly rises as alternatives to fossil fuels are increasingly available.

As well as delivering a telling empirical point, this argument helps short circuit the flip-flop, circularity, and cross-purposes that plagues much discussion of the role of carbon pricing in climate change policy. It cuts through this circularity and false-polarity with two key propositions:

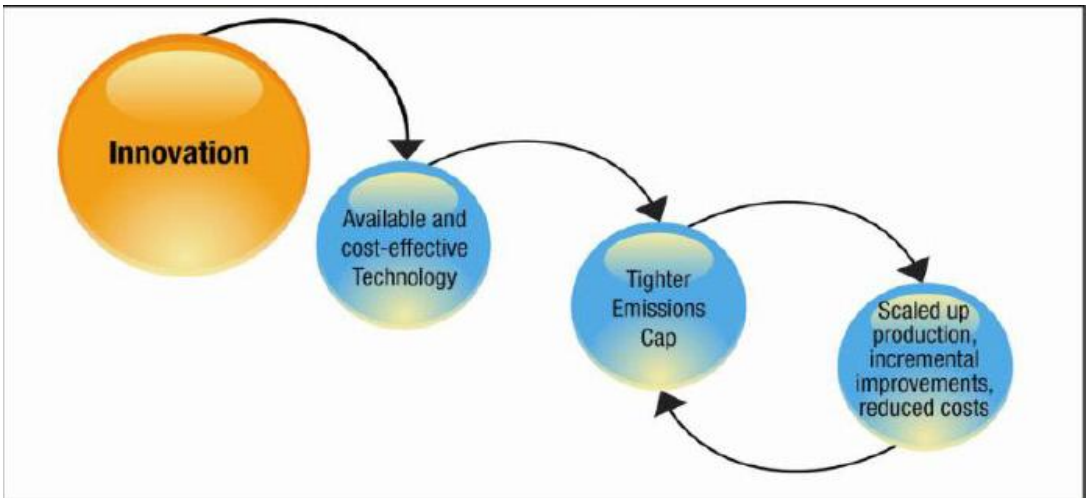
- outside of theory, carbon pricing will not deliver the desired effect on the use and creation of the full spectrum of technologies: existing technologies ready to be taken 'off the shelf', those that require further development before deployment is possible, basic R&D and those that have not yet been thought of;
- democratic governments, especially in small open economies (or those without large hydro-carbon and nuclear energy supply), face great difficulty in imposing high carbon pricing, not only from business, but also from consumers;

In the dominant framing, these are a tragic pair of truths. Indeed, Pielke says 'It is on these shoals that climate policy has repeatedly foundered' (Pielke, 2010: 221). We need some reframing to escape their apparently tragic force. When we reframe, we can.

Indeed, this reframed substantive approach has the potential to reframe the politics and analytics of the climate change policy challenge, and the relationship between theoretical analysis and real world politics. It suggest that a carbon tax, introduced to fund major programmes of innovation, should be set at a level that can be agreed in a democratic political process. 'Using politics as the metric for pricing the tax would be far superior to trying to meet some theoretical "social cost of carbon" developed through complex economic models that require discerning trends and preferences decades and longer into the future' (Pielke, 2010: 229). By explicitly connecting carbon pricing with energy innovation, a virtuous circle could be created that allows those who pay the tax to see its benefits, building the support necessary to sustain investments over decades and longer (*ibid.:* 231).

Thus, innovation policy can play a role in helping to 'transform policy challenges that are divisive and not ripe for political action into topics that are politically much easier to manage' (Victor, 2011: 117). Drawing on his understanding of the history and politics of environmental policy, Victor argues that deep cuts in emissions will not be politically feasible without technologies that will keep costs low—ideally within the rage that consumers already experience. But 'technology innovation is extremely important in rewiring the politics of climate change' (Victor, 2011: 162). While new technologies are certainly essential to actually achieving deep cuts in emissions, in tandem they help make the costs and the effort more politically palatable. As each nation becomes more convinced that the costs will be manageable then not only will it be easier to muster the support for national policies, but governments will also become more confident that other nations will take similar steps. 'That confidence will brighten the prospects for meaningful international cooperation' (*ibid.*). This line of thinking is summarised neatly in Figure 2.

Figure 2: Technology Innovation Supports Cap and Trade



Source: Clean Energy Group, 2009

6. A Rigorous Approach to Policy Analysis, Development and Evaluation

Our thinking about climate change policy and politics is also shaped by our attempt to take a rigorous approach to three of the main cognitive and analytical issues involved: the relationship between science and policy, the degree of certainty or uncertainty available to policy and political actors, and the strengths and weaknesses of cost-benefit analysis as an analytical tool.

6.1 From the Linear Model of Science to Expanding Policy Possibilities

In addressing the climate change policy challenge it is important to think clearly about the relationship between science and policy. Research on this issue has been brought together by Roger Pielke in *The Honest Broker: Making Sense of Science in Policy and Politics* and applied to the area of climate change (Pielke, 2007). Here I summarise some important findings and understandings. Policy debate and policy making would be significantly improved if these were more widely appreciated.

At an international level, the debate on climate change has been dominated by what is known as the 'linear model of science'. This view holds that consensus on science

can lead to a consensus in politics and that science can directly inform political actors which policies should be adopted.

The linear model of the relationship of science and society has been found to be an accurate description of the role of science in public decision making only in special circumstances, where values are shared and uncertainty is low (Pielke, 2007: 19-20). Where there is value consensus and low uncertainty it is possible for science to directly inform policy. Examples might include vaccination policies and flood responses. Where values differ and there is uncertainty, then attempts to apply the linear model gives rise to a damaging mutually-reinforcing process of the 'politicisation of science and the scientisation of politics'. This involves 'stealth issue advocacy', in which scientific arguments are used to advance political agendas and political agendas are pursued through science. In this situation, more information may increase the ambiguity about the relationship between alternative actions and desired outcomes (Pielke, 2007: 36).

The issue of climate change definitely falls into the latter category. Quite apart from an inherent element of uncertainty in climate science, there is major uncertainty, ambiguity, and difference about the relationship between alternative actions and outcomes, as well conflict about the desirability of both outcomes and the means that might achieve them. Such issues share the following characteristics:

- The scope of choice is ambiguous and continuous, and competing interests work to limit the scope of choice;
- Considerable conflict exists about the desirability of different outcomes, because there are many outcomes and many interests;
- Considerable conflict exists not only about the relationship between alternative actions and desired outcomes, but about the conditions that motivate the need for decision-making in the first place; and
- More information promises little insight into the course(s) of action likely to lead to a desired outcome; in some circumstances more information may increase the ambiguity about the relationship between alternative actions and desired outcomes (Pielke, 2007: 36).

These characteristics have to be taken seriously in conducting the relationship between climate science and policy and in designing the institutions and procedures for policy making and implementation.

At international level the debate on climate change has provided the perfect example of the harmful dynamics described above. Within this debate, studies that show meaningful connections between greenhouse emissions and actual or projected climate changes are interpreted as supportive of action to reduce emissions:

> Action is typically narrowly defined as the Kyoto Protocol and the political stakes are victory in either securing or denying its implementation. Under the linear model both sides argue about science as a proxy for actually discussing the worth and practicality of possible courses of action, of which the Kyoto Protocol is but one of many. On the climate debate many assume that victory in debate on scientific issues, as perceived by the public, ought to compel victory in the political debate (Pielke, 2007: 125).

But the underlying policy and political context—characterised by value differences, uncertainty and ambiguity about the best policy choices—inevitably makes itself felt. But uncertainty is not neutral. 'In these cases not only is there *uncertainty* about the nature of problems and the effects of actions in the face of problems, but uncertainty is also a resource for various interests in the process of bargaining, negotiation, and compromise in pursuit of desired ends' (*ibid.*: 37). Excessive attempts to use 'scientific certainty' to directly compel a particular course of action on climate change have created a situation in which uncertainty gives opponents of action a powerful resource:

> [O]pponents of action on climate change already will have taken a big step toward winning the political debate when advocates of action invoke certainty as the basis for action. When opponents of action raise scientific uncertainty as a reason for delay or inaction, advocates of action spend considerable time and effort trying to disprove allegations of uncertainty as the centrepiece of their efforts, but no matter how well they make their case for uncertainty, it can do little to change the underlying political outcome, as the opponents can just switch their justification to something else while maintaining their political commitment to opposition (*ibid.*: 72).

Indeed, in the Irish policy process uncertainty—not so much about the reality of anthropocentric climate change, but about the costs and benefits of various policy possibilities—has been a resource used by those who wish to minimise policy action.

Finally, and most important, there is an alternative understanding of the relationship between science and policy which is particularly relevant to the current climate change challenge at national and international level: science as a way of creating new

and innovative policy alternatives. The linear model and the associated debate on climate change policy tends to become deadlocked around a few key policy options:

> What is typically overlooked in situations of political conflict being waged through science is that options are neither fixed nor given. But science also has an important role in contributing to the invention of new and innovative policy options, *i.e.*, to create more forks in the road. New options can change calculations and motivate new coalitions and thus opportunities for political compromise and policy action. Paradoxically, efforts to expand choice can sometimes lead to more effective decision-making by creating opportunities for competing factions to find agreement instead of gridlock or conflict (Pielke, 2007: 72-3).

In contrast to the linear model of science, Pielke labels this role the 'honest broker of policy alternatives' and argues that what is needed in climate policy is a greater role for 'honest broker of policy'. What science can do in such situations is contribute to the development of new and innovative policy options that might allow for compromise. The key distinction between the linear model and the honest broker of policy is that former sees science *narrowing* policy choices, while the latter see science *expanding* them.

6.2 Taking Uncertainty Seriously

The dominant framing of the climate change policy challenge strongly privileges particular approaches to policy analysis. One is a strong emphasis on prediction, not only to establish the reality of the climate change threat, but also in working out the scale and nature of the policy response. Lempert and Schlesinger describe it as follows:

> The traditional framework for assessing alternative climate-change policies, which influences much climate-change-policy research and informs the thinking of many policy-makers, rests on the assumption that we can predict the future. In this framework, we begin with a set of alternative actions we might take; a model, often described mathematically, that allows us to describe the consequences of each action; and some metric, such as monetary units, that allows us to rank our relative preferences for various consequences. Analysts use this framework to predict the consequences of each action, and thus recommend the 'optimum' response, that is, the action that is better than all the alternatives' (Lembert & Schlesinger, 2000: 387-8).

In this vein, a huge amount of the intellectual and policy effort on the climate change challenge has been devoted to building predictive models.

In recent years, researchers examining alternative policies to address the threat of climate change have become increasingly concerned about uncertainty (*ibid.*). In their survey of uncertainty in climate policy analysis, Dessai and van der Sluijs show that 'a 'cascade' or 'explosion' of uncertainty arises when conducting climate change impact assessments' for the purposes of making national and local abatement and adaptation decisions. The nature of uncertainty is multi-dimensional: it includes statistical uncertainty, scenario uncertainty and recognised ignorance in observed data, in climate models, in climate impacts, in policy context, and on all these locations uncertainties are both epistemic (imperfect knowledge) and stochastic (intrinsic variability in the climate system) (Dessai & van der Sluijs, 2007: 10; Dessai & Hulme, 2004).

While prediction-oriented modelling has its uses, 'for many problems, such as those posed by climate change, [it] ...can be misleading, because its underlying premise of what we know about the future is not true' (Lembert & Schlesinger, 2000: 388). Different projections largely reflect different, plausible assumptions about the future. 'In fact, we do not know what the Kyoto commitments will cost. The outcome depends on numerous factors—from the cost of various fossil fuels, the health of the economy, the progress of new technologies, to the efficiency with which government programs are put into place. We can predict none of these with any accuracy' (*ibid.*:388).

In a careful review of the economic models used in climate change policy analysis, De Canio argues that instead of contributing its legitimate insights on the effects of various incentives, the interactions between different parts of the system, and the overriding importance of the distribution of wealth, economics has been misused to obfuscate the climate debate:

> Economic models have been invoked to claim a knowledge of causes and consequences, of costs and benefits, and of the specifics of optimal policies, that are entirely beyond their grasp. Models routinely used in the policy arena involve forecasts and projections extending decades into the future, but in reality no economic forecasting technique has any hope of embodying accurate information about circumstances that far ahead. Models are used to compare policy alternatives, but the fundamental principles of economics make those models incapable of carrying out the requisite comparison. Models are claimed to represent economic and social reality, despite the fact that it is known that they omit, ignore, or mischaracterize vast segments of that reality. Models are used to make strong statements about which policies should or should not be undertaken, even though it is known that their foundations, the mathematical

> properties of the models preclude drawing welfare conclusions (De Canio, 2003: 7-8).

Only by adopting such rigorous conceptual and analytical standards will it be possible to recognise and work with the degree of uncertainty in the climate change policy sphere.

Prediction-based policy analysis attempts to preserve the idea of an optimum policy in the face of multiple, plausible scenarios by estimating the likelihood of each alternate future. Lempert and Schlesinger argue that using these probabilities to define optimum policies can lead to critical mistakes in the assessment of climate change policies. The concept of an optimum policy assumes a single, rational decision-maker whose expectations about the future are well-approximated by a single set of probabilities. But society contains a multitude of actors, each with their own expectation about the future. 'Thus, no optimum policy so based is likely to support the consensus needed for political action. Many different stakeholders are affected by the climate-change problem, and they hold very different views about the climate-change future' (Lembert & Schlesinger, 2000: 389-90). Indeed, most decision-makers and other political actors understand that particular expectations support particular policies and also that the available science supports a wide range of plausible futures. Consequently, stakeholders will do their best to choose divergent subjective probabilities that support the particular position they wish to hold on ideological, financial, or other grounds (*ibid.*). Dessai and van der Sluijs note that, even when the phenomenon of uncertainty in the science is acknowledged, 'the focus on statistical and quantitative methods of uncertainty assessment leads to a tendency to ignore policy relevant information about the deeper dimensions of uncertainty that in principle cannot be quantified' (Dessai & van der Sluijs, 2007: 11).

Those who take a rigorous view of the cognitive and analytical issues in climate change policy agree that we need to accept the fact that decisions will unavoidably occur in a context of contestation, uncertainty and ignorance. This has profound implications for many aspects of climate change policy, some of which have not been adequately recognised in either international or Irish policy debate and procedure. Some of these—concerning cost-benefit analysis, the relationship between science and policy, the heavy emphasis on emissions targets and timetables, and the relative roles of central authorities (whether it be the UN, the EU of the national government) and other actors—are identified below.

> Because no one can know beforehand the exact consequences of any portfolio of policy measures, with a bottom-up approach, governments would focus on

> navigation, on maintaining course and momentum towards the goal of fundamental technological, organisational and behavioural change, rather than compliance with precise targets (Prins & Rayner, 2007b: 975).

Recognition of uncertainty has important implications for how we think about and undertake analysis to support climate change policy. Drawing on a study prepared by Toth for the IPPC Third Assessment Report, Dessai identified 12 different 'decision analysis frameworks' that are relevant to different aspects of the problem at various levels. These range from formal decision analysis, cost-benefit analysis through to policy exercises and focus groups (Dessai & van der Sluijs, 2007; Toth, 2000).

Once uncertainty is factored in, we should no longer see the problem as the search for an 'optimum policy', but as the design of an 'adaptive strategy' or 'robust strategy' (Lembert & Schlesinger, 2000). An 'adaptive' or resilient strategy is one that will work reasonably well in a range of future circumstances and can be modified as we learn more about the issues and how the future is unfolding (Morgan Granger *et al.*, 2009: 16). Thus 'sequential decision making is an indispensible mode of analysis in climate change' (Toth, 2000: 57). 'The product of each step in this sequence is a portfolio of actions including mitigation, adaptation and knowledge acquisition' (*ibid.*: 55).

In his analysis of climate science and policy, Pielke emphases that we need to accept that climate policy decisions will unavoidably occur in a context of contestation, uncertainty and ignorance (Pielke, 2010). Many are uncomfortable with such open acknowledgement of uncertainty when it comes to climate change. We are inclined to share Pielke's view that this 'uncertainty is inescapable, but not crippling' (*ibid.:* 231). It exists in all the other challenges we collectively face, such as economic stability, growth, innovation and social inclusion. In all these areas, no one pretends there is a comprehensive solution. We proceed incrementally on many fronts and seek to learn from experience.

The literature on the place of uncertainty in climate change policy analysis suggests that attachment to different approaches (top-down, bottom-up or a mixed approach) largely reflects the attitudes to risk and uncertainty (Dessai & Hulme, 2004). Walters has noted two types of attitude about the objectives of formal policy analysis, 'conventional' and 'adaptive', that are relevant to climate change uncertainty (Walters, 1986). In like manner, Weiss proposed a framework that links levels of evidence of risk, levels of intervention and attitudes to risk. When scientific uncertainty is hard to quantify, she suggests that the standards of proof used in legal practice can offer some guidance. In responding to risk, similar to the situation in a

court, different levels of evidence justify different levels of policy intervention. Critically, however, the relation between the level of evidence and the level of intervention justified is not objective, but strongly depends on ones attitude to risk. Weiss distinguishes between five different attitudes to environmental risk: the scientific absolutist, who insists on rigorous scientific proof in order to justify any intervention; the environmental absolutist, who is prepared to accept very significant costs at even the hint of environmental danger; and the techno-optimist, the environmental centrist, and the cautious environmentalist, who fall between these extremes (Weiss, 2003).

6.3 The Strengths and Limits of Cost-benefit Analysis

In the international climate change policy process, there has historically been a significant emphasis on general equilibrium modelling and cost-benefit analysis. This reflects the view that, if action to reduce GHG emissions is necessary, it is best to identify the least-cost way of achieving this. In the global context, cost-benefit analysis has been invoked to consider both how much effort should be taken towards near-term emissions reduction and where this should be done. Reflecting the issues identified above—increased recognition of uncertainty, the shift from predictive to adaptive-based approaches and, indeed, the overall pressure to reframe the climate change challenge—in recent years, there is greater awareness of the strengths and limits of such modelling and cost-benefit analysis as an approach to informing climate change policies (Masur & Posner, 2010). This partly involves bringing long-recognised problems in cost-benefit analysis to bear and partly reflects the distinctive characteristics of the climate change problem (Weitzman, 2009).

It seems important to adopt a conceptually rigorous approach to the use of economic modelling and cost-benefit analysis in climate change policy. This involves taking seriously the wide range of theoretical issues, uncertainties, assumptions and ethical judgements involved in modelling climate change policy and doing cost-benefit analysis on the global climate change policy challenge (see Box 5). There are two related sets of issues involved here. One concerns the reliability of the general equilibrium or other economic models used to analyse policy options and likely effects decades ahead. The other concerns the valuation of supposed costs and benefits of different kinds and levels of policy action.

Some economists take the view any model is better than none, and believe that policy should be based on the 'best available' model-based estimates of options, effects, cost and benefits. Others believe that this approach has not served policy

well and, if the available models and cost-benefit analyses are not sufficiently reliable and convincing, this should prompt alternative approaches to policy analysis and policy formation. Certainly, it seems hard to argue with De Canio's view that the representation of consumers and firms that are the building blocks of the general equilibrium models employed in climate policy analysis lack the features that would make them realistic; indeed, they may be so distant from the known behaviour of individuals and businesses as to be implausible (De Canio, 2003). Furthermore, he shows that the mathematical structure built on the maximization principle, turns out not to be sufficiently well-specified as to enable it to give the kind of policy advice, certainty about costs and benefits, that politicians desire. There are too many possibilities for multiple equilibria, unstable dynamics, and alternative distributional outcomes to pin down the economic system with enough precision to support policy recommendations based on neoclassical principles alone. Consequently, other assumptions, restrictions, or behavioural laws must me invoked to make the models well-behaved, and about these assumptions, restrictions, and behaviours there is no consensus. Nor is there any unambiguous empirical basis for choosing one particular set of assumptions or restrictions over another:

> The result is that the application of general equilibrium analysis to climate policy has produced a kind of specious precision, a situation in which the assumptions of the analysis masquerade as results that are solidly grounded in theory and the data. This leads to a tremendous amount of confusion and mischief, not least of which is the notion that although the physical science of the climate is plagued by uncertainties, it is possible to know with a high degree of certainty just what the economic consequences of alternative policy actions will be. This myth, more than any other, has created the policy paralysis and public confusion that so far have impeded constructive action (at least in the United States) to meet the climate challenge (De Canio, 2003: 6-7).

The evidence would seem to bear out this judgement. Indeed, the analytical implausibility of the general equilibrium models and associated estimates of costs and benefits of economic instruments, such as carbon pricing and cap-and-trade, lends further support to the kind of reframing reported and suggested in this paper and the NESC Secretariat's work. In particular, it suggest that while these economic instruments seem less effective than suggested in theory and modelling, the range of available instruments is much broader; but this broader set of instruments requires different kinds of policy analysis and, indeed, may be less amenable to the kinds of *ex ante* analysis that is assumed to be necessary and possible in the dominant framing and orthodox approach.

Box 5: The Cost-Benefit Analysis of Global Climate Policy
Summary of Issues by Hulme (2009: 117-20)

In applying cost-benefit analysis to global climate change analysts seek to compare the costs of reducing emissions of GHGs with the benefits of doing so. The benefits of reducing emissions are usually estimated to be the damage avoided by limiting the extent of climate change. This is known as the 'social cost of carbon'. Estimating it turns out to be extremely difficult and inevitably requires very significant assumptions. Because climate change affects all regions, in principle, the costs and benefits should be calculated at a global level, which is rarely possible. Estimation of the potential damage caused by climate change, and expressing this in monetary terms, involves calculation of the market costs, such as changes in energy demand or the cost of flood defences. But it should also take account of things which we value, but which do not have a market value. Both these market and non-market costs are subject to all the uncertainties that are inherent in climate change; hence cost-benefit analysis requires judgement on how likely are modest or catastrophic effects of climate change (Lembert & Schlesinger, 2000: 392). The physical, and therefore, economic damage that will be caused by climate change, and likelihood of catastrophic change, are poorly understood by science. The 'economic damage functions' used in making such calculations are largely assumed. In principle, we should subtract from these costs the capacity for avoiding the damage of climate change through adaptation, but that is highly uncertain.

In all cost-benefit analysis, future benefits and costs need to be discounted using a social discount rate. For climate change, which is a very long-term phenomenon, the choice of discount rate has a huge impact on the outcome of cost-benefit analysis. But there are alternative approaches to choosing a discount rate and these unavoidably involve ethical judgements about the relative importance of future generations as opposed to the present generation. Not surprisingly, different economic analysts use different discount rates, and this has been a central part of the debate how much action should be taken in the coming decades, as illustrated in the debate on the Stern Report. Indeed, there are further complexities, reflecting the need to adopt an 'equity weighting' when estimating the costs of death and disease in different countries or groups. Not surprisingly, Stern's review of published estimates of the social cost of carbon revealed a range from zero dollars a tonne to over $2000 per tonne (which would be less if expressed as a cost of carbon dioxide). Beyond all of this, given the critical role of uncertainty and the inherent ethical judgements, some believe that cost-benefit analysis should be trumped by the Precautionary Principle, while others argue that it provides little practical guide.

On the basis of a rigorous analysis of economic models of climate change, DeCanio concludes that 'claims to be able to estimate precisely the "costs" of climate protection policies must be abandoned' (De Canio, 2003: 157). It is hard to attribute any credence to discussions or calculations of the 'social cost of carbon'.

The large number of uncertainties, assumptions and value judgements involved in application of cost-benefit analysis to the global climate change problem are outlined in Box 5. These lead one leading British climate change expert to conclude that 'for all these reasons—a global-scale phenomenon affecting the distant future and with

uncertain consequences, many of which have no market value—the application of conventional cost-benefit analysis to climate change policy becomes at best very difficult and worst impossible' (Hulme, 2009: 116).

In addition to these general problems, it is important to think carefully about the role of cost-benefit analysis in a policy area where the key need is not only to assess existing policy possibilities, but also search for new ones. We summarise Richardson's insightful discussion of this in Box 6. These limitations of cost-benefit analysis have led many analysts to prefer a range of other decision analysis frameworks. In their paper entitled 'When We Don't Know the Costs or the Benefits: Adaptive Strategies for Abating Climate Change', Lembert *et al.* (1996) emphasise the limits of 'best available estimates'. They argue that the average of two best-estimates if inferior to what they call an 'adaptive strategy'. They highlight the similarities between adaptive strategy and Shell's scenario planning and the US army's assumption-based planning (Dewar, 2002).

Box 6: Limits of Cost-benefit Analysis as an Option-Generating Device

Richardson draws attention to limitations of cost-benefit analysis when seen as a scientific and objective tool of policy decision. He fears that cost-benefit analysis can limit intelligent deliberation about how best to use resources. While it makes sense to estimate the costs and benefits of possible policy measures, this should be used as part of a process of practical intelligence and democratic policy deliberation. Cost-benefit analysis can limit rather than expand rational deliberation because it presupposes that all the significant deliberation, on possible policies and how we value their benefits and costs, has already been done. In the ordinary process of practical reasoning we do not think of preferences being fixed independently of deliberation; our preferences and goals are reformulated as we proceed.

Consequently, he suggests that an over-reliance on cost-benefit analysis, especially in its economic-theoretic sense, can block the use of practical intelligence. First, by focusing on the calculation of the costs and benefits of *given proposals*, it can fail to generate *new solutions* and alternatives. Second, it can fail to resolve conflicts between the many ends and values we hold. Deliberation involving competing ends or values will often find ways of respecifying one or all of them so as to relieve their conflict in specific contexts. This will often yield a principled compromise. Indeed, one of the best examples of this is the initially paralysing conflict between environmental protection and economic growth, modified by the development of thinking about 'sustainable development' and 'green growth'. Third, by taking ends—and, indeed, means—as fixed it lacks a provision for reformulation of them. But this is precisely what we do in most practical problem-solving. In summary, Richardson's concern is with 'cost-benefit analysis's limitations as an agenda-setting and option-generating device' (Richardson, 2000: 1000).

Within this rigorous approach it will, of course, be possible and necessary to undertake cost-benefit analysis on many specific aspects of climate change policy. However, this is likely to involve somewhat less *ex ante* cost-benefit analysis than sometimes thought to be possible, given the high degree of uncertainty about the impact of policy measures and, as noted above, the need to develop and evaluate policy measures in an experimental process.

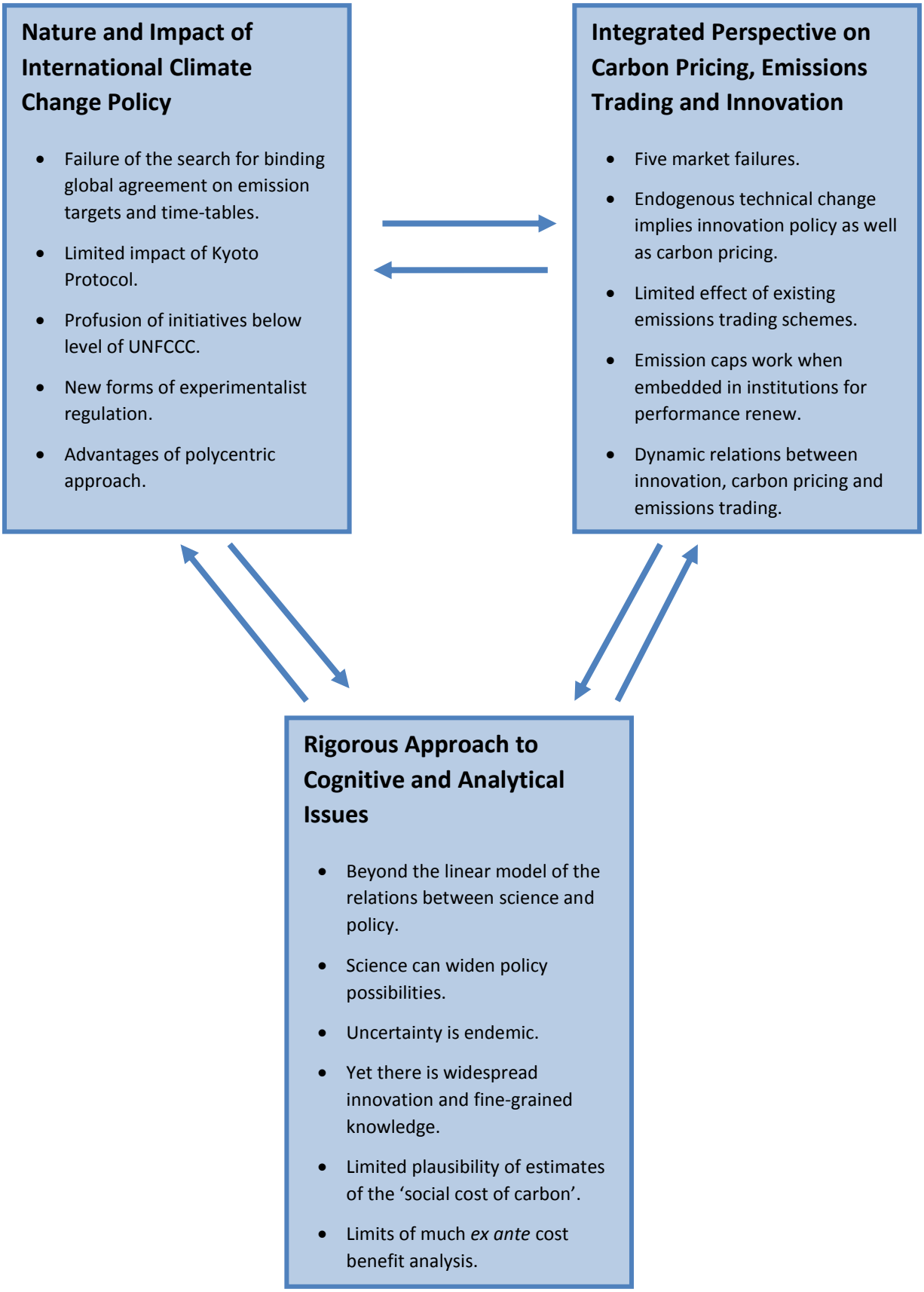
7. Towards a Polycentric Experimental Approach that Links 'How Much' with 'How To'

Much of our discussion so far has suggested that the dominant framing of the climate change challenge has served an important function, bringing the problem of global warming to international consciousness, but has also reached its limits. Many of those who are seeking to extend it argue that a less hierarchical approach is necessary, is available and can be more effective. In this section we identify some of the elements a polycentric response. These include a less-universal approach to carbon pricing and emissions trading, getting beyond the textbook distinctions between 'market-based' and regulatory approaches and between 'voluntarism' and 'command and control', managing the transition of the whole economic, social and technological system, richer approaches to attitudinal and behavioural issues, bringing the organisational disciplines of environmental management and monitoring into the picture, and a new pragmatism in combining diverse policies and governance at a range of levels. Several of these are further developed and used extensively in the NESC Secretariat's final report (NESC Secretariat, 2012). Two of them—transition management and the 'practice' approach to attitudinal and behavioural issues—are the subject of a separate Secretariat Background Paper (Moore, 2013).

7.1 Links Between Elements of the Reframing

It is important to see that the different elements of the reframing sketched above are more than just a simultaneous build-up of pressures; they are linked to one another in a way that starts to paint a picture of a subtly, but significantly, different approach to climate policy. Some of the relationships between the three sets of issues are sketched in Figure 3 and noted thereafter.

Figure 3: Links Between Elements of the Pressures on the Dominant Framing



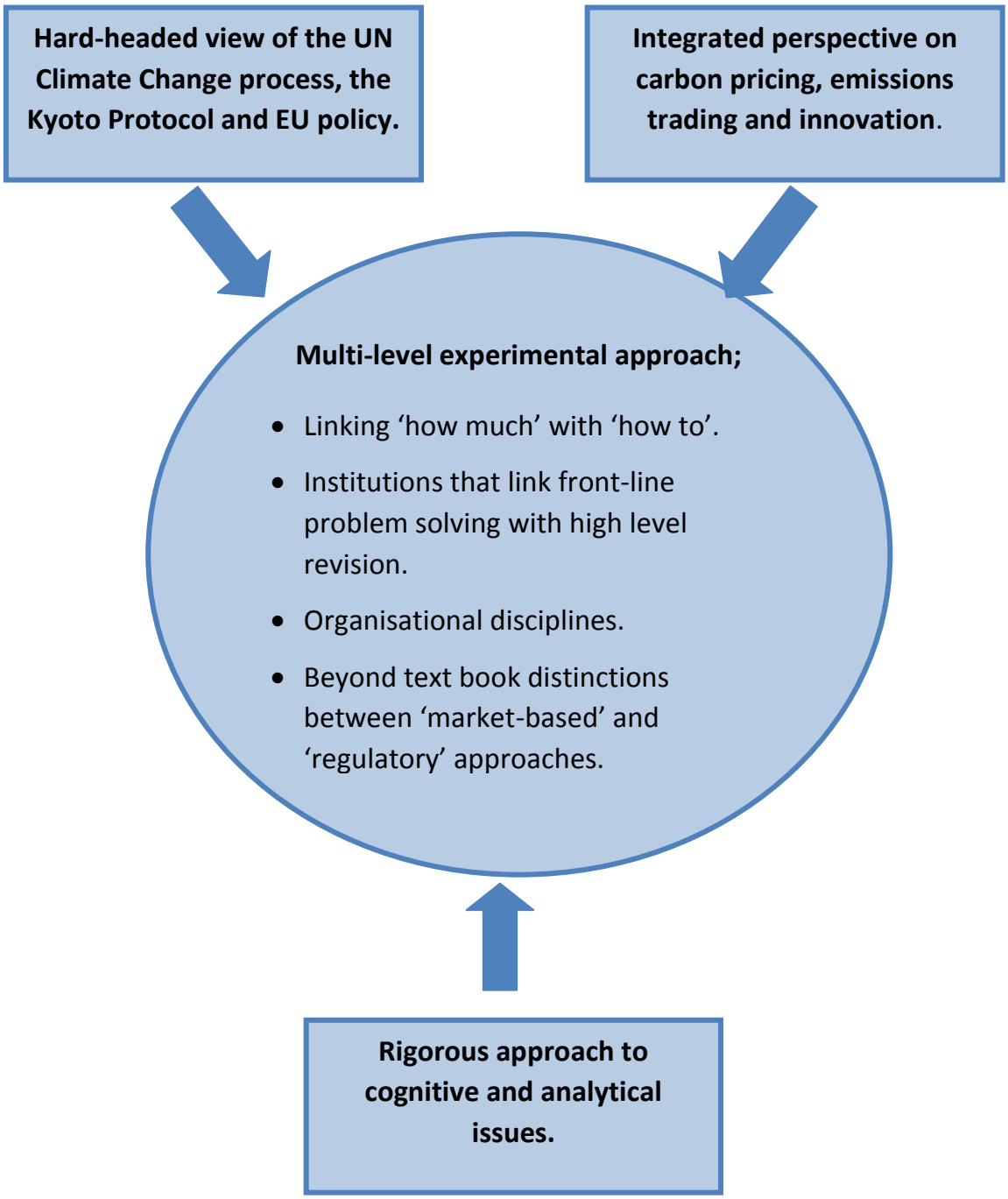
- a hard-headed view of the UN and EU climate policy not only shows the vast gulf between declared targets and timetables and the actual emissions trajectory, but draws attention to the way in which the most successful international climate treaty, the Montreal Protocol, actually worked;
- this, in turn, prompts us to look more closely at the potential of carbon pricing, emissions trading and existing technologies to achieve a profound decarbonisation;
- when we do so we discover political, analytical and practical reasons to take a hard-headed view: there is limited application of carbon pricing and greater reliance on cap and trade. But when we look closely at the real, as opposed to textbook, nature and functioning of emissions trading systems, we see that they involve less precise prior commitments and knowledge of solutions and the construction of complex institutional architectures to search for solutions and undertake performance review;
- that search for new solutions, which in turn underpins more ambitious definition of the environmental goals, involves widespread use of science as a way of widening, rather than narrowing, possibilities, so allowing an escape from the linear model of the relationship between science and policy that has dominated the climate issue to date;
- indeed, we are struck by the fact that existing technologies do not seem sufficient—in terms of cost, scalability, commercialisation or adoption—to achieve profound decarbonisation and this both helps explain the limited progress achieved in international policy and points us towards innovation policy as a vital ingredient;
- for these reasons, we are led to think about the actors below the NUFCCC—state, corporate and civil—that are involved in the kind of activities that will constitute an effective climate policy;
- we are then struck by the fact that many firms have developed fine-grained systems for monitoring and improving resource use and that these are increasingly integrated into their core production systems, and that there is a close affinity between these systems and the disciplines developed earlier to deal with food safety, quality assurance, innovation and other challenges (see Section 7.6);

- once we are looking in this direction, we are struck by the fact public policy makers, agencies and regulators are deeply involved in much of this activity, but not by means of top-down direction; we are led to recognise that there has, at least in some spheres and polities, been an interesting evolution in regulation from command and control to articulation of framework goals and norms that are elaborated in interaction with the regulated actors;
- but then we notice the degree to which, especially in the area of environment and labour standards, firms frequently feel a need to engage with NGOs in building and verifying the fine-grained information necessary to monitor their carbon footprint and learn about possible improvements;
- by and large, it is these—public, private and civil-society—organisational structures and disciplines, and the related willingness of political actors to tighten emissions caps, rather than trading and the iteration towards an equi-marginal cost of abatement, that does the real work;
- from several different directions we come to focus on the behavioural factors, practices and systems that underpin the carbon-intensive economy and that must change if a low-carbon economy is to be created: unlike more focused environmental problems, climate change demands pervasive change in the practices of living, production, travel and consumption (see Section 7.4 and 7.5);
- new forms of cross-fertilisation between the economy, society and public governance are increasingly evident, enhancing the ability to learn and innovate. Such innovation and learning are systematic, almost always combining initiative, disciplined review and a willingness to confront challenges at three level—institutional, inter-personal and personal;
- the systems of reporting and planning in evidence when environmental policy works seem to differ sharply from that created by the EU in its hierarchical approach to some aspects climate policy; the former are characterised by fine-grained monitoring of what is happening and what is possible and mutual exploration of possibilities, while a significant part of the existing EU approach to climate change seems to involve member states in preparation of projections which, on a raft of barely-specified assumptions, can be projected to reach a pre-ordained blunt top-down target. In the former the planning is much closer to what actors can really

achieve and the monitoring is much closer to what they really do and can control.

Indeed, in demonstrating how these observations and ideas connect and cohere we could have started virtually anywhere in the circle—say with firms or new-style regulation, or with the ubiquity of uncertainty and the limits of predictive analysis—and followed the links. What remains constant is that the sequence leads inexorably to a multi-level, experimental, approach to climate change policy, as illustrated in Figure 4.

Figure 4: Towards a Multi-level Experimental Approach to Climate Change Policy



After completion of our work, it was brought to our attention that many of the authors cited above, each highlighting different pressures on the dominant framing of the climate change policy challenge, had come together to produce *The Hartwell Paper: a New Direction for Climate Policy After the Crash of 2009* (Prins *et al.*, 2010). While that paper outlines a similar perspective to that developed here, rather than simply rely on it and point the policy community to it, we believe it is still worthwhile to explain how our independent examination of three main facets of the issue led us to suggest a pragmatic reframing of the climate change policy challenge. The publication of the Hartwell Paper, a later application of the Harwell analysis in an American context (Atkinson *et al.*, 2011), and similar ongoing work, underlines one of the central arguments of the NESC Secretariat: that, although it may be uncomfortable reading for long-standing and often-articulated Irish, EU and UN policy, it is our duty to report the reframing of the challenge that is underway and is bound to gain momemtum.

Together these arguments suggest that, pending the emergence of an effective global governance approach, there are many reasons to vigorously pursue actions at many levels involving a wide range of actors—including supranational entities like the EU, states, public agencies, regions, firms, civil society organisations and communities. At the same time, we remain aware that these actions must inform yet-to-be created governance systems at higher levels. It this logic that informs our approach throughout our final report:

a) in promoting honest discussion of the limits of existing UN and EU targets and timetables;
b) in placing considerable emphasis on the role of Irish public agencies, the organisational disciplines of firms and the many interesting experiments and local initiatives in which there is cross-fertilisation between firms, society and public bodies; and
c) in arguing that the ultimate effectiveness of action at several levels, involving the EU, the state, firms and social organisations depends on a public governance system that both encourages and can systematically learn from innovation—which does not yet exist.

The implications of these ideas for Ireland's climate change policy are explored in the NESC Secretariat report (2012).

In the remainder of this paper, I outline some of the elements of the multi-level experimental approach noted above and depicted in Figure 4. When combined,

these imply a rebalancing of the emphasis from 'how much' to 'how to' and a modified approach to targets, which is the final topic in the paper.

7.2 A Polycentric and Dynamic Approach to Carbon Pricing, Emissions Trading and Innovation

One important element of a more effective international approach to climate change seems likely to be a different combination of the important policy instruments—carbon pricing, emissions trading and innovation policy. Indeed, there are many developments in emissions trading underway; but it remains to be seen whether they have greater success in bearing down on emissions.

Analysts that take the failure of the dominant UN and EU approach most seriously, such as Victor and Helm, argue that the cap-and-trade and pricing regimes in ambitious countries could be made much more effective if they were less diluted by the offsets that are widely available in the global trading mechanisms (Victor, 2011; Helm, 2012). That dilution reflected both the high-minded desire to adopt a universal approach, combined with the hard-headed desire to allow international offsets that significantly ease the pressure of emissions caps and targets and timetables. They suggest that climate change policy needs to learn from the greater success of international regimes such as the GATT and WTO. These regimes involved contingent commitments from members and generated benefits that are available only to them. In contrast to the Kyoto Protocol, they created a dynamic that attracted non-members, even countries with limited commitment to free trade. The top-down global caps, targets and timetables aspired to in climate change policy are not leading us towards a solution to climate change. 'An alternative, more positive, approach is to turn the problem on its head: to start bottom-up with national and regional approaches, and to use three key policy instruments—the carbon price, the gas transition, and R&D' (Helm, 2012: 176). Although it can sound counter-intuitive, a less universal approach to the global warming policy challenge may be more effective.

7.3 Beyond Textbook Distinctions: 'Market-based Instruments' versus 'Command and Control'

The evidence and arguments above suggest that the distinctions which are made so much of in textbooks on environmental economics and climate change—between 'market-based' instruments and 'command and control', and between 'mandatory'

and 'voluntary' approaches—are losing some of their relevance in practical life. Three arguments lead to this view.

The first is the discovery that effective emissions trading schemes require construction of an elaborate institutional architecture. In Section 5.2 we saw the findings of experts on the most successful international environmental treaty, the Montreal Protocol. The imposition and effectiveness of a cap that truly bore down on emissions was dependent on a system of international monitoring and policy review. It might still be argued that there remains a big difference between emissions trading and regulation, since the 'market-based' approach does not dictate what solution firms adopt. But here another interesting development in practice and thinking becomes relevant.

Second, in recent decades, in the EU other jurisdictions, new approaches to regulation are much less prescriptive. As discussed in NESC's 2010 report, *Re-finding Success in Europe*, these 'experimental' approaches to governance set framework goals and give the regulated entity considerable freedom to pursue them as they see fit, subject to the condition that they report and participate in some form of peer review (NESC, 2010; Sabel & Zeitlin, 2010). If the broad goals of public policy are clear (or clear enough to initiate action), but the rich information about how to achieve them (or, indeed, what can be achieved) is not easily available to the political or regulatory authority, then it makes more sense to focus mandatory obligations on provision and comparison of information, rather than compliance with defined outcomes. Among the interesting developments and ideas in this area are 'rolling rule regimes' (which use regulation as a drive to continuous improvement), 'information-forcing' regulation and 'regulatory penalty defaults', which recognise that the richest information and expertise resides within firms and other organisations, but create an incentive for these actors to engage (Karkkainen, 2006). In many cases, this requires firms or other regulated entities to adopt and develop complex systems of data generation, monitoring and planning for improvement. Indeed, these are often precisely the kind of processes that firms involved in emissions trading schemes adopt in order to reduce emissions and minimise their need to buy credits.

Third, we can also escape from a dualism that is highly prevalent in the climate change debate at international and national level—between legally binding and voluntary approaches. Overall, the wider perspective suggests that more is possible through voluntary methods than the dominant framing allows. This should not be misunderstood as a general preference for voluntary policies over regulation and

mandatory obligations. The point is that there has been an explosion of new knowledge on how regulation, standard setting and continuous improvement work in a range of settings. In a few settings, purely voluntary processes will work to serve the public good or, in environmental terms, protect 'the commons'; in many, a mixture of approaches is necessary. We know much more now about the dimensions that shape the effectiveness of obligatory and voluntary regulation and standard setting (Mol *et al.*, 2004). This indicates that the appropriate form of regulation depends, in large measure, on both the nature of the 'harms' that are to be avoided, the degree of strategic uncertainty and where the relevant knowledge and expertise lies (Sabel & Simon, 2011).

So—if 'market instruments' require an institutional architecture like regulation, and regulation no longer amounts to 'command and control', and much 'private' standard setting has acquired a quasi-regulatory nature—it looks like the sharp distinctions between the textbook categories, which still figure in debates on global warming, have weakened in the face of the efforts of states, firms and civil society organisations to deal with the complexity and variability of problems and contexts.

7.4 The Transition of the Economic, Social and Technological *System*

Since climate change policy is about the transition to a low-carbon sustainable economy and society, there is increasing recognition that we need to think about how economic, social, technological and cultural *systems* change. This is explored by a number of research institutes and has given rise to an interesting body of work on 'transition management' or 'adaptive management' (Loorbach, 2007; in 't Veld *et al.*, 2011). 'Transition management has its roots in environmental studies, technological innovation studies, and integrated assessment; it was developed against a background of failing Dutch environmental policy. Despite the fact that actors were willing to change to environmentally friendly modes, they were incapable of changing because of high investment costs associated with such change' (van der Brugge & van Raak, 2007: 35). This initiated a shift from individuals and organisations towards the system level. Both transition management and adaptive management are presented as learning-oriented management theories. Both stress the limits of our knowledge and understanding of complex adaptive systems, and therefore, emphasise the importance of continuous processes of learning and adjusting (Meuleman, 2010). These approaches are discussed in a separate NESC Secretariat Background (Moore, 2013)

7.5 A Richer View of Behavioural Issues: Practices, Norms and Technologies

It is widely agreed that many attitudinal and behavioural issues arise in seeking a transition to a low-carbon economy and society. Indeed, the Stern review of 2007 emphasised the removal of barriers to behavioural change as one of three required policy elements for climate change (Stern, 2007). The dominant framing of the climate change challenge involves a particular understanding of this issue; it tends to focus on information deficits and the role of new information in changing attitudes, behaviours and individual choices. But interesting extensions of, and alternatives to, that approach are now emerging and being tried; these focus on the social 'practices' that are embedded in the fossil-fuel economy and which will need to be reconfigured in the future low-carbon economy and society. In her Background Paper, Jeanne Moore discusses the limits of the mainstream approach and outlines the new thinking (Moore, 2013).

We see value in this 'practice' approach and suggest that it has a role in addressing some of the key areas of Irish climate change policy, especially agriculture, transport and the uptake of energy efficiency opportunities. Indeed, we believe that Ireland can be an influential test-bed for initiatives of this kind. It is a country in which there is considerable innovative cross-fertilisation between business, society and public governance. But, as shown in the NESDO report, *Ireland at Another Turning Point*, this depends on organisations that are capable of combining action at the three levels—institutional, inter-personal and individual (NESDO, 2009).

7.6 Bringing Organisational Disciplines into the Picture

Among the most visible and important 'practices' of relevance to climate change are the organizational disciplines developed by firms in recent decades. Consequently, one of the interesting elements of the emerging reframing is to bring organisational knowledge and disciplines into the picture. These include environmental management systems, Life Cycle Assessment of environmental and social effects and industrial ecology. Firms and civil society organisations use these disciplines to track and correct environmental impacts. An important feature of these environmental monitoring and management systems is that they are fully integrated into the firm's production system—alongside cost control, quality and safety. Indeed, in some firms they are integrated into their upstream supply-chain processes and their downstream customer relations and marketing. Consequently, they frequently involve not just internal changes, but flows of rich non-price information between

firms, and between firms and public agencies. We see this widened focus as particularly relevant in thinking about Ireland's climate change challenge.

These disciplines have potentially profound implications for the way in which climate change policy is conducted. First, it is largely within these processes that it is possible to generate an informed view of both 'how much' emissions reduction is possible in the near term and 'how to' achieve this. Second, it suggests that states' ability to commit to emissions reductions on a given timetable, if that approach is continued, will be dependent on the quality of their engagement with enterprises and NGOs. Third, some argue that these disciplines will eventually yield a new era of 'ecological intelligence' and radical transparency in which consumer demand will become a major driver of low-carbon production (Goleman, 2010; Senge, 2008; Fung *et al.*, 2007).

7.6.1 Towards a Multi-level and Multi-actor Experimentalist Climate Change Policy

Much of the analysis we have cited suggests a widening of both the processes and substantive approach to the climate change challenge. As Rayner and Malone say, 'the record and prospects of achieving emissions reductions suggest it would be prudent to expand the repertoire of climate-change policies, if only because our past emissions and the timetable for any plausible reduction programme mean climate change is already upon us' (Rayner & Malone, 1997: 332). Climate change itself, and the human activities which influence it, including public policy, are immensely complex and contested. They suggest that 'the first essential for policy in a complex world is to resist the urge to declare one view-point true and to reject others' (*ibid.:* 334). 'To commit oneself, family, company, community or country to just one of these viewpoints is to gamble that it will turn out to be right and the others wrong. It is far more likely that all will be partly right and partly wrong. Recognizing this and stewarding the institutional pluralism for maintaining different viewpoints and a rich repertoire of policy strategies is what promoting social resilience, sustainable development and climate-change governance is all about' (*ibid.*)

Writing in 2010 Hulme, identified three significant trends. First, there has been a discernible change in some of the practices of climate science. Second, 'The meta-framing of climate change has therefore moved from bi-polar—that either the scientific evidence is strong enough for action or else it is too weak for action—to being multi-polar—that narratives of climate change mobilise widely differing values which cannot be homogenised through appeals to science' (Hulme, 2010). Third, and

perhaps most dramatically, has been the fragmentation of climate policy-making, with increasing loss of faith in the multilateral process of the UNFCCC. Instead, he says 'there is a new pragmatism in the air' (*ibid.*).

One feature of the new pragmatism is a focus on action at several levels. In the dominant approach 'almost all climate change policy research and analysis is aimed at high-level policymakers' (Rayner & Malone, 1997: 333). But there are advantages of dealing with problems at the lowest possible levels of decision making and encouraging institutional pluralism, involving action at local, national and international level (Prins & Rayner, 2007b; Meuleman, 2010). In some countries this would imply taking a more regional and local approach to climate policymaking and implementation, since many of the factors related to climate change are in the remit of sub-national entities. Hulme advocates the cultivation of multi-level polycentric institutions and partnerships through which policy innovation may occur, rather than relying exclusively on the UN or EU process (Hulme, 2010). In the NESC Secretariat report we outline the reasons for, and advantages of, a multi-level experimental approach, drawing on the work of Eleanor Ostrom, who was awarded the Nobel Prize in economics (Ostrom, 2009, 2012; Cole, 2011, 2012).

Another feature is the need to incorporate climate change concerns into other, more immediate, issues such as employment, economic development and public health. 'The appropriate strategy is to build climate concerns into the everyday concerns of people at the local level and the big concerns of policymakers at the national level' (Rayner & Malone, 1997: 333). It is necessary to design information to fit the everyday perspectives of diverse stakeholders and design policy instruments to suit specific conditions. Consistent with our emphasis on environmental management systems, and the work of Irish firms such as Glanbia, it is suggested that climate change policy should build on existing dynamics and mesh with real material processes that already exist (Prins & Rayner, 2007a). Indeed, in the current economic crisis, many of the most encouraging initiatives of relevance to climate change, especially in countries that were not among the most ambitious, such as Brazil and China, are motivated and framed around challenges of energy security and energy cost, rather than decarbonisation.

A multi-level climate change policy process would still need periodic snapshots of the state of the science, as currently done by the IPCC, 'but the sorts of questions to be addressed would change dramatically, such as being directly driven by the needs of policy makers facing specific challenges at local and regional scales of governance' (Pielke, 2010: 159). There would be decreased emphasis on research that seeks to

attribute or predict changes in the climate over centuries-long timescales, because policy action would no longer be dependent on a presumption of accurate predications that allow judgements of 'dangerous interference'. Thus science would move further towards being a tool for policy action rather than turned into an instrument for political advocacy, as discussed above.

7.7 Is Climate Change Best Framed as an Environmental Issue?

Some are even now questioning whether the dominant framing of climate change as a 'pollution', or even a 'environmental', problem can be an effective way of approaching the issue. We noted above the view that treating global warming as a typical environmental problem has led policy makers to focus on solutions that do not work. Victor argues that most of the underlying causes and nearly all of the policies that will fix global warming are rooted in economics (Victor, 2011). 'Most of the politics of environmental policy are handled by ministries that in most governments are peripheral to the real policy challenges of global warming, which are the design and management of a slow, costly, and difficult transformation in how society obtains and uses energy' (*ibid.*: 50). Furthermore, the environmental lens on global warming has inspired diplomats to use models from the history of environmental diplomacy that do not work well for coordinating complicated economic policies.

A second, somewhat different, reason is that the dominant framing of climate change as an environmental issue almost inevitably puts climate change in opposition to economic growth and the spread of prosperity and electricity to the millions who do not yet have them. This does seem to be an unavoidable consequence if the approach to global warming begins from the proposition that energy is too cheap and must be made more expensive. Some suggest that it would be more productive to reframe the issue as a problem of a lack of sustainable development. A focus on the challenge of creating and providing universal clean energy services might allow a move from a focus on 'burden sharing' to mutual gains and, thereby, enlist the support of most countries (Moomaw & Papa, 2012; Prins *et al.*, 2010; MRFCJ, 2012).

More widely, the climate change problem, and the project of decarbonisation, is one of those goals which is probably best addressed obliquely. In his book, *Obliquity*, *Why Our Goals Are Best Achieved Indirectly*, the British economist John Kay shows that in many spheres goals are less easily achieved if tackled head-on (Kay, 2010). In

business, the firms that perform best in the long run are not those that make profit the dominant goal; in society, many valued social outcomes are achieved obliquely. This reflects the limits of our knowledge, the interaction of means and ends, the plurality of solutions to problems, the dependence of outcomes on motives and the limitations of models as a guide to practical action in complex, interactive, contexts. An oblique approach to climate change, would involve a mix of instruments, ranging:

> from informational signals, such as labelling, through market instruments, such as emission trading, to command and control mechanisms, such as technology standards. The benefit of this approach is that it focuses on what governments, firms, and households actually do to reduce their emissions, in marked contrast to the target setting that has characterized international policy making since the Toronto Conference of 1988. Since the exact consequences of any particular package of policy measures would be uncertain, governments would focus less on targets and more on navigation: maintaining course and speed (Prins & Rayner, 2007a: 39).

In its report to government, the NESC Secretariat also highlights the interaction of ends and means, and the importance of focusing attention and action on what governments, public agencies, firms and households actually do.

7.8 From 'How Much' to 'How To'

A central feature of a more effective, multi-level, and polycentric approach to climate change policy must be to balance the currently dominant emphasis on 'how much' with greater exploration on 'how to'. This involves both more attention to the difficult task of 'how to' achieve a profound decarbonisation of the economy, and a more a thoughtful, precise and relevant approach to the use of targets and timetables.

This aspect of the NESC Secretariat analysis has provoked critical commentary from some, even those who share our disappointment with the failure of the dominant framing to produce an effective international response to the threat of global warming. While the issue of targets and timetables is discussed in the Secretariat's report to government, it may be helpful to outline the main argument here. There are three main points:

- First, and most important, there is a mismatch between the dominant focus on global agreement on targets and timetables and the regulatory strategies and instruments that governments actually use;

- Second, not only are targets and timetables less effective than hoped, but the remarkable emphasis on them has actually had a negative impact in several significant ways;
- Third, well-specified targets and timetables have a definite role in many aspects of public policy, including climate change, but all systems of targets have strengths and weaknesses that need to be kept in mind.

Each argument is briefly explained here.

It is important to appreciate the first argument. It is about the *nature* of the targets that dominate international climate change diplomacy, negotiated targets for reduction in overall national emissions over a given period, not about whether targets in general can have a positive effect in strengthening commitment to policy action. In our report we cite Victor's analysis, which shows that such targets and timetables are not effective for a number of related reasons (NESC Secretariat, 2012:16-8). Although emissions targets and timetables seem to align with the need to control emissions, in reality they are not well matched to the regulatory strategies and instruments that governments actually use. 'If most countries relied mainly on national cap-and-trade systems then international coordination of caps could be sensible' (Victor, 2011: 74). But they don't. Indeed, given their reliance on direct regulation and other instruments on energy efficiency and renewable energy, 'emissions levels are fickle and beyond governments control' (*ibid*.: 23). 'This implies that the choice of international emissions targets and timetables will not determine national policy' (*ibid*.: 75). This means that emissions targets and timetables lack credibility, the central requirement for effective international treaties. 'It is striking how little attention climate diplomacy gives to the important details of national policy and the credibility of national proposals' (*ibid*.: 249). As result, international emissions targets and timetables manage to combine insufficient ambition with lack of credibility; they are 'brittle' because countries that discover they cannot deliver on their commitments tend to exit, as with the Kyoto Protocol (*ibid*.: 207). These features of emissions targets and timetables must be confronted by anyone with an interest in effective policy action, regardless of whether governments' need their political commitment strengthened by adoption of binding international treaties of some kind or by other means.

The second argument is that not only has making emissions targets and timetables the 'holy grail' of climate talks not achieved its intended goal, but it has actually has a series of negative effects. Victor shows that the 'obsession' with targets and timetables 'has come at the expense of other instruments that might work better'

(*ibid*.: 209). Indeed, he argues that national policies on emissions are a lot harder to influence by focusing on emissions targets and timetables. 'So far, the experience has been that targets are usually divorced from real policy options and thus they mobilise political energy around goals that cant be achieved' (*ibid*.: 234). They encourage the kind of behaviour evident under the UNFCCC, where governments set ambitious goals while real national policies drift far off course. Indeed, the remarkable emphasis on targets and timetables, precisely because it is a failure, tends to be self-reinforcing, giving rise to a further negative effect. It is extremely difficult to get agreement on targets and timetables for emissions reductions because countries have highly diverse interests, values, industrial histories, resources and vulnerability to climate change. As a result a large proportion of the total cognitive and political energy devoted to the climate change challenge seems to have been applied to negotiating and renegotiating targets and timetables and construction of new projections and 'roadmaps' that reflect these ambitions. This, in turn, reinforces the emphasis on predictive analysis, most of which is much less reliable than it is imagined to be. In its report, the NESC Secretariat identifies the way in which the intense emphasis on emissions targets and timetables leads to considerable elision, and often confusion, of targets, projections, predictions, 'roadmaps', scenarios, research findings, plans, policy 'measures' in place, policy measures yet-to-be-implemented and even policy 'measures' needed but yet-to-be-thought-up. It has often blurred the distinction between projections and discussion of substantive policy possibilities (NESC Secretariat, 2012: 16-8). The result, as Victor says, 'has been the illusion of action but not much impact on the underlying problem' (Victor, 2011: 249). The most significant negative effect is that this self-reinforcing whirlwind of diplomacy, projections, targets, timetables and 'roadmaps' displaces serious analysis and discussion of how to achieve decarbonisation—technically, politically and organisationally.

Third, none of these points imply a blanket rejection of targets in climate change policy. As in other spheres, targets can help focus attention on a particular issue, can motivate staff and, at their best, provide a link between the front-line and high-level policy. In the case of climate change policy, there would seem to be a stronger logic for targets for outcomes that governments and other actors can control, or at least influence, such as energy efficiency and installation of renewable energy capacity. But advocates of targets need to be aware that all systems of targets have weaknesses. As Mulgan notes, an emphasis on targets often reflects the theory that there is a clear distinction, and a conflict of interest, between a 'principal', government, and the 'agent', the officials and agencies that deliver policy (Mulgan,

2009). Many policy spheres and problems do not conform to the principal-agent analysis. In addition, targets can prompt the invention of creative ways of complying with the letter of a target without honouring the real goal, reflecting a narrow compliance mindset—'hitting the target and missing the point'. In discussing public policy in a range of policy areas Mulgan says 'In retrospect Britain repeated the lesson learned by many big firms and governments over the years: whipping the system harder can achieve temporary gains in performance...but these gains are unlikely to be sustained' (*ibid.*: 139). Britain's other mistake was to substitute the monitoring of performance for performance itself. While there are no cast iron solutions to these problems, he notes that more sophisticated approaches to performance management and implementation are taking shape in many countries. 'These may involve closer involvement of practitioners in the design of policies and targets, with more provisional targets that are open to negotiation, and informed by practitioner knowledge' (*ibid*.). This is the approach advocated by the NESC Secretariat in its report on Irish climate change policy and, more generally, by the NESC over the past decade (NESC, 2002; 2005; 2010; 2011; NESC Secretariat, 2012: 48-50). In that approach, the adoption of targets is closely linked to development of indicators or benchmarks—systemic, diagnostic and performance—and the emphasis is then on creation of organisational arrangements that can make disciplined use of fine-grained information to reflect on successes and failures and drive continuous improvement (NESC, 2005: 300-1).

In conclusion, the relative emphasis on 'how much' rather than 'how to' is a striking characteristic of much climate policy and analysis. It is significant because the reality is that no one knows how fast a large economy can decarbonise (Pielke, 2010, Victor, 2011). Throughout our work we bring this distinction between 'how much' and 'how to' to bear on a range of analyses, commitments and policy statements. We strongly believe that the pressure for reframing that we report here is prompting a reversal of the dominant approach; instead of starting with a debate or commitment on 'how much', thinking will increasingly begin by asking 'how to' achieve profound decarbonisation.

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