

Advancing international climate policy: An options paper

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Introduction

1. The objective of the Taskforce is to develop a set of recommendations to governments on how best to consolidate and build on the gains made through the Kyoto Protocol. Its proposals should tackle climate change effectively at the global level over both the short and long term.

2. The aim of this paper is to facilitate discussion at the first meeting of the Taskforce on 22-23 March, after which a longer, more focussed paper will be prepared reflecting the early deliberations of the Taskforce. This paper provides a brief overview of the issues involved and outlines the main options being discussed internationally to build a more effective climate policy regime. The Taskforce should not be limited to considering only the options described in this paper as it pursues innovative solutions to the current impasse in international climate change policy. The Taskforce members' views of the characteristics of a successful future framework, along with the options themselves, will shape the research program, which will ultimately guide the Taskforce in making its final recommendations on future international climate policy.

3. Several proposals for building on the Kyoto Protocol or for replacing it have been developed by various parties, and these are summarised below. Various organisations have prepared overview papers (listed in the bibliography) that we have drawn on in this paper, along with specific research on the proposals themselves. Before discussing the proposals we comment on the context in which discussion of future negotiations will occur, some of the key issues that help frame the debate and the criteria by which any climate change regime must be assessed.

Context

4. The 1992 UN Framework Convention on Climate Change (UNFCCC) provides the broad context for considering options for future climate change policy. The main elements of this include regular reviews of the obligations of all Parties under the UNFCCC, the second review of the adequacy of emission commitments for Annex I Parties, as well as the provisions of the Kyoto Protocol that require the Parties to begin considering emissions commitments for the second commitment period no later than 2005. Another milestone that may attract considerable political attention is the requirement for countries to make significant progress on their Kyoto Protocol obligations by 2005.

5. One of the first considerations in developing international climate regimes is the status of the Kyoto Protocol. The question of whether or not the Kyoto Protocol will enter into force may not be known in early 2005. This depends decisively on Russia's ratification. In principle Russia could wait for some further period of time before declaring its final intentions. Views differ as to the ultimate significance of this in relation to the future of the climate regime. In short it cannot be assumed that if Russia does not ratify then the Kyoto Protocol will lapse. A judgement would have to take into account the stance and actual behaviour of the all of the Kyoto ratifying parties. Options are being explored, for example, to hold the Kyoto system together on the basis of the EU emissions trading scheme and some countries and sub-national entities outside the EU are known to be seeking access to it.

6. It is often assumed outside of the climate negotiating community that, should the Kyoto Protocol lapse, the international slate will be wiped clean and, after a period of reassessment, negotiations will begin on a new framework. Some assume, in this case, that a wide range of possibilities for the 'next regime'

will be on the table and the various parties will come to the negotiating table with open minds. In diplomatic and governmental circles, however, there is widespread apprehension that governments will be reluctant to start any new negotiations unless and until good faith understandings are restored.

7. In practice, the assumption that the world community will discard the gains of the past and begin afresh is hard to sustain. It is more likely that most, if not all, of the main elements of the Kyoto architecture and its institutional infrastructure (the reporting, emission monitoring and verification system) will remain in place in any new regime, or at least serve as the basis for developing new proposals. These elements include binding targets for some nations, differentiated responsibilities (especially between developed and developing countries), phased reductions in emissions, some form of international emissions trading, and assistance to developing countries for their mitigation and adaptation activities. It is also likely that the structure of the negotiation process will remain largely the same.

Key structural issues

8. Any future negotiations on climate change will take place under the auspices of the United Nations and in the context of the UNFCCC. The Framework Convention sets out a number of important principles for addressing climate change, including the need to limit anthropogenic emissions to prevent dangerous climate change, enshrining a global approach and recognising common but differentiated responsibilities. Subsequent negotiations have built on and interpreted these principles. Several key issues must be considered in future regimes.

9. *Climate targets: Short and long-term.* Climate change is the quintessential long-term issue because of the persistence of greenhouse gases in the atmosphere, the irreversibility on reasonable time frames of projected changes to the climate system and the need to replace long-lived assets in making the structural changes required to shift to low-carbon economies over the next decades. Article 2 of

the UNFCCC sets both long and short-term goals reflecting the fact that dangerous climate change must be prevented and that rates of change must be such that adverse effects on ecosystems and sustainable development are kept within safe bounds.

10. It is sometimes argued that in the absence of a long-term framework, a series of short-term targets will add to the costs and uncertainties of reaching international agreements and make climate protection the variable that 'gives' when difficulties arise. Others argue that setting an agreement on a long-term target before setting short-term emission reduction goals could stand in the way of making progress. Both long and short-term targets may be necessary to give effect to the Precautionary Principle, but it is certain that achieving emission reductions in the short-term will contribute towards a long-term target, whatever it is decided to be.

11. In addition, setting a long-term target may not remove uncertainties in calculating emission profiles that correspond to those targets, as rate related issues come into play that influence short-term emission profiles. In the literature it has been shown that rate limits (such as reducing the rate of warming to less than 0.2°C/decade) can be more limiting than long-term temperature or concentration targets and may even constrain allowable short-term emission pathways towards long-term goals. Sea-level rise targets, as proposed by the Association of Small Island States, work in a similar direction.

12. However, from an analytical perspective, establishing long and short-term climate goals is fundamental to specifying emission pathways for short-term climate policy steps.

13. There are various types of targets for climate policy including those based on: climate impacts, notably magnitude and rate limits to global temperature change or sea-level rise; atmospheric greenhouse gas concentrations; emissions of greenhouse gases; and, mitigation and adaptation activities.

14. *Dealing with uncertainty.* Any effective climate regime must accommodate the uncertainty associated with human-induced

climate change. It must be sufficiently flexible to allow for changes in scientific understanding and for sudden and unexpected changes in global weather. There is an increasingly strong case to build into any future regime the ability for an 'emergency' response to deal with catastrophic climate change. The need for flexibility should not militate against the need to set long-term goals.

15. *Fairness.* Any regime must deal squarely with the most fundamental point of disagreement, that of fairness. The refusal of the US and Australian governments to ratify the Kyoto Protocol has been justified by arguments that the Protocol is 'unfair'. Within the international debate various often conflicting notions of fairness have dominated discussions. 'Fairness' in an international climate regime has been taken by various parties to mean: historical responsibility for emissions; current emissions per person; perceptions of the right to development; the capacity to pay for emission reductions (national income); differential economic impact of emissions reductions (through economic structure, energy dependence and trade dependence); special national circumstances; and, intergenerational equity. The question of the distribution of impacts of climate change is also important in understanding fairness. This is considered further below.

16. *Realities of negotiations.* It should be acknowledged that there are very wide differences in political influence among nations engaged in climate negotiations. Developing countries are particularly disadvantaged due to their weaker economic power and the difficulty many experience in providing the resources and expertise to participate fully in international negotiations of a highly complex and drawn out nature. This inevitably leads to the formation of blocs that are sometimes based on political expediency rather than common interests in pursuing a climate regime.

Criteria for an effective climate regime

17. This section briefly considers the broad criteria that should be met by any effective climate regime. International climate change negotiations are extraordinarily complex and assessments of the relative merits of climate regimes will be based finally on political judgements rather than any formal evaluation against specific criteria. Ultimately, there is only one criterion for choosing a climate regime – its political feasibility for the governments engaged in negotiations. Any successful proposal must therefore recognise the political realities of individual nations and blocs of countries. This does not mean a lowest-common-denominator approach, as within each country there are increasingly powerful constituencies for taking strong action to reduce greenhouse gas emissions. In addition, the momentum is growing in favour of penalising nations that refuse to carry their share of the burden.

In forming a view on political feasibility, the Taskforce will be mindful of the criteria listed below. They have been pared back to a minimum set of four. There are often trade-offs between these criteria.

Environmental integrity

18. Above all, any climate regime must attempt to prevent dangerous anthropogenic interference with the climate system. This means that the targets and measures must, over time, result in a large reduction in net global greenhouse gas emissions. Any regime with environmental integrity must cover all significant sources of greenhouse gas emissions. It must also accommodate the role of carbon sinks while excluding opportunities to use sinks in the short to medium term in order to defer necessary reductions of emissions.

Equity

19. Any feasible regime must be seen to be as fair as possible by all parties. While the interpretation of fairness is contested the issue must be addressed directly. In particular, the interests of the world's poorest and most vulnerable citizens should be given high priority.

To illustrate the complexity of the idea of fairness, we refer to five equity principles identified by researchers at CICERO in Norway.¹

1. Egalitarian: all people should have equal rights to use the atmosphere.
2. Sovereignty: current emission levels constitute a prevailing status quo right.
3. Horizontal: actors under similar economic conditions should have similar commitments to reduce emissions.
4. Vertical: the greater the capacity to act or the ability to pay, the greater the economic burden that should be borne.
5. Polluter pays: the greater the contribution to the problem, the greater the burden that should be borne.

Institutional fairness could be added as a sixth principle. This requires that, within the regime, all countries must have fair access to the process of decision making.

Economic effectiveness

20. Any regime should attempt to achieve agreed reductions in greenhouse gas emissions at the lowest cost and with as much flexibility as feasible without compromising environmental integrity. In pursuit of this objective, the Kyoto Protocol allowed for emissions trading amongst participating countries recognising that, with suitable limits, trading permits a lowest-cost approach. This does not preclude the development and implementation of a range of policies and measures by participating countries some of which will serve economic goals in addition to greenhouse gas mitigation, including employment creation and technological development. It should be recognised too that least-cost approach, such as a carbon tax, is not always the fairest one.

It is highly likely that the requirements of any future international climate regime will need to be integrated with existing international trade and investment treaties.

Consolidating the gains

21. Despite the present impasse, the negotiating process leading to the Kyoto Protocol was highly successful at achieving international agreement on a range of issues essential to any future climate regime. These include agreement on measuring and reporting emissions, creating a multilateral greenhouse gas cap and trade system for industrialised countries, closely linking a parallel process on the science of climate change to the policy process, rules governing the use of carbon sinks, and establishing the link between climate change adaptation and mitigation and sustainable development, in the form of the Clean Development Mechanism. Any future regime should, where feasible, build on the gains made through the Kyoto negotiations.

¹ Ringius, L, Torvanger, A and Holtmark, B, 1998. *Can multi-criteria rules fairly distribute climate burdens? OECD results from three burden sharing rules*. CICERO Working Paper 1998:6. University of Oslo. <http://www.cicero.uio.no/media/177.pdf>.

Options for climate regimes

22. A number of frameworks have been proposed for future global climate change policy. The primary differences between them are: the targets they set for the global effort; the coverage of countries that take on commitments and the nature of the commitments; and, the differentiation of commitments between those countries (burden sharing).

23. The eight options that have attracted most interest and support are listed below and described and assessed in the rest of this paper. Some are variations on more substantial models.

- Kyoto plus – negotiated fixed national emissions targets that continue the approach established by the Kyoto Protocol
 - Per capita emissions targets (including contraction and convergence) – linking national emissions targets to per capita allowances
 - Brazilian proposal – based on the historical responsibility for climate change of individual countries
 - Price caps – an ‘add-on’ to ambitious national emissions targets in which the cost of abatement is capped to address uncertainties
 - Dynamic targets – indexing national emissions targets to economic growth
 - Sectoral approach – enabling countries to proceed on a sector-by-sector or multi-sector basis, geared to global sectoral emissions standards
- Regional blocks – whereby regional groupings of countries establish ‘bubbles’ or binding targets, with regions converging in their commitments over time
 - Multistage approach – whereby countries grouped according to their stage of development take on different types of commitments

24. In discussing each option below we include a brief analysis of how well each option addresses the key issues described in the previous section. The specific questions considered are:

- Is the option based on a long-term target, and if so what type?
- What coverage is proposed? Is there a process by which all emitters are drawn into commitments? How and at what stage? Does this appear realistic in terms of capacity to respond? How does it deal with the problem of free riders?
- How does the option address the issue of equity?
- How does the option deal with uncertainty? What flexibility does the option have? Is there specific consideration of economic effectiveness? Does the option allow a crisis response?
- Does the option build on the gains made through Kyoto?

Kyoto Plus

25. The Kyoto Plus option would build directly on the Kyoto Protocol's architecture, notably the legally binding emissions reduction targets and the market-based flexibility mechanisms. It would take forward the approach envisaged in the Kyoto Protocol for a second (and subsequent) commitment period.

26. The key challenges for the Kyoto Plus approach are two-fold. As for all of the options, it must re-engage the countries that have repudiated the commitments they negotiated in the Kyoto Protocol – specifically Australia and the US. In walking away these countries have expressed concerns over damage to their economies from meeting their targets and from the 'unfair advantage' given to major emitters in the developing world that do not have binding targets.

27. On the other hand there are policy and technical challenges, specifically to:

- broaden participation in Annex I beyond the industrialised countries
- deepen emissions reductions targets
- arrive at an allocation formula that shares the emission reduction efforts in a manner perceived by all to be fair.

28. Perhaps most crucially, though, success of a Kyoto Plus approach depends on US and Russian participation in the Kyoto Protocol. If the Kyoto Protocol does not enter into force it will be difficult to argue the case to re-visit the same approach a second time without substantial modifications to the framework.

Considerations

29. The Kyoto Plus approach is not based on a commonly agreed long-term target. Rather it is a bottom up approach that seeks to reduce greenhouse gas emissions through a succession of negotiated targets that are ratcheted up every five years. The process of target setting is informed by the science of climate change and the views of different countries on short-term emission profiles consistent with long-term climate objectives.

However, there is no explicit link between the two.

30. The coverage of the Kyoto approach has been restricted to industrialised countries, and a key challenge in taking this option forward is to expand the number of countries with current or anticipated emissions targets. There is no formula for deciding which countries should be included in Annex I. A consideration in expanding the number of countries in Annex I is that they require detailed and accurate national emissions inventories, and the capacity for regular reporting of emissions. They also require the technical capability and economic capacity to take actions that reduce emissions.

31. The equity principles incorporated into the Kyoto Plus approach are horizontal, where the types of commitments are based on economic considerations, and potentially vertical, where the level of commitment for different Annex I countries may need to consider capacity to act as additional countries join.

32. The flexibility mechanisms address the issue of economic uncertainty and are designed to maximise the economic effectiveness of emissions reductions efforts. The five-year commitment periods provide scope to re-assess targets on the basis of the emerging scientific knowledge, although there is very limited scope for a crisis response between commitment periods.

33. A stand-alone Kyoto Plus option, with an expanding group of countries taking on legally binding targets, is unlikely to succeed in stabilising atmospheric CO₂ concentration levels using any of the entry rules for new countries to join Annex I that are currently considered plausible. Neither India nor China would be likely to join such a system soon enough for emissions limits to apply to the extent that would stabilise atmospheric CO₂ concentrations. Hence, whilst a Kyoto Plus system may be a necessary element it is unlikely alone to ensure environmental integrity.

Contraction and Convergence: Per capita emissions targets

34. Proposals employing per capita emissions targets are based on the principle that all individuals – regardless of nationality – have an equal right to emit but that total global emissions must be sharply reduced to meet an agreed CO₂ concentration limit.

35. In 1996, the Global Commons Institute (GCI), a UK-based think tank, provided a specific framework based on per capita targets. Called Contraction and Convergence this approach sees per capita emissions rights of all countries or regions converge on a single entitlement from an agreed year onwards.

36. Implementing Contraction and Convergence in its original form would need negotiation on two key steps. The first is about agreement on a safe level of atmospheric greenhouse gas concentrations. Countries would need to reach a judgement drawing on scientific advice from the IPCC. Global annual emissions that lead to that concentration level would be calculated. More recently, ideas for a staged approach to the setting of a safe level have been discussed with periodic adjustments to reflect changing science or changing target concentration levels.

37. The second negotiated step would require agreement on annual per capita emissions allowances for each Party, annual allowances that would converge on a common level of per capita emissions in the target year.

38. To illustrate, one proposal advanced by GCI is for national emissions profiles to converge on per capita equality by 2030 and to set a contraction target of 450 ppm of CO₂-equivalent.

39. It is generally assumed that penalties would apply to nations that exceed their yearly allocation rights, but that emissions trading would allow high-emissions nations to exceed their per capita entitlements by purchasing surplus rights from low-emissions nations.

40. Various proposals have been suggested which could provide some assurance that wealth transferred to the developing world would be directed towards adaptation purposes rather

than contributing to consolidated revenue. This is, however, not an essential characteristic of the concept.

Considerations

41. The original version of Contraction and Convergence fixes a maximum greenhouse atmospheric concentration target based on an informed judgement on what constitutes a safe concentration level. Two issues arise, one in relation to the achievement of Article 2 objectives and the second in relation to the time path of emissions that could correspond to this concentration.

42. Choosing a long-term level of greenhouse gas concentration as a target carries with it a large measure of uncertainty about the final temperature increase (for a CO₂ doubling this would be between 1.5 and 4.5°C increase). Thus, taken alone it does not constitute a guarantee of environmental integrity. As with any other approach, other assumptions would have to be made in order to meet environmental goals; in practice this would require periodic changes to the ultimate concentration target as science improves.

43. Secondly, the time path of the concentration profile is of fundamental importance in determining the time path of emissions and the rates of climatic change experienced. Consequently agreeing on a concentration limit would not be the only starting condition for this system. In practice, and in order to deal with scientific and technical complexities, it may need to accommodate aspects of other systems, including those driven by temperature targets.

44. Conceptually the Contraction and Convergence system can also work when driven by the same sort of climate targeting system, such as five-year emission budgets, as could be used in a multistage or Kyoto plus type systems.

45. Coverage is extended to all countries immediately although with sharply differing implications. Within a few years of adoption, this approach could see significant wealth transfers occurring from the developed world – which would be required to reduce emissions – to the developing world. Countries with high per capita

emissions – like the US and Australia – would have the greatest adjustments to make.

46. One of the main strategic issues in considering the Contraction and Convergence system is that for CO₂ concentration targets below about 550 ppm some large developing countries, including China, would not have surpluses but would have to purchase emission allowances. In this circumstance key countries may opt out, and within the proposed framework there is no other mechanism for bringing them back in.

47. The approach is underpinned by the egalitarian principle of shared rights and responsibilities in managing the atmosphere. The strongly egalitarian nature of Contraction and Convergence, along with its simplicity, has attracted widespread support.

48. A pure per capita approach does not account for particular country circumstances, such as differences in countries' economic structure, resource base, available technologies, access to renewable energy, and climatic conditions. It would therefore impose differing economic costs on developed countries. Recognising these shortcomings, some proposals modify the pure per capita convergence approach by allowing for factors that account for specific national characteristics contributing to variations in emissions per-capita².

49. As with most options, implementation of this framework would require increasing the capacity of many countries – especially developing countries – in the areas of emissions and population inventories, and emissions trading.

² Gupta S and Bhandari P. 1999. An effective allocation criterion for CO₂ emissions. *Energy Policy* 1(1): pp. 727-736

Brazilian Historical Responsibility proposal

50. In the process of negotiating the Kyoto Protocol, Brazil proposed a system of allocating emissions targets on the basis of each country's relative contribution to global warming.³ Known as the Brazilian Historical Responsibility Proposal, it draws heavily on the 'polluter pays' principle and is essentially an emission allocation rule or one of the criteria for deciding who does what and when. It is not a broader framework as are other models described in this section.

51. Under the Brazilian Proposal, Annex I countries with the longest histories of industrialisation, and hence greatest cumulative contributions to global warming since 1840, would be allocated the most stringent emissions targets. Non-Annex I countries would not be assigned targets in the first instance but would be drawn into the process in subsequent commitment periods when their share of historical emissions crossed a threshold. Since the proposal was first tabled by Brazil, considerable work has been undertaken on defining the threshold for non-Annex I country participation.⁴

52. To illustrate, the following table shows the reductions in emissions required for various Annex 1 countries on the basis of historical responsibility where the goal is to reduce emissions across Annex I countries by 20% by 2010, relative to a 1990 baseline.

53. The Third Conference of the Parties to the UNFCCC (COP3) referred the burden sharing principle of the Brazilian Proposal to the Subsidiary Body on Scientific and Technological Advice for further development. This ongoing process, through expert meetings and further independent research, aims to agree a widely

acceptable and less complex approach to allocating emissions reductions.

	Proposed emissions reduction in 2010 relative to 1990 (%)
UK	65.99
Germany	27.87
France	24.64
USA	22.93
Canada	15.86
Australia	10.77
Japan	8.79

Source: UNFCCC, 1997. Implementation of the Berlin Mandate. Additional Proposals by Parties. Paper No. 1. Brazil. FCCC/AGBM/1997/MISC.1/Add.3 GE.97

Considerations

54. The proposal closely links emissions over a given period of time to their effect upon temperature increase. Being based on temperature change means the proposal could be adjusted to a long-term global temperature change target. In the original Brazilian proposal Annex I countries were set a 30% emissions reduction target for 2020 against 1990 levels.

55. Coverage, in terms of emissions reductions activities, is initially limited to Annex I countries, although non-Annex I countries are assumed to be included subsequently. Importantly the Brazilian Proposal is based on science – through temperature change – and links quantification of each individual country's contribution to temperature increase to the effort required to mitigate the problem. This could provide a basis for drawing non-Annex I countries into future burden sharing arrangements.⁵

³ UNFCCC, 1997. Implementation of the Berlin Mandate. Additional Proposals by Parties. Paper No. 1. Brazil. FCCC/AGBM/1997/MISC.1/Add.3 GE.97

⁴ UNFCCC, 2001. *Scientific and methodological aspects of the proposal by Brazil, Progress report on the review of the scientific and methodological aspects.* FCCC/SBSTA/2001/INF.2

⁵ La Rovere, EL, Valente de Macedo, L and Baumert, KA, 2002. The Brazilian Proposal on Relative Responsibility for Global Warming. In *Building on the Kyoto Protocol, Options for protecting the climate.* Edited by Baumert, Blanchard, Llosa and Perkaus. World Resources Institute

56. Burden sharing among liable countries is based on historical emissions data relating to the process of industrialisation. This presents obvious problems with data reliability that would likely become a source of dispute and derogation in the negotiations.

57. The polluter pays principle underlying the Brazilian Proposal is one of the key equity principles. However some commentators have described aspects of the proposal as contrary to other equity principles. By taking no account of current emission levels (the sovereignty equity principle), the proposal unduly penalises countries like the UK with a relatively long period of industrialisation⁶. Under this proposal France, which currently has absolute and per capita emissions much lower than the USA, would be required to reduce its emissions by more. The economic cost for France would be much higher.

58. As presented by Brazil the proposal requires accurate historical data without a specific mechanism for dealing with uncertainties. It does, however, provide flexibility by incorporating a mechanism for trading 'temperature credits' between liable parties.

59. This approach has no specific provision for an emergency response. If this were required, the historical responsibility of non-Annex I countries would need to be re-assessed to determine if they should take on emissions reductions targets.

60. A further dimension of the original proposal was that Annex I countries not meeting their target would be liable to pay a penalty into a 'Clean Development Fund'. The fund would help finance mitigation and adaptation activities in non-Annex I countries. This provided the initial impetus for what became the Clean Development Mechanism. Obviously the level at which the penalty is set would be critical, as a low penalty may induce polluting countries to prefer to pay than abate.

⁶ Lammi, H and Tynkkynen, O, 2001. *The Whole Climate: Climate equity and its implications for the north*. Friends of the Earth, Finland

Price caps

61. The major difficulty in negotiating fixed emissions reductions targets is dealing with uncertainties in projecting future emissions and thus future costs of mitigation. The USA and Australia, in particular, expressed fears that meeting the fixed targets of the Kyoto Protocol may impose unexpectedly large economic costs. These uncertainties increase as targets are set further into the future and, because of the close link between economic growth and emissions growth, uncertainties also increase with the economic volatility, a characteristic of developing economies too.

62. Emissions targets can be designed in several ways to reduce uncertainty. Dynamic systems adjust emissions targets according to, for example, the rate of economic growth (see next section). Another way to reduce uncertainty is to set price caps.

63. Price caps link an emissions reduction target with a ceiling price on mitigation costs. The central concept is that by providing greater upfront certainty about the costs of meeting a given emissions target, countries would accept higher targets than would otherwise be the case.

64. As with the Brazilian proposal, price capping is essentially an element of a broader policy framework that could be incorporated into a number of other options.

65. The best known price cap system has been proposed by David Victor.⁷ It requires binding emission reduction targets for participating countries, an emissions trading scheme and an agreed cap on the cost of mitigation. If the marginal cost of abatement, reflected in the price of a tradeable emissions permit, rises above the agreed price cap then governments are allowed to issue and sell more permits at the capped price. A liable party is therefore able to buy at or below the price cap, providing much greater certainty over compliance costs.

66. The crucial elements of a price cap approach are setting the level of the price cap and setting the emissions reduction targets. The former would need to be a global cap (and would require a well-functioning international emissions trading system) while the latter allows differentiation of commitments based, in part, on expected national abatement costs.

67. Setting the price cap would be difficult as willingness to pay for emissions reductions varies between countries and there would be a danger of setting it at too low a level to accommodate countries with high marginal abatement costs, although this depends on the allocated reduction target as well.⁸ More significantly, the 'let out' provided by the cap on costs may act as a disincentive to the investment in new low-carbon technologies that will drive future, much deeper, emission reduction targets.

68. The argument in favour of price caps is that by providing certainty over compliance costs parties should accept more challenging targets.⁹ Arguments against price caps are two-fold. From an economic perspective price caps can distort markets with agents responding sometimes to quantity goals and sometimes to price signals. From an environmental perspective issuing emissions permits when the market price reaches the cap undermines environmental effectiveness, throwing open the question of what emissions reductions will actually be achieved. In such schemes, it is always the environment that 'gives'.

Considerations

69. A price caps approach is not specifically linked to a climate target, short or long-term, and the 'safety valve' nature of price caps allows emissions to exceed interim target levels. If it were linked to a long-term target, the interim targets would need revision after each commitment period when the actual emissions reductions achieved were reported.

⁷ Victor, D, 2001. *The collapse of the Kyoto Protocol and the struggle to slow global warming*. Council on Foreign Relations, Washington DC

⁸ Müller, B, Michelowa, A and Vrolijk, C, 2001. *Rejecting Kyoto: a study of proposed alternatives to the Kyoto Protocol*. Climate Strategies.

⁹ Philibert, C and Pershing, J, 2002. *Beyond Kyoto: Energy dynamics and climate stabilisation*. IEA, Paris

70. While the proposal is based on Annex I country participation, generically the price cap approach could also be used for non-Annex I country involvement because it directly addresses their concerns over compliance costs. Therefore price caps could be used as a first step for non-Annex I countries in accepting quantitative emissions reductions targets. However there is nothing inherent in this approach that defines when non-Annex I countries should take targets. Nor is there any specific consideration of equity principles in determining which countries should accept targets.

71. This approach provides economic certainty at the cost of environmental certainty. Liable countries know their maximum compliance cost. Yet the actual emissions reductions achieved depend on whether targets are met through actual emissions reductions or by buying additional permits issued by governments at the capped price. There are therefore problems with economic incentives.

72. Building on the Kyoto Protocol, emissions trading is a core component of a price caps approach. Further, the nature of this approach means participating countries are likely to pursue emissions reductions projects through technology transfer to developing countries.

Dynamic targets

73. Like price caps, the Dynamic Targets approach seeks to deal with a dominant concern of most governments in climate negotiations, uncertainty about the economic costs of fixed emission reduction targets. It does this by applying emissions targets that can be adjusted to respond to other variables. Possible variables include changes in population and exports, although most discussion of this approach centres on GDP growth rates.

74. In this option, country emissions are not capped in absolute terms. Emissions allowances are defined on the basis of some shared expectation about rates of economic growth. These allowances are adjusted ex post according to actual growth rates.

75. The US-based World Resources Institute (WRI) has developed one version of this approach, known as a Carbon Intensity Target. Under this version the target itself is expressed not in terms of an absolute measure but rather as a ratio of emissions to economic output. The goal is to reduce the intensity of emissions per unit of economic activity. WRI suggests it is 'a possible next step, but not the last step' in global emissions reduction. WRI argues it would help address the key greenhouse challenge in developing countries of decoupling economic development and emissions growth and would be a more acceptable formula for governments concerned about mitigation cost uncertainties.

76. President Bush announced a variation of WRI's approach in February 2002 when he committed the US to a voluntary 'greenhouse gas intensity' target. This target aims to cut greenhouse gas emissions per unit of economic output by 18 percent (relative to 2002) over the next 10 years.

Considerations

77. Under this approach, reduced economic uncertainty comes at the cost of greater environmental uncertainty. Because Dynamic Targets do not aim to achieve a fixed emissions reduction they do not guarantee an environmental outcome, although they target outcomes within a predictable range.

78. Under a Carbon Intensity Target, emissions could either continue to rise or fall depending on whether the required reduction of intensity is greater than growth economic output growth. The US 'greenhouse gas intensity' target provides a good example. President Bush announced a goal of reducing greenhouse gas intensity from 183 to 151 tons per million dollars of GDP over the 2002 to 2012 timeframe. This represents a 17.5 percent reduction in greenhouse gas intensity. This is, in fact, similar to the actual performance of the 1990s (a 16.9 percent reduction). Because of projected GDP increases, a greenhouse gas intensity decline of this size actually means a 14 percent increase in the absolute levels of greenhouse gas emissions by 2012, again comparable to the emissions rise in the 1990s.¹⁰

79. Further, emissions of greenhouse gases other than CO₂ are not always directly correlated to economic output. In some countries, such as Argentina and New Zealand, methane emissions associated with agricultural activity make up a large share of total emissions, but are not closely linked to changes in the country's GDP.

80. Dynamic Targets are not designed as a burden sharing approach although they do allow for differentiation between countries. There is no need for the rules to be the same for all countries. Rather, they can be structured according to the variables selected for individual countries or blocs – for instance variables could be standardised for the developing world with different variables selected for developed countries. Alternatively, Dynamic Targets could be applied to the developing world only to encourage participation in mitigation efforts. A cap and trade approach could operate in parallel for the developed world.

81. The approach is compatible with emissions trading although it adds a layer of complexity if operating in parallel with fixed targets. The tradeable unit with Dynamic Targets is the same as for fixed targets although the quantity of units available to a country is not known until the end

¹⁰ Analysis of Bush Administration Greenhouse Gas Target, World Resource Institute, February 14, 2002

of the compliance period. If the approach were adopted globally then trading could occur more simply under a post-verification trading system, whereby transfers take place after emissions and GDP (or other selected variables) are verified.

82. Detailed analysis of each country's circumstances would be required to ensure the reliability of forecast economic growth and, more importantly, to reconcile that growth with emissions in the compliance period. Strong institutional capacity would be required to engage in a potentially more complex emissions trading regime.

Sectoral approaches

83. The development of sectoral approaches has been driven by the idea that a predictive model should be used to support negotiations over the allocation of emissions reductions targets.

84. Under sectoral approaches national targets would depend on an analysis of emissions in a number of sectors, such as energy, industry and households. For each country, sectoral emissions are compared against global sectoral emission standards. The quantum by which sectoral emissions fall short of the global standard becomes the sectoral target. All sectoral targets can then be added to give a national emissions reduction target. The process of setting global sectoral emission standards would require consensus among technical experts, perhaps through a body such as the Subsidiary Body on Scientific and Technological Advice, although the basis of global standards has not been specified by advocates of sectoral approaches.

85. Sectoral approaches usually build on the per capita emissions approach by assuming emissions will converge in each country on an equal per capita level in each nominated sector. They take into account the structure of national economies via consideration of a number of sectors and other specific circumstances in determining burden sharing. For example they recognise differences in turnover rates of infrastructure in certain sectors, the need for essential human services, and sectoral mitigation costs.

86. The best-known sectoral approaches are the Triptych proposal,¹¹ originally used by the EU to help determine Member States' commitments within the EU bubble negotiated in the Kyoto Protocol, and the multi-sector convergence proposal.¹²

¹¹ Groenenberg, H, Blok, K and van der Sluijs, J, 2003. *Global triptych: a bottom-up approach for the differentiation of commitments under the Climate Convention*. Paper presented at the Conference Climate Policy after 2012, Nov 2003, Ghent University

¹² Jansen, J, Battjes, J, Sijm, J, Volkers, C and Ybema, J, 2000. *The Multi-Sector Convergence Approach: a flexible*

87. Triptych distinguishes between three broad sectors: electricity production, energy-intensive industries and the domestic sectors, which include households, commerce, transport, light industry and agriculture. These sectors were selected to account for certain differences in national circumstances that influence long-term emission reduction opportunities – population size and growth rates, standards of living, fuel mixes in primary energy, economic structures and the competitiveness of trade-exposed industries.

88. Global long-term sustainability targets are established for each sector, with sectoral emission allowances treated slightly differently. In the energy-intensive industries, the targets are based on energy efficiency. For electricity production, targets are based on greenhouse gas intensity. And in the domestic sectors, targets are based on per capita emissions. Triptych allows for growth in activity in the various sectors and considers technological solutions to reduce emissions.

89. Allowances for each sector are added to give a fixed allowance for each country. This provides flexibility in pursuing cost-effective emission reduction strategies.

90. The multi-sector convergence proposal distinguishes between seven sectors: power, households, transport, industry, services, agriculture and waste. As with Triptych, the sectors were selected to account for the differing structures of national economies.

91. For each sector, global emission standards – expressed in per capita terms – are established based on technical potential. For each country, sectoral emissions levels in the base year are obtained and projected to converge with the global sectoral emission standards by the target year. So convergence is applied at the sectoral rather than national level. For intermediate years, sectoral emission targets are obtained by interpolating between the base and target years. Adding sectoral

framework for negotiating global rules for national greenhouse gas emission mitigation targets. Center for International Climate and Environmental Research (CICERO Working Paper 2001:4)

emission levels and multiplying by the total population gives national targets for intermediate years.

92. The multi-sector convergence model can be fine-tuned by including allowance factors. These are country-specific circumstances that cause deviations from the projected national sectoral targets, and may include differences in climate, renewable energy resources and population density. They may justify additional allowances being negotiated by countries with less favourable national circumstances.

Considerations

93. Sectoral approaches are used for burden sharing once a long-term global target has been established. Long-term global targets of different types and different timeframes can be accommodated.

94. Sectoral approaches are only suitable for countries that have accurate data on sectoral emissions. While neither Triptych nor multi-sector convergence are designed to apply only to Annex I countries, they would be difficult to apply to most non-Annex I countries where emissions data are patchy and unreliable. They therefore do not allow for the easy inclusion of all countries over time.

95. By establishing a quantitative model to predict national allocations, sectoral approaches arguably provide a fair and objective basis to guide negotiations. Further, sectoral approaches provide scope to account for differing national circumstances, potentially enhancing fairness between the countries included. However, there is also scope for dispute over which factors should be included to account for differing national circumstances. Finally, these approaches are based on per capita emissions, the egalitarian equity principle, although with scope for modification to accommodate other aspects of fairness.

96. Because sectoral approaches require considerable amounts of data and modelling, they are not particularly flexible approaches. On the other hand, the analysis underpinning sectoral approaches does consider economic effectiveness and both models described allow

emissions trading to ensure least-cost compliance.

97. Overall, they are better suited to groups of countries that are similar and have histories of collaboration, such as those that might agree to form a bubble in a larger agreement.

Regional blocks

98. The option of entering a post-Kyoto climate regime through a set of regional agreements rather than a single global agreement has received little public analysis. The approach is generally seen as operating through agreements to cooperate on emissions reduction activities struck between countries based on geographical region, economic or trade compatibility, political alignment or a combination of these.

99. While no firm proposal to move to regional agreements has been identified, the construction of the Kyoto Protocol as well as geopolitical reality suggests this option could be developed.

100. The Kyoto Protocol can be viewed as a set of agreements between different groups of countries. It incorporates special provisions for blocs of countries and for individual countries. The developing world, for instance, has no emissions reduction requirements and countries can benefit from developed country investment through the CDM. Economies in transition generally have less onerous targets than developed countries. The EU has the ability to redistribute its emissions reductions burden. The JUSCANZ group negotiated changes to the provisions for sinks.

101. While placing itself outside of the Protocol, the US has pursued bilateral climate change agreements with other countries, including India, Japan, and Australia.

102. Depending on Russian ratification of the Protocol, at least two major climate control regimes may operate during the Kyoto compliance period – an EU-led Kyoto regime, and a US-led non-Kyoto regime based on bilateral arrangements possibly evolving into an alternative multilateral arrangement.

103. Current World Trade Organisation negotiations provide a comparison. Here an effectively stalled international negotiation has provided impetus for bilateral and multilateral trade agreements between countries based on mutual advantage. These arrangements may ultimately devolve into a single global

agreement through the WTO, although others see them as stalling full multilateral negotiations even further.

Considerations

104. It is difficult to be definitive on the implications of this approach given that no proposal has been developed.

105. The key advantage to the approach is the obvious political feasibility of implementing such a structure within key nations that have so far rejected the Kyoto Protocol – namely the US and Australia. The approach could also be welcomed by other nations, including Russia, if economic advantage surpasses that of a global agreement struck through consensus.

106. The disadvantage of the approach is that it provides little environmental certainty – at least in the short-term – for global emissions reductions of the magnitude required. This could be addressed in the medium-term if different regional or country-to-country arrangements were to merge into a single global approach.

107. The approach does not automatically lead to global burden sharing and leaves open the possibility of ‘free riders’ within the fragmented structures that would be created.

Multistage approaches

108. Support for 'common but differentiated responsibilities' is a central pillar of the UN Framework Convention on Climate Change (Article 3.1). It recognises that different countries have differing financial capacities and technological capabilities to respond to climate change, and have made differing contributions to the observed global temperature increase and accumulation of greenhouse gases in the atmosphere. Yet each nation shares rights to the atmosphere and must contribute to addressing climate change.

109. Multistage approaches group countries according to their phase of economic and social development. Countries are allocated to a particular group on the basis of quantitative criteria, such as GDP per capita. They move from one group to the next as development proceeds and they cross a threshold value separating the groups.

110. Multistage approaches build on the Kyoto Protocol's separation of countries into two groups – Annex I countries with binding emissions targets and the non-Annex I countries yet to adopt targets. The crucial difference is that multistage approaches add a third or fourth group, which facilitates more direct involvement in emissions reductions by some developing countries.

111. The type and level of commitment varies between the groups, being commensurate with the circumstances of the member countries. Countries with the highest level of development take on quantitative commitments. Groups at lower stages of development take more qualitative approaches, such as adopting sustainability policies and measures. Multistage approaches can be very flexible. The commitments in each group are likely to involve different approaches. The success of multistage approaches depends on countries gradually moving from one group to another, with the groups converging on a long-term target.

112. The multistage approach was first developed over five years ago by researchers at RIVM in the Netherlands as a global application

of the Brazilian proposal with a threshold for participation.¹³ They identified four groups: the first without quantitative targets, those with intensity targets, followed by an emissions stabilisation stage, and a final group with absolute emissions reductions.

113. A more recent example from the Climate Action Network¹⁴ allocates countries to one of three tracks.

1. The Kyoto track. In this track countries have legally binding, tradeable emissions reductions targets. As in the Kyoto Protocol it applies initially to the most industrialised countries and subsequently to some developing countries in the second commitment period of the Protocol. Commitment levels would be driven in the longer term by an equal per capita objective, but could be influenced in the shorter term by income and historical responsibility variables.
2. The Greening (decarbonisation) track. This applies initially to most developing countries which lack the level of economic development required for participating in the Kyoto track. Actions and policies in this track focus on rapid introduction of low-carbon technologies with assistance from those countries on the Kyoto Track.
3. The Adaptation track. This track applies to the least developed countries and small island developing states, and would assist them with adaptation to the unavoidable effects of climate changes, through measures funded by the industrialised (Kyoto track) countries. They would also be assisted with adoption of low-carbon technologies.

114. Countries would progress from the second to the first track according to an agreed

¹³ den Elzen, MGJ, Berk MM, Lucas, P, Eickhout, B and van Vuuren, DP, 2003. Exploring climate regimes for differentiation of commitments to achieve the EU climate target. RIVM report 728001023/2003, Bilthoven, Netherlands

¹⁴ Climate Action Network, 2003. *A viable global framework for preventing dangerous climate change*. CAN Discussion Paper: COP9, Milan, Italy

timetable based on income and emission levels (and perhaps historical responsibility). Some would make the transition in the second Kyoto commitment period. A mechanism would also be agreed for a transition from the third to the second track. Eventually all countries would have binding emission reduction targets.

Considerations

115. A long-term target is central to making multistage approaches successful, although the approach is not fixed to a particular type of target. The RIVM example is based on an atmospheric concentration target while the CAN target is based on temperature. Long-term targets may be established for each group, even though the number of countries in the lower groups decreases over time.

116. Multistage approaches are designed to ensure all countries are involved in a global process to address climate change. The level of involvement of each typically depends on their stage of economic development, capacity and capabilities. This approach would specifically address US and Australian concerns that major developing world emitters, like China and India, remain outside the immediate climate change effort.

117. The issue of equity is dealt with in defining the groups, and all five equity principles can be incorporated into these definitions. The RIVM example used GDP per capita to define the groups, focusing on horizontal equity. The CAN proposal does not define participation thresholds, although refers to per capita emissions, per capita income and historical responsibility as the grounds for doing so. This emphasises the horizontal and polluter pays equity principles and incorporates key features drawn from the contraction and convergence and Brazilian approaches.

118. Multistage approaches are inherently flexible because they contain a number of groups to which countries can be allocated. The crucial allocation is between the first and second groups or tracks, where data on economic development, population and emissions is likely to be required. Questions of dealing with

uncertainty and economic effectiveness largely depend on the approaches for each group.

119. The CAN proposal directly builds on Kyoto by adopting a "Kyoto plus" approach in its highest group. Building on the gains made through the Kyoto Protocol is not a design characteristic of the multistage approach, but is a likely outcome.

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