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Finding Transatlantic Common Ground on Climate Change?

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Global climate change has emerged as a key issue straining relations between the European Union and the United States. Last fall in The Hague, US and EU negotiators failed to agree on rules for implementing the Kyoto Protocol, the centerpiece of international attempts to control emissions of climate-altering greenhouse gases. This spring, the incoming Bush administration announced it would oppose US participation in the Kyoto accord, launching a flurry of criticism in Europe.

It is not surprising that climate change has become so contentious. In recent decades, nations have negotiated a wide variety of environmental agreements on issues ranging from solid waste to ozone-depleting CFCs. But climate change is perhaps the most vexing challenge. Since almost every sector of each nation's economy emits greenhouse gases, few human activities would remain untouched by attempts to control them. The problem is global and long-term – emissions from any spot on Earth can affect the climate worldwide for centuries, though with potentially very different consequences in different places. Climate change is also fraught with uncertainty. Current scientific understanding supports a range of views, from those who see the problem as a potential environmental catastrophe to those who argue its effects will be hard to notice among the other changes of the 21st century.

Over the last decade, important progress has been made towards addressing the climate change challenge. In the 1992 Framework Convention on Climate Change, most national governments agreed to a common, though ambiguous, long-term goal of stabilising atmospheric concentrations of greenhouse gases at a safe level. In the Framework's 1997 Kyoto Protocol, nations agreed to the key principles of binding limits on greenhouse gas emissions and market-based

1 This article was prepared within the framework of the IAI Transatlantic Programme, sponsored by the German Marshall Fund of the United States.

mechanisms to help achieve those reductions efficiently. Concurrently, private sec tor firms, gov ern ments, and other or gani sa tions world wide have made im portant prog ress in re duc ing emis sions and in de vel op ing new tech nolo gies that of fer the po ten tial for deeper re duc tions in the fu ture.

But de spite these ini tial suc cesses, the cur rent pol icy frame work has done little to bridge the unavoidably wide range of expectations, interests and attitudes towards risk different parties hold regarding the climate change future. Neither Euro pe ans nor Ameri cans can pro tect their en vi ron ment from cli mate change without the cooperation of the other. But the breadth, complexity, and un cer tainty of the prob lem make it un likely that they, or the nu mer ous oth ers in volved, will come to a common view any time soon. Para doxi cally, while it is true that green house gas emis sions are the ul ti mate cause of the en vi ron mental prob lem, the Kyoto Pro to col's over rid ing fo cus on near- term re duc tions in these emis sions un nec es sar ily makes it more dif fi cult to so lid ify an emerg ing con sen sus on the full port fo lio of actions needed to ad dress the long- term cli mate chal lenge.

This ar ti cle re views the trans at lan tic pol icy prob lem posed by cli mate change, the in ter na tional re sponse that has emerged over the last dec ade, and fun da mental causes of the recent impasse. It argues that the character of the climate change chal lenge re quires a pol icy ap proach that al lows the par ties to agree on near-term actions without waiting for consensus on the extent of the problem or the potential long- term costs of ad dress ing it. The ar ti cle sug gests that the EU, US, and the rest of the world can agree on mean ing ful near- term steps to ad dress cli mate change by em pha sis ing a re sponse that is ro bust against a wide range of plausible long- term cli mate fu tures. Such an ap proach would be con sis tent with the Frame work Con ven tion, would re tain but mod ify Kyo to's bind ing emis sions targets, and also in clude a broader set of mile stones for near- term cli mate pol icy. It could en able the EU, US, and the rest of the world to take significant near-term steps to ad dress cli mate change in the face of their dif fer ing ex pec ta tions, in terests, and values.

The climate change problem

A vast and growing body of scientific evidence indicates that human influences have be gun to com pete with na ture as a force chang ing the Earth's cli mate. Nonetheless, the impacts of these changes and the difficulty of halting them remain deeply un cer tain and likely to re main so for the fore see able fu ture.

Since the start of the in dus trial revo lu tion green house gas emis sions, pri marily car bon di ox ide from burn ing fos sil fu els, have in creased their con cen tra tion in the Earth's atmosphere by over 30 percent. These gases, a naturally occurring part of our at mos phere, trap heat and help regu late the Earth's tem pera ture. But over the last cen tury, their in creas ing con cen tra tions have helped warm the Earth by about 1°C. The last dec ade has been the warm est ever re corded. Con cur rently, we have observed melting glaciers, thinning ice caps, an earlier spring, and changes in the fre quency and se ver ity of droughts and storms.[2]

Even without human influence, the Earth's climate is not constant. Thus, it is unclear to what extent today's climate changes are due to human or natural causes, but scientists believe human influence plays at least some role. At present, developed countries, with about a fifth of the world's population, produce over half of greenhouse gas emissions, only about a third more per unit of economic output, but five times more than developed countries per capita. As living standards rise in the developing world, their emissions may dominate within a few decades. It is virtually certain that if current trends continue, human influences will become the dominant force changing the Earth's climate some time during the 21st century.

Yet, the effects of future climate change are difficult to predict, not only because they depend on detailed shifts in regional patterns of temperature, storms and precipitation, but at least as important, they depend on the economies and values of future human societies. How dependent will the economies of developing nations be on subsistence agriculture? What value will our descendents place on natural ecosystems devastated by a changing climate? If climate shifts are gradual, current scientific understanding suggests that natural ecosystems may be heavily damaged, the economies of many developed countries may see only relatively small impacts; and many developing countries could be seriously stressed.[3] There is little understanding of the impact of sudden or unexpected climate shifts. The degree of difficulty in halting climate change is at least as uncertain. It depends critically on technology and life styles many decades in the future. With today's technology, halting climate change could cost several percentage points of gross world product. With the technology of fifty years ago the same result would cost much more. With the technology of the future, the costs are deeply uncertain.

The international response

Faced with growing evidence of human influence on the climate, the nations of the world have negotiated two agreements over the last decade to address the threat of climate change, the 1992 Framework Convention on Climate Change (FCCC) and its 1997 Kyoto Protocol. The Framework Convention, signed at the Rio de Janeiro Earth Summit and since ratified by over 175 states, including the United States and the states of the European Union, presents a widely accepted, but ambiguous, long-term goal of stabilising greenhouse gas concentrations in the atmosphere at a level that would "prevent dangerous anthropogenic interference with the climate system" while enabling "economic development to proceed in a sustainable manner."[4] All signatories agreed to measure and report emissions and

2 Intergovernmental Panel on Climate Change, *Summary for Policymakers, Working Group 1, Climate Change 2001: The Scientific Basis*, (Geneva: IPCC, 2001) http://www.ipcc.ch/.

3 Intergovernmental Panel on Climate Change, *Summary for Policymakers, Working Group 2, Climate Change 2001: Impacts, Adaptation and Vulnerability*, (Geneva: IPCC, 2001) http://www.ipcc.ch/.

4 United Nations Framework Convention on Climate Change, Article 2

en cour age more climate- friendly ac tivi ties, while de vel oped na tions also pledged to en act vol un tary meas ures to re duce their emis sions to 1990 lev els by the year 2000. The FCCC fur ther es tab lished pe ri odic meet ings, the Con fer ence of Par ties (COP), to re view prog ress to wards the long- term goal of cli mate sta bi li sa tion and to enact other measures as necessary.

By the mid- nineties, green house gas emis sions were still ris ing and it be came clear that most na tions would miss their vol un tary re duc tion tar gets. Con cur rently, a report of the Intergovernmental Panel on Climate Change (IPCC), a UN-sponsored net work of thou sands of sci en tists world wide, con cluded that an thro po-genic greenhouse gas emissions had already caused a discernible human in flu-ence on global climate.[5] In response, the third COP, meeting in Japan in De cem ber 1997, adopted the Kyoto Pro to col. Its key part con sists of le gally bind-ing commitments by 38 developed nations to reduce their emissions of green-house gases 5 per cent be low 1990 be tween the years 2008 to 2012, ap por tioned differently among the participating nations. For instance, the United States agreed to an emissions tar get 7 per cent be low 1990 lev els, the Euro pean Un ion agreed to a target 8 percent below 1990 levels, and Russia agreed to a target equal to its 1990 emis sions. De vel op ing coun tries have no emis sion re duc tion ob-ligations in this first commitment pe riod.

The Kyoto emis sion re duc tion tar gets are sig nifi cant. De pend ing on the fore-casts, they could rep re sent a 30 per cent or more cut in what many na tions' emis-sions would oth er wise have been. None the less, in and of them selves, the Kyoto re duc tions are far too small to sta bi lise at mos pheric con cen tra tions of green house gases. Thus, the Kyoto Pro to col is widely seen as a first step to wards the Frame-work Con ven tion's long- term goal. Fu ture emis sion re duc tion ob li ga tions for all na tions are sched uled to be dis cussed in ne go tia tions cur rently planned to be gin some time be fore 2005.

What would Kyoto cost?

There is much de bate over the po ten tial cost of the Kyoto Pro to col's tar gets and time ta bles. Some es ti mates sug gest that the wide spread use of con ser va tion and low-emitting technologies could allow the de vel oped coun tries to meet their ob li-ga tions with lit tle ex pense. Other es ti mates sug gest that the costs of meet ing the Kyoto tar gets could be sub stan tial, in the or der of one per cent of gross do mes tic prod uct. These widely di ver gent pre dic tions are due in part to dif fer ing ex pec ta-tions about the cost of al ter na tive en ergy sources and the ex tent of avail able, but under- utilised po ten tial for en ergy con ser va tion in each na tion's econ omy. [6]

5 J.T. Hough ton, L.G. Meira Filho, B.A. Cal len der, N. Har ris, A. Kat ten berg and K Mas kell (eds), *The Sci ence of Cli mate Change: Con tri bu tion of Work ing Group I to the Sec ond As sess ment of the In-ter gov ern men tal Panel on Cli mate Change* (Cam bridge: Cam bridge Uni ver sity Press, 1995).

6 R. Re petto and D. Aus tin, *The Costs of Cli mate Pro tec tion: A Guide for the Per plexed*, (Wash ing-ton, DC: World Re sources In sti tute, 1997).

However, the yet-to-be-determined details of the Protocol's implementation may present the most significant cost uncertainty. The Protocol offers several "flexible mechanisms" enabling nations and the firms within them to trade emis- sion re duc tions, thereby in creas ing the ef fi ciency, and re duc ing the cost, of each nation's commitment. The first mechanism allows developed nations to trade emis sions per mits among them selves. The owner of a per mit has the right to emit a speci fied amount of green house gases and those who re duce emis sions be low their tar gets can sell their ad di tional re duc tions to those who do not. Vir tu ally all economic analy sis sug gests that trad ing can cut the costs of emis sion re duc tion tar gets sig nifi cantly and also en cour age the tech no logi cal in no va tion that will re- duce fu ture costs.

An other mecha nism would al low de vel oped na tions to earn cred its by fund ing emission-reducing projects in developing nations through a program called the Clean De vel op ment Mecha nism (CDM). Fast- growing de vel op ing coun tries, which must re place an ti quated, in ef fi cient capi tal stock and build large amounts of new in fra struc ture, of ten have emis sion re duc tion op por tu ni ties cost ing much less than those in de vel oped coun tries. The CDM would lower com pli ance costs for the lat- ter while at the same time en cour ag ing vi tal tech nol ogy trans fer that would en able the former to follow cleaner development paths.

The ex act rules gov ern ing the Kyoto flexi ble mecha nisms and the treat ment of car bon sinks (that is, ag ri cul tural lands and for ests which can re move car bon from the at mos phere and store it in plant ma te ri als and soils) will do much to de ter- mine the treaty's near-term costs and long-term environmental impacts. These rules are not yet fi nal ised, in part be cause the EU and US dis agree on how to bal- ance cost savings against environmental benefits. For instance, Russia po ten- tially has nu mer ous per mits to sell be cause its shrink ing econ omy has al ready put its emis sions well be low 1990 lev els. If the Pro to col al lows Rus sia to sell all this "hot air" on the world market, other countries could meet their Kyoto targets at much less cost but with much less im pact on global emis sions. In large part, ne go- tia tors are sty mied be cause cre at ing an in ter na tional emis sions trad ing sys tem is an ex traor di nar ily com plex en deav our with lit tle prece dent to guide it. Suc cess ful trading programs exist on the national and local levels, but nothing of the scale and scope en vi sioned by Kyoto has ever been at tempted.

The Kyoto Protocol: fatally flawed or indispensable?

The Kyoto Pro to col has suf fered se ri ous po liti cal blows over the last year. In No- vem ber 2000, at the 6th Con fer ence of Par ties meet ing in The Hague (COP6), the United States and Euro pean Un ion failed to agree on cru cial im ple men ta tion rules, in par ticu lar, the cred its to be earned from car bon stored in ag ri cul tural lands and for ests. The US fa vored ex pan sive al lo ca tion of such cred its, as a low- cost means to help meet its Kyoto ob li ga tions and to en cour age sup port in the US Con gress from rep re sen ta tives of farm states that could bene fit from such car bon se ques tra- tion. But EU ne go tia tors feared that too much se ques tra tion could slow the adop- tion of emission-reducing technologies and practices by reducing the need for

deep emis sion re duc tions from the in dus trial and trans por ta tion sec tors. In March 2001, the Bush ad mini stra tion an nounced its op po si tion to the United States' par-tici pa tion in the Kyoto Pro to col, cit ing the lack of de vel op ing coun try par tici pa tion and po ten tial dam age to the US econ omy.

These events have intensified the transatlantic debate over the di rec tion of climate change policy. Many Euro pe ans view the Kyoto Pro to col as in dis pen sa-ble. Driven by strong do mes tic en vi ron mental move ments, the Euro pean Un ion of-ten uses the "precautionary principle" as a guide for managing environmental risks.[7] This prin ci ple sug gests that hu man ac tivi ties with a po ten tial for se ri ous en-vi ron mental harm should be lim ited even in the ab sence of full sci en tific cer tainty. Ac cord ingly, the EU has gen er ally seen the need for im me di ate and sig nifi cant ac-tion to re duce green house gases emis sions. For many of its ad vo cates, the Kyoto Protocol is crucial because it embodies a decade of work and international consensus- building that, if aban doned, would de lay cli mate ac tion for many years before an in ter na tional coa li tion could be re as sem bled. Some Kyoto sup port ers ar gue that the Pro to col's spe cific emis sion re duc tion tar gets are in vio late be cause re open ing ne go tia tions over these core treaty ob li ga tions would cause the rest of the agreement to unravel. Others sug gest that the frame work could be re tained with modified targets and timetables. Many argue that the Framework Con ven-tion's in abil ity to re duce emis sions proves the need for bind ing caps on emis sions.

In the wake of the Bush ad min istra tion's re jec tion of Kyoto, some Euro pe ans have sug gested that the Pro to col can be put into force with out the United States.[8] While tech ni cally pos si ble (the Pro to col can en ter into force if it is rati fied by coun-tries rep re sent ing 55 per cent of de vel oped coun try emis sions), such a course may be po liti cally un re al is tic, put ting the rati fy ing coun tries at an eco nomic dis ad van-tage rela tive to the United States. How ever, there may also be suf fi cient "hot air" to al low the par tici pat ing na tions to meet their emis sion re duc tion tar gets largely through permit trad ing with Rus sia. Such a sce nario might un fold with lit tle en vi-ron mental bene fit, but with much op por tu nity for US-EU re crimi na tions.

Polls show that a large majority of Americans favour action against the cli-mate change prob lem. Large US firms have in creas ingly voiced the need for ac-tion. An other view, found of ten in the United States, holds that the Kyoto Pro to col is fundamentally flawed. In some quarters, Kyoto is opposed from a conviction that the US should be less en tan gled in in ter na tional agree ments that limit its free-dom of ac tion. Re cent en ergy short ages in the US have also en cour aged some to favor unfettered increases in fossil fuel production. Much US concern with the Kyoto Pro to col, how ever, rests on con cerns about the po ten tial costs. Ameri cans are ac cus tomed to low en ergy prices and of ten re act with strong dis fa vour when prices rise. Ad di tion ally, while its ba sic laws for wa ter and air qual ity are based on

7 P. Sand, "The Pre cau tion ary Prin ci ple: A Euro pean Per spec tive", *Hu man and Eco logi cal Risk As-sessment*, vol. 6, no. 3, 2000, pp. 445- 58.

8 "EU to in crease pres sure on US to ac cept Kyoto", *Fi nan cial Times*, 2 April 2001.

health standards not directly compared to costs, there is an increasingly strong strand of cost-benefit thinking in US environmental policy. Many economic studies suggest that gradual emission abatement over many decades, with near-term reductions much less than Kyoto's targets, are the most cost-effective path to stabilised concentrations.[9] In addition, there is concern that US law would put firms in the US at a competitive disadvantage by enforcing any binding international emission caps more aggressively than elsewhere. While most agree that, in principle, Kyoto's flexible mechanisms can significantly reduce its costs, others argue that unavoidable mistakes in implementing these mechanisms could themselves be very expensive. For instance, the United States would require in the order of $2 trillion in newly-created assets to meet its Kyoto targets with emissions trading overseas.[10] Critics argue that the practices and institutions necessary to support such trading can not be created in so short a time.

Developing countries hold a wide range of views on the Kyoto Protocol, from the small island states seriously at risk from rising sea levels which are among its strongest backers to the oil-producing states generally unsympathetic towards efforts to reduce demand for their primary export. Developing countries are united, however, in the view that developed nations must take significant steps to reduce their emissions before developing nations commit to binding caps on theirs. Although emission intensities (the amount of emissions per unit of economic activity) are dropping rapidly in many developing countries, these nations believe that at present their primary need is to dramatically increase the standard of living of their populations.

Both sceptics and supporters of the Kyoto Protocol offer a variety of alternatives. Some advocate working within its framework, but reducing potential costs by relaxing the emission reduction targets and expanding the actions that give credit reductions. Some analysts propose a "safety valve" approach, which would retain the emission targets, but allow governments to issue new permits at an agreed price.[11] This approach would retain many of the virtues of a trading system but eliminate uncertainty about the maximum costs it would impose. Many seeking effective action have grown weary of international negotiations and instead emphasise the many independent responses currently underway by individual nations or firms, such as the establishment of domestic emissions trading in the UK and efforts by firms to set and meet aggressive targets for reducing their own emissions. Some argue that any significant global emission reductions are unlikely, so that the response to climate change should instead focus on increasing society's ability to adapt to its adverse effects.[12]

9 T.M.L. Wigley, R. Richels and J. A. Edmonds, "Alternative emissions pathways for stabilizing CO2 concentrations", *Nature,* vol. 379, 1996, pp. 240-3.

10 D. Victor, *The Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming* (Princeton University Press, 2001).

11 R.J. Kopp, R. D. Morgenstern, W. Pizer and M. Toman, *A Proposal for Credible Early Action in US Climate Policy*, (Washington DC: Resources for the Future, 1999); http://www.weathervane.rff.org/features/feature060.html.

Near-term milestones for a robust long-term climate policy

At present, there appears to be little consensus on climate change policy. Most Europeans favour the Kyoto framework. The Bush administration's emerging climate action plan will not. Failure to converge on climate policy could put an enduring strain on US-EU relations, derail much of the progress made to date in responding to climate change, and make it more difficult to fashion an effective response in the future.

It is useful then to step back and sketch the contours of an ideal approach to climate change, and inquire whether it might offer some guidance towards breaking the current impasse.

Climate change presents a challenge of decision-making under conditions of deep uncertainty; that is, a situation in which decisions made today will unavoidably have consequential future implications impossible to predict with any confidence. Such challenges are difficult, ubiquitous and tractable. Explicitly or implicitly, government, business and individuals commonly address problems with deep uncertainty, often by using robust, adaptive strategies. A robust strategy is one that will work reasonably well, at least compared to the alternatives, across a wide range of plausible scenarios. Robust strategies are often adaptive, that is, they are designed to evolve over time in response to new information. For example, if you were planning a future outdoor event during rainy season you might reserve a tent and wait until the morning of the event to observe the weather and decide whether to use it. If you knew the future with certainty, you would either rent a room safe from the rain or enjoy the sunshine without wasting money reserving the tent. But the tent is a reasonable, if second-best, solution in both the rainy and sunny futures, and thus renting it beforehand is a robust, adaptive-decision strategy.

Climate change, given its long-term, contentious, and deeply uncertain nature, seems a natural candidate for a robust, adaptive-decision approach.[13] Not only is robustness a useful criteria for judging policies when the future is fundamentally unknowable, it may also provide a framework for consensus among contending parties who do not have to agree on what will happen in the future in order to agree on the best actions to take today.[14]

Ideally, a robust, adaptive climate strategy would have three key elements. It would present long-term goals, fifty to one hundred years out, agreed to by most of the relevant stakeholders. It would specify near-term milestones to guide actions over the next five or ten years. Finally, it would specify a process that over time

12 D. Sarewitz and R. Pielke, "Breaking the Global Warming Deadlock", *The Atlantic Monthly*, vol. 286, no. 1, 2000.

13 R. J. Lempert, M. E. Schlesinger, "Robust Strategies for Abating Climate Change", *Climatic Change,* vol. 45, no. 3/4, 2000, pp. 387-401.

14 K. van der Heijden, *Scenarios: The Art of Strategic Conversation* (Chichester, UK: Wiley and Sons, 1996).

would re fine the long- term goals and pe ri odi cally up date the near- term mile stones as steps to achiev ing the goals.

The Frame work Con ven tion ad dresses, to greater or lesser ex tent, each of these key elements. It offers a widely shared, though suitably ambiguous, long- term goal – sta bi lis ing at mos pheric con cen tra tions of green house gases at a level that is environmentally safe and economically sustainable. The FCCC's Kyoto Protocol provides near-term milestones in the form of national emissions re duction tar gets for the first, roughly decade- long, com mit ment pe riod. The FCCC established the Conference of Parties to periodically review and update these milestones.

Nonetheless, today's climate policy has fallen short of an effective robust strat egy. Rather than a cata lyst for con sen sus among par ties with dif fer ent ex pecta tions of the fu ture, to day's cli mate pol icy has be come a light ning rod for con troversy. Few nations ap pear on tar get to meet their Kyoto ob li ga tions with purely do mes tic re duc tions and the emis sions trad ing sys tem re quired to en sure com pliance risks be com ing too com plex and in volv ing too large a fi nan cial stake to be implemented successfully.[15] Finally, the current framework exacerbates the tendency to fo cus at ten tion on the near- term, al though all agree that the goal of stabilising atmospheric concentrations will require long-term transformations in socie ty's emissions- producing in dus trial and trans por ta tion in fra struc tures.

At pres ent, there is no agree ment, and in suf fi cient in for ma tion, to de ter mine the level at which green house gas con cen tra tions should be sta bi lised. None theless in for ma tion ex ists to de fine near- term ac tions con sis tent with a wide range of long- term des ti na tions. For sim plic ity, imag ine that a dec ade or two from now so ciety will learn that it faces one of three plau si ble fu tures: 1) cli mate change is a *Big Problem*, re quir ing world wide, green house gas emis sions to de cline over 80 percent dur ing the course of the 21st cen tury; 2) cli mate change pres ents *Lit tle Problem*, requiring little reduction in emissions; and 3) technological advance and efforts to address other environmental problems (such as regional air pollution) dramatically re duce green house gas emis sions so that we *Never Know* what the im pact of cli mate change would have been.

Now imag ine so ci ety poised at the mo ment when it is about to learn the scenario it faces. What would so ci ety most want to have ac com plished since the year 2001 to pre pare for what lies ahead? Five mile stones would seem im por tant.[16]

15 Vic tor, *Col lapse of the Kyoto Pro to col*.

16 These ar gu ments draw from on go ing in te grated as sess ment stud ies of ro bust, adaptive- deci sion strate gies for cli mate change us ing "ex plora tory mod el ing" tech niques, most re cently R. J. Lem pert, M. E. Schlesinger, S. C. Bankes, N. G. Andronova, "The Impact of Variability on Near-Term Climate- Change Pol icy Choice," *Cli matic Change*, vol. 45, no. 1, 2000, pp. 129- 61, and D.A. Robalino and R. J. Lem pert, "Car rots and Sticks for New Tech nol ogy: Craft ing Green house Gas Reduc tions Poli cies for a Het ero ge ne ous and Un cer tain World", *Integrated Assessment*, vol. 1, no. 1, 2000, pp. 1-19.

We would want to have

1. slowed cli mate change to the ex tent pos si ble with low- cost ac tions for re ducing emis sions;

2. gen er ated a wide ar ray of low- cost tech no logi cal op tions for elimi nat ing human kind's net green house gas emis sions;

3. built well func tion ing do mes tic and in ter na tional in sti tu tions ca pa ble of regulat ing and moni tor ing any re quired large- scale emis sions re duc tions;

4. developed an effectivecapability to adapt to any un avoid able im pact of climate change;

5. pro moted world wide eco nomic growth, for over all well- being and to give nations and firms sufficient resources to take whatever cli mate re sponse ac tions are necessary.

These mile stones are con sis tent with the na tional com mit ments of the Framework Con ven tion (Ar ti cle 4) and en com pass most near- term ob jec tives ex pressed by nu mer ous par ties to the cli mate change de bate. Not all mile stones are nec essary for all fu tures. For in stance, in sti tu tions for regu lat ing emis sions will not be needed in the *Lit tle Prob lem* or *Never Know* sce nar ios. None the less, these milestones rep re sent im por tant hedg ing ac tions be cause the first four can be rela tively inexpensive and insufficient progress towards any of the five could jeopardise socie ty's abil ity to re spond suc cess fully to one or more of the sce nar ios. In ad dition, these mile stones may help shape a more de sir able fu ture. For in stance, efforts to create technologies for future low-cost emissions and to develop regu la tory in sti tu tions may in crease the like li hood of the *Never Know* sce nario by encouraging firms to advance potential low-emitting technologies. Encouraging this last scenario could be particularly important in addressing the potential for rapid, ir re versi ble cli mate im pacts.

Relaxing the trade-offs required to achieve near-term milestones

There are many specific actions that government, firms and other organisations can and should take to meet these near-term milestones. While clear trade-offs ex ist – more re sources spent to wards one mile stone may mean less for an other – in the near term they need not be se vere. But the cur rent, over rid ing fo cus on specific tar gets and time ta bles for na tional emis sion re duc tions ex ac er bates the dif fi culty of achiev ing a bal ance among these mile stones ac cept able to all the par ties, given the deep uncertainty and varied interests associated with the climate change problem.

Binding targets for near-term national emission reductions, even ones that are rela tively easy to at tain, are a pow er ful tool to en cour age near- term, low- cost emission reductions (Milestone 1). Such targets may also be the only means to

induce serious efforts at building institutions for regulating and monitoring emissions (Milestone 3). The development and diffusion of emission-reducing technologies (Milestone 2) takes time so that many policies important in the long-term, such as R&D spending and tax credits for early adopters, may have little effect on near-term emissions. Attempts to accelerate technology development primarily with the use of stringent near-term emissions targets may be costly and thus conflict with Milestone 5. As evidenced by the negotiations to date, strict emission targets can also complicate the requirements for emissions trading and other institutional designs, greatly increasing the chances for failure with Milestone 3. Emissions targets do little to promote efforts to improve the capacity to adapt to adverse climate changes (Milestone 4).

These problems manifest themselves in the current diplomatic impasse. Many Europeans emphasise the urgent need to begin the social and technological transformations that may enable viable options for deep future emission reductions. Many Americans emphasise the need for efficient, low-cost actions to meet near-term goals. These differences play out, for instance, in the US-EU disagreements about the extent to which countries should use emissions trading and carbon sinks to avoid emission reductions in their own economies.

These shortcomings of a primary reliance on targets and timetables for national emission reductions would be unavoidable if the environmental harm from climate change were directly tied to annual greenhouse gas emissions. But they are not; the climate changes as a result of the *concentration* of greenhouse gases in the atmosphere, and because greenhouse gases, once emitted, can stay in the atmosphere for decades to centuries, the emissions in any single year make virtually no environmental difference. This contrasts with many other environmental problems such as local air pollution, where the impact depends directly and immediately on daily emissions.

If the future were certain, there might be some near-term, emission reduction target for each nation that could successfully balance the differing interests of all the parties. But given the deep uncertainty, Americans and Europeans will assess any near-term emission reduction target in light of different expectations about the potential consequences of failing to meet one or more of the near-term objectives. For any level of emission reduction target, some important stakeholder will see an important near-term need unmet. Thus, it seems virtually impossible that near-term steps of a robust climate policy can be formulated, negotiated and successfully implemented using national greenhouse gas emissions as the sole objective.

Moving forward

The United States and European Union have reached an impasse over climate change, which threatens both transatlantic relations and the Earth's environment. There is widespread, growing, though certainly not universal, sympathy with the long-term goal of stabilising atmospheric greenhouse gas concentrations and advocates exist for each of the necessary near-term milestones on the path to achieving this goal. But the primary focus of climate policy on targets and

time ta bles for emis sion re duc tions has made it more dif fi cult to reach con sen sus on a viable port fo lio of near- term ac tions.

Ad vo cates of the Kyoto Pro to col are proba bly cor rect that some type of binding, near- term in ter na tional con trols on green house gas emis sions are an im portant part of any suc cess ful re sponse to cli mate change. But the crit ics are cor rect that, as cur rently con fig ured, the Kyoto Pro to col has fun da men tal flaws. In particu lar, the Frame work's na tional emis sion re duc tion tar gets, the par ticu lar lev els of which have lit tle im me di ate con nec tion to en vi ron mental im pact, have in flamed con tro versy and in creased the com plex ity and, hence, risk of fail ure of any early-stage ex peri ments in in ter na tional emis sions trad ing.

The US, EU and the other par ties to the Frame work Con ven tion on Cli mate Change and the Kyoto Protocol would do well to revisit the full set of outcomes they hope to achieve from their near- term cli mate poli cies. In so do ing, they may recognise a need to adjust emis sions caps and sup ple ment them with ad di tional measures of success to encourage the full port fo lio of near- term ac tions nec essary for a ro bust long- term re sponse to cli mate change. Such ad di tional meas ures of suc cess might in clude, for in stance, na tional com mit ments to take spe cific actions or achieve lev els of prog ress re lated to the de vel op ment and dif fu sion of new emission-reducing technologies and to building the capacity to adapt to the impacts of cli mate change. New meas ures of suc cess might also in clude re cent propos als such as tar gets based on the in ten sity (rather than the ab so lute amount) of national emissions.[17] Some such national commitments might resemble the "pledge and re view" con cept ini tially con sid ered in early cli mate ne go tia tions but rejected as dif fi cult to cod ify and in suf fi cient to com pel se ri ous ac tion. But such commitments could be useful when combined with bind ing emis sion tar gets and in formed by to day's bet ter un der stand ing of the near- term ac tions most im por tant to a robust long-term response to cli mate change. Some ad di tional com mit ments might be bind ing, but more likely they would be sup ported by ex ten sive moni tor ing and reporting under the "national communications" provisions of the Framework Convention.[18]

Whether to re tain, mod ify or re place the Kyoto frame work looms as a cen tral diplomatic problem because the Protocol has become a focus of opposition for many and a sym bol of hard won prog ress for oth ers. The Frame work Con ven tional and Pro to col have achieved a number of im por tant suc cesses to date, in clud ing an in ter na tional con sen sus on long- term goals and on an ini tial pro cess for modi fy ing climate pol icy over time, an ac cep tance of the prin ci ples of bind ing emis sions reduction tar gets and the use of market- based mecha nisms for meet ing them, and an ini tial in fra struc ture for the moni tor ing nec es sary to sup port any ac tion on climate change. Thus, build ing on the cur rent struc tures may be less dis rup tive than

17 K. Bau mert, R. Bhan dari and N. Kete, *What might a de vel op ing coun try cli mate com mit ment look like?* (Wash ing ton, DC: World Re sources In sti tute, Cli mate Note, May 1999).

18 United Na tions Frame work Con ven tion on Cli mate Change, Ar ti cle 12.

attempting to begin again with a clean slate. The existing treaty language is certainly sufficiently broad to accommodate a wide range of possible interpretations and revisions. Given US opposition, any conceivable climate change agreement will include significant modifications to the emissions caps, through some combination of weakening or delaying the target, expanding the definition of what counts as emission reductions, or some variant of the safety valve. But the substance of the differences between the EU, US and others can be reduced if negotiators combine changes in the emission caps with new commitments to other actions directly tied to the other key milestones.

There are certainly entrenched ideologies and economic interests on all sides of the issue, but any necessary, serious economic dislocations due to climate change policy remain largely in the future. Thus, by retaining emissions controls, but balancing them as only one component of a well-balanced, robust climate policy, the EU and US may be able to create a framework that will allow them, and the rest of the world, to agree on the key near-term actions needed to prepare effectively for a wide range of plausible climate-change futures.