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ACHIEVING EARLY AND SUBSTANTIAL GREENHOUSE GAS REDUCTIONS UNDER A POST-KYOTO AGREEMENT

John C. Dernbach*

INTRODUCTION

It has been more than 15 years since the United Nations Framework Convention on Climate Change¹ was opened for signature in 1992, and more than a decade since the Kyoto Protocol² was agreed to in 1997. We are now at the beginning of the 2008-2012 compliance period for the Kyoto Protocol, the first and only agreement under the Framework Convention that imposes binding greenhouse gas emission limitations. Yet there is little evidence that either agreement has had any significant effect on overall greenhouse gas emissions,³ and substantial doubt that the Kyoto Protocol can achieve significant reductions by 2012 even among the parties that are subject to Kyoto's emissions reduction targets.⁴

* John C. Dernbach is Professor of Law at Widener University. He is former policy director of the Pennsylvania Department of Environmental Protection. Thanks to the participants in the Georgetown workshop for this symposium, and to David Driesen and David Wirth, for comments on an earlier draft. Librarians Diane Goltz and Ed Sonnenberg provided invaluable research assistance. Prof. Dernbach can be reached at jcdernbach@widener.edu.

¹ *United Nations Framework Convention on Climate Change*, U.N. Doc. A/AC.237/18 (1992), reprinted in 31 I.L.M. 849 (1992).

² *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Dec. 10, 1997, U.N. Doc. FCCC/CP/197/L.7/Add. 1, reprinted in 37 I.L.M. 22 (1998).

³ Scott Barrett, *A Multitrack Climate Treaty System*, ARCHITECTURES FOR AGREEMENT: ADDRESSING GLOBAL CLIMATE CHANGE IN THE POST-KYOTO WORLD 237, 237 (Joseph E. Aldy & Robert N. Stavins eds. 2007).

⁴ Guus J.M. Velders et al., *The Importance of the Montreal Protocol in Protecting Climate*, 104 PROC. NAT'L ACAD. SCI. 4,814, 4,818 (2007) (explaining that emissions increases in developed countries such as the United States and Spain almost completely offset emissions reductions in countries in transition such as Russia and Estonia). In some countries, of course, there has been progress. Among the 15 EU countries, greenhouse gas emissions in 2005 were about 1.5 percent lower than they were in 1990, although that is about four percentage points higher than the path needed to achieve the EU's eight percent reduction by 2008-2012. EUROPEAN ENVIRONMENTAL AGENCY, ANNUAL EUROPEAN COMMUNITY GREENHOUSE GAS

The Bali Action Plan,⁵ which the parties to the Framework Convention agreed to in December 2007, puts in place a negotiating process that is designed to reach a decision on a post-Kyoto agreement by December 2009. The parties may or may not reach agreement by that time; among other things, the new U.S. president will then have been in office for less than a year. If they do reach agreement, it is likely to take several more years for that agreement to be ratified (or not) by the participating governments and for appropriate implementing legislation or other national laws to be enacted (or not). That legislation, in turn, will be directed at a set of future compliance dates that are unlikely to be any earlier than 2013-2017, the next five-year period after the Kyoto commitment period. That means, in practical terms, that significant measurable reductions in greenhouse gas emissions could be at least a decade away, and perhaps longer.

But we can't wait that long. The post-Kyoto agreement needs to achieve early and substantial reductions of greenhouse gas emissions, in addition to providing an effective means of further reducing emissions in the long term.

INVENTORY 1990–2005 AND INVENTORY REPORT 2007: SUBMISSION TO THE UNFCCC SECRETARIAT 10 (2007), *available at* http://reports.eea.europa.eu/technical_report_2007_7/en/Full%20report%20Annual%20European%20Community%20greenhouse%20gas%20inventory%201990-2005%20and%20inventory%20report%202007.pdf. Emissions dropped between 1990 for the two largest emitters, Germany and the United Kingdom, but increased in the third and fourth largest emitting countries, France and Italy. *Id.* at 15. Of course, the Kyoto Protocol has provided a wealth of experience on how to design and implement an emissions trading system, and has led to a legal structure in Europe and elsewhere that is likely to be the basis for even further emissions reductions. *See, e.g.*, JONATHAN ROBINSON ET AL., CLIMATE CHANGE LAW: EMISSIONS TRADING IN THE EU AND THE UK (2007). In addition, it would have had much greater effect if the United States had participated in it. From an overall emissions reduction standpoint, though, it has had only a modest effect.

⁵ United Nations Conference on Climate Change, Thirteenth Session, Bali Action Plan, Decision -/CP.13 (Dec. 15, 2007), *available at* http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf.

Greenhouse gas emissions have risen 24 % around the world since 1990.⁶ Unless new policies and measures are implemented, greenhouse gas emissions are projected to increase at least 25 percent, and as much as 90% by 2030.⁷ The scientific information being developed indicates that the human role in climate change is substantial, that average surface temperatures are increasing and that sea levels are rising, that these changes are having observable and negative effects around the world, and that these effects will grow in magnitude and scale as greenhouse gas concentrations in the atmosphere continue to increase. Indeed, the preamble to the Bali Action plan twice describes the situation as urgent.

The lack of international agreement has not necessarily prevented action; the European Union committed to an emissions trading system before the Kyoto Protocol was ratified, and many U.S. states have adopted significant reduction goals as well as emissions trading schemes.⁸ Yet the lack of international agreement has likely often prevented action or has been used as an excuse for not taking action. More importantly, the sum of unilateral national, regional, and state or provincial actions almost surely cannot match the scale, cohesiveness, and effectiveness of an international agreement.

This Article attempts to answer the following question: How would we structure a post-Kyoto agreement if one of our objectives was significant short-term emissions

⁶ Hans-Holger Rogner et al., *Introduction*, in INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 95, 103 (Bert Metz et al. eds 2007). This increase is based on the global warming potential of the gases controlled under the Kyoto Protocol, and does not include ozone depleting substances regulated under the Montreal Protocol. *Id.* Ozone depleting substances also contribute to global warming. By reducing emissions of those substances, the Montreal Protocol has already had a much larger impact on climate change mitigation than the Kyoto Protocol is likely to achieve. *The Importance of the Montreal Protocol*, *supra* note 4, at 4,818.

⁷ *Introduction*, *supra* note 6, at 111.

⁸ William A. Pizer, *Practical Global Climate Policy*, in ARCHITECTURES FOR AGREEMENT, *supra* note ___, at 280, 284.

reductions? This is, in a sense, the question that the Kyoto Protocol attempted to answer, requiring developed countries to reduce their greenhouse gas emissions by about five percent from 1990 levels by 2008-2012. There is a considerable temptation, because of the Protocol's limited effectiveness, to try a different approach entirely. The Bali Action Plan as well as the experience of the past decade virtually ensures an approach that is, at a minimum, different from Kyoto in some ways. But there is still value in early and significant results, and the Kyoto Protocol does not provide the only path for achieving them.⁹

This Article has three parts. Part I explains the international law and policy structure for addressing climate change, including the action plan agreed to in December 2007 at the conference of parties to the Framework Convention in Bali, Indonesia. Although the Framework Convention provides for a variety of approaches to address climate change, the Kyoto Protocol that was agreed to under the Convention is limited to essentially one approach—quantified emissions reductions for developed countries and emissions trading. The Bali Action Plan, which sets up a negotiating process for a successor agreement to the Kyoto Protocol, appears to re-establish the Framework Convention's multiple approaches to mitigating climate change. The availability of multiple approaches will make it easier to achieve early and substantial emission reductions. On the other hand, the Bali Action plan is silent on the issue of short-term reductions and reflects the lack of a firm international consensus on how to proceed.

Part II explains why policy makers should seriously consider substantial early reductions in greenhouse gas emissions as a part of any post-Kyoto framework. These

⁹ Of course, long-term emissions reductions are also needed. Many sources of greenhouse gas emissions, for instance, are likely best addressed through replacement technologies that are not yet ready for wide deployment or that have not yet even been invented.

reasons include the growing urgency of the climate change science, the precautionary approach identified in the Convention as a decision-making principle, the fact that cost-effective measures are now available, and the significant non-climate benefits (security, economic, social, and environmental) that can be achieved by implementing them. As a practical matter, too, long-term greenhouse gas emissions are virtually impossible without short-term reductions. The Convention also includes ethical obligations on developed countries—to take leadership in addressing climate change and to reduce impacts on developing and vulnerable countries—which require early and substantial action.

Part III sets out suggested elements of a framework for early action in a post-Kyoto agreement. In essence, Part III proposes that the parties establish a short-term goal for stabilizing global greenhouse gas emissions, involve both developed and developing countries, and include an agreement to deepen the emissions reduction commitment of the Kyoto cap-and-trade program. In addition, the parties should negotiate separate agreements concerning particular policies or economic sectors. These additional agreements make substantial short term emission reductions more likely, or increase the size of those emissions reductions. This is true regardless of how the cap-and-trade part of the agreement is structured. Part III proposes a process for identifying, agreeing to, and implementing policies and measures that will maximize the benefits resulting from short-term action. This legal structure would supplement, not replace, any long-term goals that emerge from the Bali Action Plan.

The Article suggests that early and substantial greenhouse gas reductions could change and perhaps transform the international conversation about climate change

mitigation. Short-term results would build international confidence and create momentum for further subsequent actions. Because so many cost-effective opportunities have yet to be deployed, particularly for energy efficiency and conservation, short-term action would also show the significant economic and other benefits of climate change mitigation—for both developed countries such as the United States as well as developing countries. Most fundamentally, substantial short-term reductions would actually respond to the magnitude of the challenge with which we are confronted.

I. THE ROAD TO BALI

The Framework Convention anticipates that countries will undertake activities on a variety of tracks to address climate change. It also authorizes an annual conference of the parties to assess progress and provides for the adoption of protocols that can articulate more precise legal rules for the parties to follow in reducing their greenhouse gas emissions.¹⁰ By contrast, the Kyoto Protocol, which was adopted to implement the Convention, essentially provides only one international path for greenhouse gas mitigation--emissions reduction targets and a timetable. The Bali Action Plan adopted by the conference of the parties in 2007¹¹ can be understood as restoring the multiple tracks provided by the Framework Convention. Multiple tracks or paths for reducing greenhouse gases increase the likelihood of substantial early action, particularly by

¹⁰ Framework Convention, *supra* note __, arts. & & 17. Protocols, like treaties, must be ratified by countries in order to be legally binding under international law.

¹¹ The Bali Action plan was adopted by the parties to the Framework Convention, not the Kyoto Protocol. Bali Action Plan, *supra* note __ (beginning with a reference to the Conference of the Parties to the Convention). Even though the United States is not a party to the Kyoto Protocol, it is a party to the Framework Convention. United Nations Framework Convention on Climate Change, Status of Ratification, http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php (last visited Mar. 2, 2008). Thus, the United States was a party to the negotiations that led to the Bali Action Plan.

developing countries. The Bali Action Plan does not mention short-term reductions but it could—and should—lead to a subsequent protocol that achieves substantial and early emission reductions.

A. *Framework Convention*

The Framework Convention’s objective is “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”¹² The Convention creates an international platform for achieving that goal that has a variety of paths or tracks, including mitigation, adaptation, reporting, and scientific and technological research, to address climate change. These different paths or tracks provide a foundation for the parties to move ahead on a variety of different approaches at once, including approaches that would lead to substantial early emission reductions.

The Convention requires all parties, both developed and developing, to establish, implement, and periodically update national programs to mitigate climate change.¹³ These programs can be as varied as the emission sources they cover. Article 4.1(c) requires all parties to cooperate in the “development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases...in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.”¹⁴

In addition, the Convention contains requirements that are applicable only to developed countries, and is not limited to any particular approach to mitigation. The

¹² Framework Convention, *supra* note 1, art. 3.

¹³ *Id.* art. 4.1(b).

¹⁴ *Id.* art. 4.1(c).

Convention treats developed countries and developing countries differently because, as the Framework Convention's preamble states, developed countries have contributed "the largest share of historical and current global emissions of greenhouse gases, and have higher per capita emissions levels than developing countries."¹⁵ The developed countries' historic contribution to greenhouse gas emissions has lasting cumulative effects because of the persistence of these gases in the atmosphere.

The Convention itself refers to broad approaches that developed countries can take in reducing their greenhouse gas emissions—quantified emissions reductions and "policies and measures." There are no commitments by developed countries to reduce greenhouse gas emissions by a certain amount by a date certain; developed countries agreed only to the "aim" of reducing their greenhouse gas emissions to 1990 levels by 2000.¹⁶ On the other hand, the Convention also contains a commitment to review the adequacy of developed country commitments, including the "aim" commitment.¹⁷ At the same time, developed countries also agreed to adopt "policies and measures" that will demonstrate that they "are taking the lead" in addressing climate change.¹⁸ The duty to adopt such "policies and measures" is independent of any target and timetable for reducing greenhouse gas emissions.¹⁹

¹⁵ *Id.* preamble para. 3.

¹⁶ *Id.* art. 4.2(a).

¹⁷ Framework Convention, *supra* note 1, art. 4.2(d).

¹⁸ *Id.* art. 4.2(a). They also agreed to report to the conference of the parties on the policies and measures that they are implementing, and on their effectiveness in reducing greenhouse gas emissions. *Id.* arts. 4.2(a) & 12.2.

¹⁹ R.A. Reiner, *The Framework Convention on Climate Change: Developed Country Commitments on Greenhouse Emissions* 35 (1995) (copy on file with author) (describing the commitment by developed countries to adopt policies and measures as one of the "two essential commitments by developed countries" in the Convention. The other is the requirement to communicate detailed information about the effectiveness of these measures to the Conference of the Parties.

Thus, there is nothing in the Framework Convention that limits the parties to any particular approach or tool. To the contrary, the Convention provides both developed and developing country parties with considerable flexibility in implementation.

B. Kyoto Protocol

The Kyoto Protocol, which was agreed to in 1997, was based on the parties' review of the "aim" commitment. The Kyoto Protocol limits the parties to essentially one internationally-agreed emissions reduction pathway. Under the Kyoto Protocol, developed countries agreed to reduce their net greenhouse gas emissions by at least five percent from 1990 levels by 2008-2012.²⁰ A key feature of the Kyoto Protocol is its use of market mechanisms, particularly different forms of emissions trading, to achieve the required reductions.²¹ The Protocol contains somewhat different commitments for individual developed countries; the U.S. commitment is seven percent below 1990 levels.²² The Kyoto Protocol went into effect in 2005; the United States is now the only developed country that is not a party.²³ By capping emissions reductions at specific levels in individual countries, and authorizing a trading system, the Kyoto Protocol makes a cap-and-trade program the centerpiece of national and regional programs for its

²⁰ *Id.* art. 3.1. The Annex I or developed countries also agreed to make "demonstrable progress" by 2005 in meeting their commitments. *Id.* art. 3.2. For a history and assessment of the Kyoto Protocol, *see, e.g.*, SEBASTIAN OBERTHUR & HERMANN E. OTT, *THE KYOTO PROTOCOL: INTERNATIONAL CLIMATE POLICY FOR THE 21ST CENTURY* (1999).

²¹ These are Joint Implementation (*id.* art. 6), the Clean Development Mechanism (*id.* art. 12), and emissions trading (*id.* art. 17).

²² *Id.* Annex B.

²³ United Nations Framework Convention on Climate Change, Parties to the Kyoto Protocol, <http://maindb.unfccc.int/public/country.pl?group=kyoto> (last visited March 13, 2008).

implementation. Most prominent among these is the European Union emissions trading system, which began in 2005.²⁴

The Protocol also specifies that developed countries, in meeting the required emissions reductions, are to carry out “policies and measures” as warranted by their national circumstances. The protocol contains an illustrative list of these policies and measures, including increased energy efficiency, protection and enhancement of greenhouse gas sinks and reservoirs, research and development on clean energy technology, and carbon sequestration. On the other hand, it does not require or authorize international agreement on any specific policies and measures or particular economic sectors, or create any international structure for developed or developing countries to cooperate on such matters. Nor is there any quantitative emissions reduction commitment for developing countries.²⁵

C. Bali

At their meeting in Bali, Indonesia in December 2007, the conference of the parties to the Framework Convention adopted the Bali Action Plan, which sets up a “comprehensive process” for reaching agreement on a post-Kyoto framework for addressing climate change. The parties also made decisions on a number of other issues, most notably a plan for achieving early action on financial incentives to prevent deforestation in developing countries.

²⁴ JONATHAN ROBINSON ET AL., CLIMATE CHANGE LAW: EMISSIONS TRADING IN THE EU AND THE UK (2007).

²⁵ In addition, there is no long-range emissions reduction target, and no agreement on what atmospheric concentration of greenhouse gases would constitute dangerous interference with the climate system.

The Bali Action Plan sets up a process for reaching a decision on a post-Kyoto agreement by the fifteenth conference of the parties, which is scheduled to be held in Copenhagen, Denmark between November 30 and December 11, 2009.²⁶ It also focuses the parties on a long-term goal, opens the door to developing country agreement to reduce emissions, and would have the parties consider a greater range of mitigation, adaptation, technology transfer and financial assistance issues than are contained in the Kyoto Protocol.

The preamble states that the Action plan responds to the Intergovernmental Panel on Climate Change's findings that "warming of the climate system is unequivocal" and that "delay in reducing emissions significantly constrains opportunities to achieve lower stabilization levels and increases the risk of more severe climate change impacts." The preamble twice uses "urgent" or "urgently" to describe our challenge.²⁷ In so doing, the preamble contains a footnote to three separate pages in the 2007 Intergovernmental Panel on Climate Change report, *Mitigation of Climate Change*.²⁸ These pages describe a range of different stabilization scenarios for atmospheric concentrations of greenhouse gases. These scenarios range from 445-490 parts per million 885-1130 parts per million of carbon dioxide equivalent gases.²⁹ To achieve low to medium stabilization levels, IPCC concluded, developed countries would need to reduce their emissions by 10 to 40% below 1990 levels by 2020 and by 40 to 95% below 1990 levels by 2050.³⁰ Achieving

²⁶ Bali Action Plan, *supra* note 5; Ministry of Foreign Affairs of Denmark, Frequently Asked Questions, COP 15, United Nations Climate Conference, Copenhagen, Denmark, <http://www.cop15.dk/en/servicemenu/faq/> (last visited Jan. 6, 2007).

²⁷ Bali Action Plan, *supra* note 5. The plan states the need "to urgently enhance implementation of the Convention" and "the urgency to address climate change."

²⁸ *Id.* n.1, citing INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, WORKING GROUP III REPORT: MITIGATION OF CLIMATE CHANGE 39, 90, & 776 (2007).

²⁹ *Id.* at 39.

³⁰ *Id.* at 90.

even a higher stabilization level could require reductions from developed countries by as much as 25% by 2020 and 80% by 2050.³¹

In negotiating this post-Kyoto agreement, the Bali Action Plan says, parties are to consider a “long-term global goal for emissions reductions, to achieve the ultimate objective of the Convention.”³² In addition, the parties agreed consider “enhanced” action on climate change mitigation, adaptation, technology development and transfer, and provision of financial resources and investment.³³ Developed country parties agreed to consider “[m]easurable, reportable, and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives.”³⁴ Developing countries agreed to consider “[n]ationally appropriate mitigation actions;” there is no reference to quantified emission reductions. They also agreed to consider mitigation measures that are “supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.”³⁵ To improve implementation of Article 4.1(c) of the Convention, parties are also to consider “[c]ooperative sectoral approaches and sector-specific actions.”³⁶ In addition, parties are to consider opportunities to improve and promote the cost-effectiveness of mitigation actions.³⁷

³¹ *Id.* at 776 (but stating that developed countries might not need to reduce their emissions by 2020 to achieve a higher stabilization level, and only reduce their emissions by 30% below 1990 levels by 2050). *Id.*

³² Bali Action Plan, *supra* note 5, para. 1(a).

³³ *Id.* paras. 1(b)-1(e).

³⁴ *Id.* para. 1(b)(i).

³⁵ *Id.* para. 1(b)(ii). This paragraph explicitly links developing country emission reduction commitments to new developed country commitments on capacity building in developing countries. Summary of the Thirteenth Conference of the Parties to the UN Framework Convention on Climate Change and Third Meeting of the Parties to the Kyoto Protocol, 3-15 December 2007, EARTH NEGOTIATIONS BULLETIN, Dec. 18, 2007, at 20, available at <http://www.iisd.ca/download/pdf/enb12354e.pdf>.

³⁶ *Id.* para. 1(b)(iv).

³⁷ *Id.* para. 1(b)(v).

The Bali Action Plan appears to put the world on course for a post-Kyoto agreement that looks farther into the future, involves developing countries to a greater degree, and is broader in scope than the Kyoto Protocol. It would have the parties consider a long-term emissions reduction goal. The Kyoto Protocol, by contrast, only contains a goal for 2008 to 2012. While the Bali plan only calls for consideration of “quantified emission limitation and reduction objectives” for developed countries, developing countries at least agreed to consider national mitigation actions if they received sufficient support from developed countries. Nothing like that is in the Kyoto Protocol for developing countries. The level of detail concerning enhanced mitigation, adaptation, technology transfer, and financial resources is also greater than that found in the Kyoto Protocol.

The Bali Action Plan, however leaves much to future negotiations. It does not contain a short-term or long-term goal for reducing emissions, does not specify when the next commitment period (after 2008-2012) would be, and does not specify the criteria for an emissions reduction agreement. While the parties agreed to consider a broader range of issues, there is no guarantee that the parties will reach agreement on them. It represents an incremental step toward a post-Kyoto agreement—and an agreement in which the United States is still willing to participate--but only that.³⁸

In addition to broadening the potential scope of a post-Kyoto agreement, the conference of the parties also agreed to immediately establish a process for reducing greenhouse gas emissions from deforestation, which are estimated to be contributing to 20% of world greenhouse gas emissions. The aim of this agreement is to encourage

³⁸ Thomas L. Friedman, *What Was That All About?*, N.Y. TIMES, Dec. 19, 2007, at A33 (“I still don’t know what Bali was about, but I do know that it was incremental, not transformational....”).

developed countries to provide funding to avoid deforestation by, among other things, resolving the methodological issues of accounting from greenhouse gas emissions reduction from avoided deforestation. The process for addressing these issues begins in the spring of 2008.³⁹ This agreement provides a path for early action on deforestation that is separate from the later agreement that will hopefully be achieved under the Bali Action Plan. It is already encouraging donor countries and organizations to make substantial financial pledges to reduce deforestation.⁴⁰ By setting up negotiations for a range of approaches to address climate change, the Bali meeting is more in keeping with the breadth of approaches contained in the Framework Convention than the narrower approach contained in the Kyoto Protocol. As will be seen, a broader range of approaches enhances the likelihood of achieving early and substantial emissions reductions.

II. THE CASE FOR SUBSTANTIAL SHORT-TERM REDUCTIONS

Achieving substantial short-term emissions reductions should be a key objective for a post-Kyoto agreement. The reasons for this are the science itself, the precautionary approach, the current availability of cost-effective policies and measures, the need to reduce the costs of climate change, the availability of considerable non-climate benefits from climate change mitigation, the need for governments to establish credibility in addressing climate change, the difficulty of achieving long-term reductions without short-term reductions, the ethical and equitable consequences of delay, and the need to build

³⁹ United Nations Climate Conference, Decision -/CP.13, Reducing emissions from deforestation in developing countries: approaches to stimulate action (2007), available at http://unfccc.int/files/meetings/cop_13/application/pdf/cp_redd.pdf.

⁴⁰ Charles Clover, *Agreement Reached in Bali on Deforestation*, TELEGRAPH, Dec. 14, 2007, <http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2007/12/14/eabali214.xml>.

international confidence that mitigation is possible. A contrary argument based on cost-benefit analysis fails to address all of these reasons or the range of mitigation options.

Considerable agreement already exists on many of the objectives for a post-Kyoto agreement. According to the IPCC, “[t]here is broad consensus in the literature that a successful agreement will have to be environmentally effective, cost-effective, incorporate distributional considerations and equity, and be institutionally feasible.”⁴¹ Other commonly mentioned criteria are continued use of market mechanisms and quantified emission reduction targets; participation by more countries, including developing countries; and compliance.⁴² Environmental effectiveness ordinarily refers to overall reductions, and does not connote any preference for short-term or long-term reductions.⁴³ In fact, the criterion of significant short-term emissions reductions is not included on many (perhaps most) lists.⁴⁴ Policy makers should nonetheless consider significant short-term emissions reductions as an additional criterion for a post-Kyoto

⁴¹ Terry Barker et al., *Technical Summary*, in CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 25, 89 (Bert Metz et al. eds 2007).

⁴² Jeffrey Frankel, *Formulas for Quantitative Emission Targets*, in ARCHITECTURES FOR AGREEMENT, *supra* note 3, at 31, 32-41. See also DANIEL BODANSKY ET AL., INTERNATIONAL CLIMATE EFFORTS BEYOND 2012: A SURVEY OF APPROACHES 5 (2004) (identifying environmental effectiveness, cost-effectiveness, equity, dynamic flexibility, and complementarity as policy criteria for a post-Kyoto agreement); AKIHIRO SAWA, 21ST CENTURY PUBLIC POLICY INSTITUTE, PROPOSAL FOR A POST-KYOTO FRAMEWORK ii (2007) (identifying environmental effectiveness; science-based analysis; equity; inclusiveness; political feasibility; and sustainable, long-term perspective as principles for a post-Kyoto agreement).

⁴³ *Id.* (explaining that environmental effectiveness means that “greenhouse gases are actually reduced”).

⁴⁴ One exception is Frankel, *supra* note __, at 35-39, who explains the need for short-term reductions in the context of “dynamic consistency”.

agreement.⁴⁵ As the IPCC has concluded, the “need for immediate short-term action in order to make any significant impact in the longer term has become apparent.”⁴⁶

A. Rationales

Substantial short-term reductions are needed in a post-Kyoto agreement for at least eight separate reasons.

1. Climate Change Science

To begin with, the science of climate change indicates the growing urgency of the problem. The Bali Action Plan, referring to the recent IPCC reports, twice refers to the problem as urgent. This urgency has several sources, including the growing certainty about the impact of humans on climate change. IPCC’s 1996 report found only a discernible human influence on climate; IPCC now says there is a 90 to 99% probability that increases in global average temperatures are due to increases in anthropogenic (human caused) greenhouse gas concentrations.⁴⁷ In addition, the pace of warming around the world has accelerated in the last several decades compared with prior decades.⁴⁸ The IPCC has identified “reasons for concern” about these trends. These are 1) heightened risks to unique and threatened ecosystems and communities; 2) higher confidence of increases in the frequency of, and damage from, droughts, floods, and heat waves; 3) greater vulnerability of the poor and elderly to the adverse effects of climate

⁴⁵ By short-term reductions, I mean absolute reductions from existing (or 1990) emissions, not simply lower emissions than those projected under business-as-usual emissions growth scenarios. Put differently, this Article is focused on actually reducing emissions, not simply slowing the growth of emissions. Still, the analysis provided here would also support slowing the increase in emissions growth, although that approach would be far less effective in addressing the problems identified in this section.

⁴⁶ *Technical Summary*, *supra* note __, at 47,

⁴⁷ *Id.*

⁴⁸ James Hansen *et al.*, *Global Temperature Change*, 103 *PROC. NAT’L ACAD. SCI.* 14,288 (2006).

change; 4) growing economic costs of impacts over time as atmospheric greenhouse gas concentrations increase, and 5) the possibility of significant sea level rise from the Greenland and Antarctic ice sheets.⁴⁹ This last concern addresses the real but relatively small risk of catastrophic sea level rise, an issue that arises when we consider not only the probability that something might happen but the consequences of that thing if it occurs.

It is also becoming clearer that the quest for a “safe” level of atmospheric greenhouse gases—the stated goal of the Framework Convention—is likely to prove illusory. There is no “safe” level; there are only higher and lower levels of risk. The Convention’s objective acknowledges both the problem of climate change and the need for international action to address it.⁵⁰ The objective also creates an organizing principle for activities under the Convention and has led to a great deal of scientific research and debate to determine what that level is. Indeed, the Bali Action Plan could lead to the political determination of a long-term objective under the Convention based on this objective. At the same time, the Convention’s goal can make it appear that a radical break exists between the impact of greenhouse gas concentrations above and below that level.⁵¹ But that is not what the science tells us. While the Convention’s objective is to stabilize greenhouse gas emissions at a level that will prevent dangerous anthropogenic interference with the climate system, the determination of what is “dangerous” or “safe” is a political or risk management decision.⁵² While that decision should be informed by science, it is not something that science can decide. What the science indicates, by

⁴⁹ Intergovernmental Panel on Climate Change, Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report 20 (Nov. 16, 2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

⁵⁰ Daniel Bodansky, *The United Nations Framework Convention on Climate Change: A Commentary*, 18 YALE J. INT’L L. 451, 500 (1993).

⁵¹ Barrett, *supra* note __, at 238-39.

⁵² Technical Summary, *supra* note __, at 32 (“[A]ny judgment on ‘dangerous interference’ is necessarily a social and political one, depending on the level of risk deemed acceptable....”).

contrast, is that growing concentrations of greenhouse gases bring increasing risks of adverse effects.⁵³ Moreover, there is no way of knowing in advance that any given level will prevent dangerous climate change in some parts of the world or will prevent catastrophic and abrupt climate changes.⁵⁴ There is a continuum, in other words, and it runs from more safe and less dangerous at lower levels to less safe and more dangerous at higher levels.

This range of risks can be expressed in quantitative terms. The atmospheric concentration of greenhouse gases is now 430 parts per million (ppm) of carbon dioxide equivalent, and are increasing about 2.5 ppm annually.⁵⁵ If the concentration of greenhouse gases is stabilized at 450 ppm, there is a 5-20 percent chance that average surface temperatures will exceed three degrees Celsius (about six degrees Fahrenheit), which would “entail very damaging physical, social and economic impacts, and heightened risk of catastrophic changes.”⁵⁶ If greenhouse gases are stabilized at 550 ppm, the risk of exceeding three degrees Celsius is 30-70%; at 650 ppm, the risk is 60-95%.⁵⁷ While the risk of very bad outcomes increases with the atmospheric concentration of greenhouse gases, none of these scenarios is risk free, and none guarantee disaster (although the highest concentration comes pretty close).⁵⁸

⁵³ *Id.* (“Projected anthropogenic climate change appears likely to adversely affect sustainable development, with the effects tending to increase with higher GHG concentrations.”).

⁵⁴ Barrett, *supra* note __, at 238-39.

⁵⁵ UNITED KINGDOM, HER MAJESTY’S TREASURY, *THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 219* (2007). The Kyoto Protocol, and most analyses of greenhouse gases, focus on six different gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Kyoto Protocol, *supra* note --, Annex A. These gases have different global warming potential (e.g., a ton of methane represent 23 times the warming potential of a ton of carbon dioxide). *Id.* at 224. The term “carbon dioxide equivalent” creates a common metric for quantifying and understanding the total effect of all six gases.

⁵⁶ *Id.* at 221.

⁵⁷ *Id.*

⁵⁸ Indeed, the stabilization level should probably not exceed 550 ppm *Id.* at 337-38.

2. Precautionary Approach

A precautionary approach to climate change mitigation, which is identified by the Framework Convention as a decision-making principle,⁵⁹ also suggests the value of early reductions. “The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects,” the Convention states. “Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing” cost-effective measures.⁶⁰

Higher greenhouse gas emissions result in greater cumulative atmospheric concentrations of these gases, at least in the short term. There is a significant risk that the climate system will be more sensitive to these higher concentrations than anticipated, even if they peak and then fall within several decades afterwards. The Greenland ice cap appears to be melting more rapidly than projected, for example, providing evidence that the climate may be more sensitive to increased greenhouse gas concentrations than anticipated.⁶¹ Indeed, the IPCC concludes that uncertainty about climate sensitivity may be the most important justification for short-term action.⁶² Two studies published early in 2008 indicate that stabilizing climate change likely requires almost no greenhouse gas emissions, and indicating that the climate will continue to warm significantly even if concentrations are stabilized at 2000 levels.⁶³ It is possible that letting greenhouse gas

⁵⁹ Framework Convention, *supra* note __, art. 3.3. The precautionary approach is a basic principle of sustainable development, *Sustainable Development as a Framework*, *supra* note __, at 60-63.

⁶⁰ Framework Convention, *supra* note 1, art. 3.3.

⁶¹ Andrew Revkin, *In Greenland, Ice and Instability*, N.Y. TIMES, Jan. 8, 2008, <http://www.nytimes.com/2008/01/08/science/earth/08gree.html?em&ex=1199941200&en=7463a2850a6c1c13&ei=5087%0A>.

⁶² *Issues Related to Mitigation in the Long-Term Context*, *supra* note __, at 234.

⁶³ H. Damon Matthews & Ken Caldeira, *Stabilizing Climate Requires Near-Zero Emissions*, 35 GEOPHYSICAL RESEARCH LETTERS L04705 (2008) (concluding that “future anthropogenic emissions would need to be eliminated in order to stabilize global-mean temperatures.”); Andreas Schmittner et al., *Future Changes in Climate, Ocean Circulation, Ecosystems, and Biogeochemical Cycling Simulated for a*

concentrations peak and then fall at a later period may be more cost-effective than earlier peaking and reduction scenarios. But that is possible only if the climate is less sensitive to the forcing caused by greater short-term emissions than it may actually be or if the “overshoot” is limited.⁶⁴

IPCC’s evaluation of different emissions stabilization scenarios indicates that large reductions in greenhouse gas emissions will be needed regardless of the stabilization level that is chosen. Significantly, IPCC adds: “The lower the stabilization level, the earlier these large reductions have to be achieved.”⁶⁵ Lower stabilization levels, as already explained, mean reduced risks. The precautionary approach would have us limit our risks by substantially reducing emissions in the near term.

The absence of significant attention to short-term reductions may be due in part to the fact that most analysts are focusing on the Convention’s goal of preventing dangerous concentrations of greenhouse gases. The stabilization goal may make it seem less important when the needed reductions are achieved, so long as the stabilization goal is achieved. Moreover, the Kyoto Protocol has been widely criticized for containing only a short-term goal, not a stabilization goal or any other long-term objective. Yet as the IPCC states, it is impossible to separate the stabilization goal from the question of short-term emissions reductions. It is also possible to have both short-term and long-term goals in a post-Kyoto agreement. A precautionary approach to the science directs us to substantial short-term reductions.

Business-as-Usual CO₂ Emissions Scenario Until Year 4000 A.D., 22 GLOBAL BIOGEOCHEMICAL CYCLES 1013 (2008) (assessing, for the first time, the relationship between the carbon cycle and climate change over thousands of years, and concluding that “[e]arly action on emissions reductions is needed in order to avoid dangerous climate change for future generations.” *Id.* at GB 1030; Leora Falk, *Studies Find Large Emissions Cuts Needed for Temperature Stabilization*, Daily Environment Report, March 11, 2008, at A-6.

⁶⁴ Michel G. J. den Elzen & Detlef P. van Vuuren, *Peaking Profiles for Achieving Long-Term Temperature Targets with more Likelihood at Lower Costs*, 104 PROC. NAT’L ACAD. SCI. 17,931 (2007).

⁶⁵ *Technical Summary*, *supra* note __, at 32.

3. Current Availability of Cost-Effective Measures

Another reason for early action is that a great many policies and measures are already cost-effective, wholly apart from their climate change mitigation and non-climate benefits. It is thus difficult to see what is gained by waiting. In fact, the precautionary approach in the Framework Convention expressly indicates that cost-effective measures should not be postponed. Two important categories of policies and measures are energy efficiency and conservation and changes in human behavior and lifestyle.

According to the IPCC, energy efficiency could reduce projected greenhouse gas emissions from new and existing buildings by 30% by 2030.⁶⁶ Substantial greenhouse gas reduction and cost saving opportunities are also available in the industrial sector.⁶⁷ More generally, energy efficiency and conservation differ from other mitigation options, such as renewable energy and carbon sequestration, because they offer an opportunity for payback of the initial investment through cost savings.

In developed countries such as the United States that have high energy use, a variety of studies indicate the potential for cost savings and reduced greenhouse gas emissions through energy efficiency and conservation.⁶⁸ In addition to improving the efficiency of existing residential and commercial buildings, two of the most commonly known tools are improved fuel efficiency standards for motor vehicles and more stringent efficiency standards for appliances and equipment.⁶⁹ Other policies and measures include

⁶⁶ *Id.* at 13.

⁶⁷ *Id.* at 14.

⁶⁸ John Dernbach and the Widener University Law School Seminar on Energy Efficiency, *Stabilizing and Then Reducing U.S. Energy Consumption: Legal and Policy Tools for Efficiency and Conservation*, 37 ENVTL. L. REP. (Envtl. L. Inst.) 10,003, 10,028-10,030 (2007).

⁶⁹ *Id.* at 10,014-10,017.

expanded use of rail freight, public benefit funds for electricity, real-time pricing for electricity use, fuel taxation, and transit-oriented development.⁷⁰ The reduced energy consumption available from the intensive and coordinated use of these and other efficiency and conservation tools is so great that they might even enable the United States to stabilize and then reduce its energy use over the next decade or two.⁷¹ Because carbon dioxide emissions from fossil fuels constitute the overwhelming majority of U.S. greenhouse gas emissions,⁷² stabilizing U.S. energy consumption would go a long way toward stabilizing the growth in U.S. greenhouse gas emissions.

A 2007 analysis of 250 greenhouse gas mitigation options in the United States also indicates that many cost-effective ways to reduce energy use and greenhouse gas emissions already exist. This analysis, performed by McKinsey & Company for The Conference Board,⁷³ concluded that the United States could reduce its greenhouse gas emissions by 3.0 to 4.5 gigatons by 2030 over business-as-usual projections “using tested approaches and high-potential emerging technologies.”⁷⁴ This reduction would mean that U.S. greenhouse gas emissions in 2030 are 7 to 28% lower than 2005 emissions.⁷⁵ Forty percent of these reductions, the study concluded, could be accomplished at a negative marginal cost over their life cycle.⁷⁶ The study then recommended the following as one of three action principles for the United States in addressing global warming:

⁷⁰ *Id.* at 10,017-10,027.

⁷¹ *Id.* at 10,028-10,030.

⁷² U.S. ENVIRONMENTAL PROTECTION AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2005 at ES-5 (2006), available at <http://www.epa.gov/climatechange/emissions/downloads06/07ES.pdf>.

⁷³ MCKINSEY & COMPANY, REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST? (2007), available at http://www.mckinsey.com/client-service/ccsi/pdf/US_ghg_final_report.pdf.

⁷⁴ *Id.* at ix.

⁷⁵ *Id.* at xii.

⁷⁶ *Id.* at xii-xiii.

Pursue energy efficiency and negative-cost options quickly. Many of the most economically attractive abatement options we analyzed are “time perishable”: every year we delay producing energy-efficient commercial buildings, houses, motor vehicles, and so forth, the more negative-cost options we lose. The cost of building energy efficiency into an asset when it is created is typically a fraction of the cost of retrofitting it later, or retiring an asset before its useful life is over. In addition, an aggressive energy efficiency program would reduce the demand for fossil fuels and the need for new power plants.⁷⁷

Energy efficiency also provides significant opportunities in developing countries.

The greenhouse gas intensity of developing countries—greenhouse gas emissions per dollar of GDP—is much higher than it is developed countries. Developing countries, which have 43% of the world’s GDP, have a greenhouse gas intensity of 1.06 kilograms of carbon dioxide equivalent per dollar of GDP.⁷⁸ With 57% of the world’s GDP, developed countries have a greenhouse gas intensity of 0.68 kilograms of carbon dioxide equivalent per U.S. dollar in GDP. Despite their low per capita greenhouse gas emissions, in other words, the greenhouse gas intensity of developing countries is nearly double that of developed countries. According to the World Bank, thousands of energy efficiency opportunities are scattered through the economies of developing countries, including China, India, and Brazil. These opportunities have not been implemented, “despite high financial rates of return and payback periods between one and five years (with many in the one- to two-year range).”⁷⁹

⁷⁷ *Id.* at xvi.

⁷⁸ MITIGATION OF CLIMATE CHANGE, *supra* note __, at 30.

⁷⁹ ROBERT P. TAYLOR ET AL., WORLD BANK, FINANCING ENERGY EFFICIENCY: LESSONS FROM BRAZIL, CHINA, INDIA AND BEYOND 5 (2008), available at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2008/02/18/000333037_20080218015226/Rendered/PDF/425290PUB0ISBN11OFFICIALOUSE0ONLY10.pdf.

Changes in human lifestyle and behavior involve another set of currently available policies and measures.⁸⁰ These policies and measures are particularly important because, for example, about one-third of the energy consumed in the United States “is directly controlled by households.”⁸¹ By another estimate, activities that are under the “direct, substantial control of the individual and that are not undertaken in the scope of the individual’s employment,” are responsible for about one third of U.S. greenhouse gas emissions and eight percent of global greenhouse gas emissions.⁸² Policies and measures that would influence individual behavior include public reporting of greenhouse gas emissions, mandatory disclosure of the greenhouse gas effects of particular consumer products, public information on the greenhouse gas effects of various personal decisions, public information on climate change effects in particular regions, tax incentives for the purchase of energy-efficient products, and rules providing for the distribution of allowances from an emissions trading system to individuals and businesses that have substantially reduced their greenhouse gas emissions.⁸³ Thus, at least in developed countries, lifestyle and behavior changes could lead to significant reductions in greenhouse gas emissions in the short term.

Other policies and measures could influence individual behavior in developed or developing countries. These include education and training in all economic sectors; staff

⁸⁰ See, e.g., Michael P. Vandenbergh & Ann C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673 (2007); John C. Dernbach, *Overcoming the Behavioral Impetus for Greater Energy Consumption*, 20 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 15 (2007); Paul C. Stern, Director, Committee on the Human Dimensions of Global Change, National Research Council, *Why Social and Behavioral Science Research is Critical to Meeting California’s Climate Challenges*, Presentation to the California Energy Commission (Dec. 12, 2006) (Power Point presentation); Loren Lutzenhiser, *Social and Behavioral Aspects of Energy Use*, 18 ANN. REV. ENERGY & ENV’T 247 (1993).

⁸¹ Paul C. Stern & Gerald T. Gardner, *Psychological Research and Energy Policy*, AMERICAN PSYCHOLOGIST, April 1981, at 329, 336.

⁸² *The Carbon-Neutral Individual*, supra note __, at ____.

⁸³ John C. Dernbach, *Harnessing Individual Behavior to Address Climate Change: Options for Congress*, 26 VA. ENVTL. L. J. ____ (forthcoming 2008).

training, feedback, and documentation of existing practices in the industrial sector; reduction in motor vehicle use in the transportation sector through improved planning and infrastructure as well as public education; and changes in occupant behavior and choices in commercial and residential buildings.⁸⁴

4. Cost Reduction and Production of Non-Climate Benefits

Early action is also likely to reduce the costs of climate change and produce significant non-climate related benefits. The climate and other benefits of early mitigation measures, both of which are ignored in macroeconomic analyses of climate change mitigation,⁸⁵ are likely to be considerable. A well-known analysis by the United Kingdom concluded that the costs of climate change will increase over time and that it will be much less costly to act now to address climate change than to wait until the impacts of climate change are more fully realized.⁸⁶ It follows that earlier action will involve lower costs than later action. Because of inertia in the climate system, moreover, the benefits of mitigation actions are not likely to be felt for several decades. Thus, early action is needed to achieve medium- and long-term benefits.⁸⁷

The co-benefits of climate change—economic, environmental, security, and social benefits other than climate change mitigation—are also considerable.⁸⁸ These include reductions in other air pollutants (e.g., sulfur dioxide, particulates), improved human health, higher agricultural productivity, reduced stress on natural ecosystems, lower air

⁸⁴ *Summary for Policy Makers*, *supra* note __, at 12.

⁸⁵ Terry Barker et al., *Summary for Policymakers*, in MITIGATION OF CLIMATE CHANGE, *supra* note --, at 1, 8.

⁸⁶ STERN REVIEW, *supra* note __, at 649-52.

⁸⁷ *Technical Summary*, *supra* note __, at 33.

⁸⁸ Terry Barker et al., *Mitigation from a Cross-Sectoral Perspective*, in MITIGATION OF CLIMATE CHANGE, *supra* note --, at 619, 669-677.

pollution control costs, higher employment, and greater security.⁸⁹ Other benefits include lower energy prices for the poor, new jobs, improved technology, and new business opportunities.⁹⁰ The health benefits alone “may offset a substantial fraction of mitigation costs,” and other co-benefits “would further enhance cost savings.”⁹¹ These co-benefits are so significant that policies and measures are most often adopted for the primary purpose of achieving them, not mitigating climate change.⁹² Because these benefits have been demonstrated from policies that already being implemented, it follows that the broader application of these and similar policies would also yield these and other benefits. And because these policies don’t require long lead times or the development of new technologies, they should be implemented now.

5. Political “Down Payment”

Short-term emissions reductions also provide a kind of “down payment” on the long-term goal and give credibility to the governments making those commitments.⁹³ From a problem-solving perspective, it makes little sense to commit to a long-term objective without also taking short-term action; the long-term goal can always be modified or delayed. Immediate short-term results establish a precedent on which future

⁸⁹ *Id.*

⁹⁰ John Dernbach and the Widener University Law School Seminar on Global Warming, *Moving the Climate Debate from Models to Proposed Legislation: Lessons from State Experience*, 30 ENVTL. L. REP. (Envtl. L. Inst.) 10,933 (2000).

⁹¹ *Summary for Policy Makers*, *supra* note __, at 12.

⁹² *Mitigation from a Cross-Sectoral Perspective*, *supra* note __, at 669; *Moving the Climate Debate*, *supra* note __, at __.

⁹³ Frankel, *supra* note __, at 35-39 (explaining the reasons for “dynamic consistency” as a criterion for a post-Kyoto agreement).

actions can be based and help convince investors and others that that the commitments being made are real.⁹⁴

To be sure a government's credibility also depends on its ability to keep abatement costs as low as possible.⁹⁵ But when cost-effective options exist in particular sectors or from the use of particular legal or policy tools, a government's credibility is not likely to be compromised based on cost for employing those options or tools. In fact, the contrary is more nearly true. Wholly apart from the credibility issue that arises when a government does little or nothing in the short term to address an acknowledged problem, how can a government say it is serious about climate change when it won't even do things that make economic sense right now?

6. Probable Impossibility of Long-Term Reductions Without Short-Term Reductions

In addition, dramatic long-term reductions may not be possible without appreciable short-term reductions. For a variety of legal, institutional, and behavioral reasons, all of them ultimately rooted in the scope and magnitude of the task, it is not likely to be possible to load virtually all of the needed reductions into the long term. According to a 2007 report by Canada's Roundtable on the Environment and the Economy, for example, achieving that country's 2050 target of a 65% reduction in greenhouse gas emissions from current levels requires the country to meet its interim target of a 20% reduction. "Missing the 2020 target will put at risk the attainment of the longer-term target, or make achieving that target come at both higher economic and

⁹⁴ *Id.* at 37-39.

⁹⁵ Jonathan B. Weiner, *Incentives and Meta-Architecture*, in ARCHITECTURES FOR AGREEMENT, *supra* note 3, at 67, 71.

environmental costs.”⁹⁶ Early action fosters learning by doing across all affected sectors, not only in technological development and deployment but also concerning the effectiveness of various policies and measures. This kind of learning, in turn, can help speed the reduction of greenhouse gas emissions.⁹⁷

Technology lock-in may be the most important reason short-term reductions contribute to long-term reductions. Investments in existing technologies, and thus the greenhouse gas emissions that stem from those technologies, tend to last for their lifetime. Lock-in is, of course, a bigger problem for longer-lived technologies and infrastructure, such as power plants, buildings, and highways. The IPCC concluded that “mitigation actions need to start in the short term” to avoid lock-in of carbon-intensive technologies.”⁹⁸

7. Ethical Responsibilities Under Framework Convention

Substantial short-term reductions are also warranted by ethical principles stated in the Framework Convention as decision-making principles for the parties, and even as a legal duty. These are developed country leadership, equity for developing and vulnerable countries, and the national right to promote sustainable development. These principles are

⁹⁶ ROUNDTABLE ON THE ENVIRONMENT AND THE ECONOMY, GETTING TO 2050: CANADA’S TRANSITION TO A LOW-EMISSION FUTURE 47 (2007), available at <http://www.nrtee-trnee.ca/eng/publications/getting-to-2050/Getting-to-2050-eng.pdf>. “Early action offers the best guarantee of maximum success at minimum cost.” *Id.*

⁹⁷ D.P. van Vuuren & H.J.M. de Vries, National Institute of Public Health and the Environment, Mitigation Scenarios in a World Oriented at Sustainable Development: The Role of Technology, Efficiency, and Timing 12, 23 (2000), available at <http://www.mnp.nl/bibliotheek/rapporten/490200001.pdf>.

⁹⁸ *Technical Summary, supra* note ___, at 33.

entitled to particular respect for a post-Kyoto agreement that would, after all, be entered under the Convention itself.⁹⁹

Developed country leadership is an outgrowth of the principle of common but differentiated responsibilities.¹⁰⁰ The idea is that all countries are responsible addressing climate change, but that developed countries have to play a leadership role in addressing it.¹⁰¹ Developed country leadership is expressed as a decision-making principle in the Convention and as a duty, by developed countries, to adopt appropriate policies and measures. The Convention states, as a principle that the parties are to consider: “the developed country Parties should take the lead in combating climate change and the adverse effects thereof.”¹⁰² As previously explained, the Convention also requires developed countries to adopt “policies and measures” to demonstrate that they are “taking the lead in modifying longer-term trends in anthropogenic emissions...”¹⁰³

Developed countries could, of course, exercise leadership by making early reductions in their greenhouse gas emissions. The Kyoto Protocol model, which imposed quantitative emission reductions on developed countries, is consistent with that approach. A negative political reaction to Kyoto in the United States and the growth emissions in

⁹⁹ The Convention is not, of course, the only source of relevant ethical principles. According to an international assessment of the ethical dimensions of climate change, “various ethical systems converge in the conclusion that atmospheric levels of GHGs should be stabilized at the lowest possible levels above existing atmospheric GHG concentrations.” ROCK ETHICS INSTITUTE, PENN STATE UNIVERSITY, WHITE PAPER ON THE ETHICAL DIMENSIONS OF CLIMATE CHANGE 18 (2006). As already noted, lower stabilization levels require substantial early action.

¹⁰⁰ The term is referred to three times in the convention. *Id.* preamble (par. 6); art. 3.1; art. 4.1. *See also* U.N. Conference on Environment and Development, Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/5/Rev.1, principle 7, 31 I.L.M. 874 (1992) (“States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit to sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.”).

¹⁰¹ Reinstein, *supra* note __, at 20.

¹⁰² Framework Convention, *supra* note __, art. 3.1.

¹⁰³ *Id.* art. 4.2.

developing country economies, particularly China and India, have exposed the limits of an approach that is limited to developed countries. Still, if developed countries don't make substantial early reductions in their emissions, it is difficult to see how or why developing countries would. Early reductions would enable developed countries to make substantial long-term reductions, in part because they would put developed countries on a trajectory for long-term reductions and in part because they would reduce or avoid the problem of carbon-intensive lock-in for technology and infrastructure that is employed in the near term. Early reductions by developed countries also give credibility to the long-term commitments that developed countries state, and make it more likely that developed countries will follow through on these long-term commitments. Developed country leadership could also mean providing technical, financial, and other capacity-building assistance to developing countries, enabling those countries to also make early and substantial reductions.

Equity for developing and vulnerable countries is based on the reality that these countries have done the least to contribute to historic and current greenhouse gas emissions and tend to have the fewest financial and technological resources. They are also most vulnerable to the adverse effects of climate change because they have least financial and technological ability to successfully adapt. While they thus have the least responsibility for the problem and the least ability to reduce their own emissions, they are also the countries that have been the most adversely affected.¹⁰⁴ The Convention thus

¹⁰⁴ UNITED NATIONS DEVELOPMENT PROGRAM, HUMAN DEVELOPMENT REPORT 2007/2008 vii (2007), available at http://hdr.undp.org/en/media/hdr_20072008_en_complete.pdf (“The distributional challenge is made particularly difficult because those who have largely caused the problem—the rich countries—are not going to be those who suffer the most in the short term. It is the poorest who did not and still are not contributing significantly to green house gas emissions that are the most vulnerable.”). See also U. Thara Srinivasan, *The Debt of Nations and the Distribution of Ecological Impacts from Human Activities*, PROC.

states, as another decision-making principle, that the “specific needs and special circumstances” of developing countries, especially those most vulnerable to the adverse effects of climate change, “should be given full consideration.”¹⁰⁵ In this regard, the Convention is supported by a growing body of scholarly work and citizen action on human rights under other treaties.¹⁰⁶

Early reductions would also be more protective of developing and vulnerable countries. Early reductions would enable stabilization at a lower level, which in turn would reduce adverse climate change effects on those countries. Because developing countries lack the resources needed to adapt to climate change, they are likely to be more adversely affected by climate change than developed countries.

The Convention also recognizes a right by all countries to promote sustainable development. Sustainable development is a framework for fostering and improving human quality of life and well being by integrating economic development, human rights, peace and security, and environmental protection. It applies not only to the current generation; it applies as well to future generations as well. Sustainable development is the officially recognized international approach for maintaining and improving the human condition.¹⁰⁷ The Convention states: “The Parties have a right to, and should, promote sustainable development.”¹⁰⁸

NAT’L ACAD. SCI. (forthcoming 2008) (explaining that climate change impacts for low-income countries between 1961 and 2000 “have been overwhelmingly driven by emissions” from rich and middle-income countries).

¹⁰⁵ Framework Convention, *supra* note 1, art. 3.2.

¹⁰⁶ See, e.g., Sara C. Aminzadeh, *Note: A Moral Imperative: The Human Rights Implications of Climate Change*, 30 HASTINGS INT’L & COMP. L. REV. 231 (2007); Timo Koivurova, *International Legal Avenues to Address the Plight of Victims of Climate Change: Problems and Prospects*, 22 J. ENVTL. L. & LITIG. 267 (2007).

¹⁰⁷ John C. Dernbach, *Sustainable Development as a Framework for National Governance*, 49 CASE WESTERN L. REV. 1, 17-32 (1998).

¹⁰⁸ Framework Convention, *supra* note 1, art. 3.4.

Early reductions would also further sustainable development in both developed and developing countries, in part because they would enable achievement of lower greenhouse gas concentrations and thus reduce adverse developmental effects of climate change. Lower concentrations also reduce the risk of catastrophic climate changes. In addition, early reductions would take advantage of co-benefits of mitigation measures, leading to social, economic, and environmental improvements at the same time. Thus, developed country leadership, equity for developing and vulnerable countries, and the national right to promote sustainable development all point to the importance of substantial early reductions.

8. Confidence Building that Mitigation is Possible

Finally, substantial early reductions are needed to build international confidence that climate change mitigation can actually be accomplished. A major challenge in addressing climate change, and perhaps the most important challenge, is the relatively low level of confidence that appears to exist concerning the ability of both developed and developing countries to address this issue without compromising human well-being.¹⁰⁹ Early and substantial reductions that are cost effective, foster sustainable development, target greenhouse gas emission sources that would not likely be otherwise addressed, and avoid technological lock-in—or even some of these objectives—would create a track record of achievement would build confidence in our ability to successfully address this issue—and make it easier to achieve the further reductions that are required over the longer term.

¹⁰⁹ This is different from the confidence building and trust among negotiators that is needed to reach and implement an agreement. See Kati Kulovesi et al., *UN 2006 Climate Change Conference: A Confidence-Building Step?*, 7 CLIMATE POL'Y 255 (2007).

B. Objections to Achieving Early and Substantial Results

Some analysts appear to oppose short-term reductions.¹¹⁰ There is a widely held view that the temporal distribution of greenhouse gas reductions should be guided by cost-benefit analysis.¹¹¹ Such analyses tend to indicate that the great bulk of the necessary emissions reductions are most appropriately achieved after 2030.¹¹² A great many factors counsel for this result--the high costs of greenhouse gas mitigation, the fact that future costs are subject to a discount rate, the fact that needed technologies will take time to develop, and the long-term nature of this problem. The economic argument has added force when we consider that countries will decide whether to participate in a post-Kyoto agreement based on their understanding of the costs they will bear as a result. Finally, the specific Kyoto targets have been criticized as unrealistic, especially for the United States, which experienced both a 37% growth in GDP during the 1990s. The Kyoto Protocol, which would have had the U.S. reduce its greenhouse gas emissions by 5% from 1990 levels by 2008-2012, would have forced the U.S. to reduce its greenhouse gas emissions by 25-30% from business-as-usual levels. "Thus, the Kyoto Protocol's targets are too little, too fast."¹¹³

To a significant degree, this line of analysis has merit. Some reductions are appear to be possible only in the long run, and the high costs of mitigating some sources of greenhouse gases will be reduced only through the development and deployment of

¹¹⁰ Sheila M. Olmstead & Robert M. Stavins, *An International Policy Architecture for the Post-Kyoto Era*, 96 AM. ECON. REV. PAPERS & PROC. 35 (2006).

¹¹¹ See, e.g., Weiner, *supra* note __, at 72.

¹¹² Brian Fisher et al., *Issues Related to Mitigation in the Long-Term Context*, in CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE, *supra* note __, at 169, 235-37.

¹¹³ Olmstead & Stavins, *supra* note __, at 36.

technologies that do not now exist. But this is not true of all mitigation options, particularly those that are now available and cost-effective, as well as those that provide significant co-benefits and reduce the potential impacts of climate change. Developed countries have an ethical and even legal duty under the Framework Convention to implement such policies and measures. Significantly, these issues—cobenefits, benefits from reducing climate change impacts, and ethical responsibilities—are not addressed in macro-economic analyses that tend to indicate a preference for an approach that relies almost entirely on long-term action.¹¹⁴

The argument for primarily long-term reductions also appears to rest on a more benevolent understanding of the potential effect of climate change than is warranted by the evidence. It is not prudent to postpone implementation of these options in the face of mounting scientific information about the impact of climate change, the desirability of the lowest possible stabilization level, and the sensitivity of the climate to human greenhouse gas emissions. This is particularly true when the implementation and achievement of long-term reductions will depend on actions taken in the immediate future. Nor does postponing short-term measures create the kind of political momentum and confidence building in the mitigation effort that is needed to provide a sound foundation for future actions. *Some* significant fraction of the world's greenhouse gas emissions can be reduced now or in the near future, and ample reasons exist to accomplish those reductions in a post-Kyoto agreement.

¹¹⁴ Terry Barker et al., *Summary for Policymakers*, in MITIGATION OF CLIMATE CHANGE, *supra* note --, at 1, 8.

III. A STRUCTURE FOR EARLY AND SUBSTANTIAL RESULTS

A post-Kyoto agreement should include a short-term goal for stabilizing global greenhouse gas emissions, and should engage both developed and developing countries in achieving that goal. While a cap-and-trade program should be a major part of that agreement, it should not be the only part. Instead, there should be additional tracks or agreements for internationally agreed policies and measures. These additional agreements would increase the likelihood of substantial short term emission reductions, or the size of these reductions, regardless of how the cap-and-trade part of the agreement is structured. The parties should identify policies and measures that will maximize the benefits resulting from short-term action, and incorporate these policies and measures into a post-Kyoto agreement.

A. Short-term Emissions Stabilization Goal

The parties should consider a goal for stabilizing global greenhouse gas emissions by no later than 2020. This goal would be in addition to the long-term stabilization goal to be considered under the Bali Action Plan, as well as any intermediate or medium-term goals that might be established. Goals serve to clarify goals and provide coherent organizing principles for a variety of tasks. They are also essential in motivating action by a variety of actors.¹¹⁵ If the Parties are to identify substantial and short-term reductions as a goal, then they should say so as clearly as possible.

This goal would be consistent with scientific evidence indicating that early action is needed, that lower stabilization levels involve lower costs and risks than higher

¹¹⁵ John C. Dernbach, *Targets, Timetables and Effective Implementing Mechanisms: Necessary Building Blocks for Sustainable Development*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 79 (2003).

stabilization levels, and with the other justifications for substantial early reductions described in Part II. This goal would also be consistent with the warning of scientist James Hansen, who said in 2006 “that we have at most ten years—not ten years to decide upon action, but ten years to alter fundamentally the trajectory of global greenhouse emissions.”¹¹⁶ If true, we would need to have done that by 2016, which is at the end of the earliest five-year commitment period after Kyoto (2013-2017). A short term goal consistent with this view would be stabilization of world greenhouse gas emissions by 2015; greenhouse gas emissions would stop growing annually as they have for a long time. That would not stabilize the growth in world greenhouse gas *concentrations*, because emissions generally exceed the environment’s ability to absorb them. Still, it would represent a significant break in the trajectory of greenhouse gas emissions.

B. Developed and Developing Countries

A post-Kyoto agreement is more likely to achieve early and substantial reductions if it requires reductions by both developed and developing countries. Broadening participation to include developing countries is, of course, an important goal for any post-Kyoto agreement; otherwise the United States is not likely to ratify it.¹¹⁷ But participation by developing countries also enhances the likelihood of early and substantial results. To begin with, developing countries account for a significant and growing share of overall greenhouse gas emissions. At least two-thirds of the projected global increase in carbon dioxide emissions between now and 2030 will be from

¹¹⁶ Jim Hansen, *The Threat to the Planet*, N.Y. REV. OF BOOKS, July 13, 2006, <http://www.nybooks.com/articles/19131>.

¹¹⁷ Quite plainly, the fall 2008 presidential election will have an effect on this issue. In addition, some observers believe ratification is more likely if the United States has already adopted comprehensive climate change legislation, or is about to do so.

developing countries.¹¹⁸ China's emissions, in fact, are growing more than have previously been projected; the size of the projected increase by 2010 is several times larger than the reductions sought in the Kyoto Protocol,¹¹⁹

Another reason to engage developing countries is to ensure that developed countries fully account for their greenhouse gas impact. There is evidence, for example, that global carbon dioxide emissions from European Union consumption are 12% higher than European Union production. This results from the fact that Europe imports more energy-intensive and pollution-intensive than the products that it exports.¹²⁰

Finally, engaging developing countries to implement policies and measures that save energy, produce other benefits, and reduce the impacts of climate change would further development—sustainable development—and alleviate poverty in those countries. Such early actions, in other words, have economic, social, environmental, and security benefits that exceed their mitigating effect on climate change.¹²¹ Indeed, focusing early action on such measures could help overcome the perception existing throughout the developing world that “environmental controls are a luxury.”¹²²

It is, of course, possible to limit the focus of early and substantial reductions on developed countries. But those reductions could be more than offset by increases in developing countries, some caused by production of goods in developing countries for consumption in developed countries. Early and substantial reductions are more likely to occur if they come from both developed and developing countries.

¹¹⁸ *Introduction, supra* note 8, at 111.

¹¹⁹ Maximilian Auffhammer & Richard T. Carson, *Forecasting the Path of China's CO2 Emissions Using Province Level Information* (2007).

¹²⁰ JOHN KORNERUP BANG ET AL., WORLD WILDLIFE FUND, EU CONSUMPTION, GLOBAL POLLUTION 2 (2008), available at http://assets.panda.org/downloads/eu_consumption_global_pollution.pdf.

¹²¹ *Technical Summary, supra* note __, at 31.

¹²² Ruth Greenspan Bell, *What to do About Climate Change*, FOREIGN AFFAIRS, May/June 2006.

C. Role of Cap-and-Trade

While a cap-and-trade program is likely to be at the center of any post-Kyoto agreement, it should not be the only part of that agreement. A simple extension of the Kyoto Protocol's cap-and-trade approach is not likely to succeed in broadening developing country participation. In consequence, it reduces the likelihood of accomplishing early and substantial emission reductions, along with the attendant benefits of those reductions.

The parties could structure a cap-and-trade program to achieve substantial and short-term emissions reductions. Such an agreement would build on the quantitative emissions reductions sought in the Kyoto Protocol. That is, the agreement would contain not only a long-term goal but also at least one short-term emissions reduction goal that is translated into specific economy-wide commitments for developed countries. The date and required reduction contained in the agreement could be structured to achieve a substantial and short-term reduction. Emissions trading, joint implementation, and the Clean Development Mechanism—all elements of the Kyoto Protocol that are intended to reduce costs—could be continued in more or less their present form.

Such an agreement would come with built-in limitations. First, under the Bali Action Plan, such an agreement would likely be limited to developed countries; these are the only countries that agreed to even consider “quantified emission limitation and reduction objectives” in a post-Kyoto agreement. While the agreement might achieve significant short-term reductions in developed countries, its effect on emissions in developing countries would be limited unless at least some developing countries changed

their position.¹²³ Second, the agreement would have to be capable of being ratified by developed countries, particularly the United States, which again is not likely to ratify an agreement that does not involve developing countries. Third, a cap-and-trade program is not likely to work effectively in developing countries where the elements necessary for the effectiveness of that program—including strict monitoring, adherence to the rule of law, and citizen participation—are often lacking.¹²⁴

Fourth, even in developed countries, market imperfections mean that a cap-and-trade program by itself is unlikely to effectively reach certain major sources of greenhouse gas emissions or achieve all potential benefits. A cap-and-trade system such as that employed in the Kyoto Protocol should lead to a price on carbon that would have ripple effects throughout an economy.¹²⁵ According to conventional economic wisdom, the economic pressure created by either program would lead to less use of fossil fuels, greater use of less-carbon intensive fuels, and other changes that would result in lower greenhouse gas emissions.

Because of market imperfections, though, this pressure will not always have the desired result. Consumers often do not purchase more energy efficient products because they undervalue the economic savings of those products.¹²⁶ In addition, the person with the ability to achieve greater energy efficiency (e.g., landlord) is frequently not the person who pays the energy bills (e.g., tenant). The incentive, in other words, is not directed at the person with the ability to make decisions that will reduce greenhouse gas

¹²³ Some emissions reductions would be achieved in developing countries through the Clean Development Mechanism, for example.

¹²⁴ Bell, *supra* note __, at __.

¹²⁵ Robert N. Stavins, Proposal for a U.S. Cap-and-Trade System to Address Global Climate Change: A Sensible and Practical Approach to Reduce Greenhouse Gas Emissions (2007), *available at* http://ksghome.harvard.edu/~rstavins/Papers/Stavins_Hamilton_Working_Paper_on_Cap-and-Trade.pdf. Though less politically likely, a carbon tax would have the same effect.

¹²⁶ *Id.* at 30.

emissions.¹²⁷ Beyond that, the price signal provided by a cap-and-trade or tax program is not likely to lead to sufficient investment in the variety of different research and development activities needed to mitigate climate change.¹²⁸ Finally, while a cap-and-trade program can surely reduce the costs of emissions control, it is less likely to lead to more immediate environmental, social, and economic co-benefits than a performance standard of equivalent stringency. As experience under the Kyoto Protocol shows, buyers of emissions allowances are primarily interested in reducing their costs, not in fostering or capturing the other benefits that may come from a use of a particular policy or measure.¹²⁹ These limitations in a stand-alone cap-and-trade program strengthen the case for energy efficiency policies and measures, for policies and measures that would drive greater levels of private investment, and for policies and measures that would generate substantial co-benefits.

D. A Multi-Track Framework

The Kyoto Protocol provides for only one type of commitment—absolute nationwide emission reduction targets. A multi-track framework—a framework that provides for several different types of commitments or agreements—would provide a legal structure more capable of delivering substantial early emission reductions than a one-track framework. One of these tracks, of course, would provide a legal structure for deepening the Kyoto Protocol emission cuts and strengthening its cap-and-trade program.

¹²⁷ *Id.*

¹²⁸ *Id.*. David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading Under the Kyoto Protocol* 40-48 (2007), INDIANA L. J. (forthcoming).

¹²⁹ *Id.* .

1. Components of a Multi-Track Framework

A multi-track framework would allow countries to take on different commitments, including not only quantifiable emissions reduction targets, but also specific national policy commitments and international sectoral agreements on matters such as fuel economy for motor vehicles. Such a framework could also have tracks for research and development on science and technology, technology sharing, adaptation, and finance.¹³⁰ A post-Kyoto agreement whose objectives included significant short-term emissions reductions would need to be based on a multi-track framework. To explain that, it is first necessary to briefly explain such framework agreements as well as several types of tracks for carrying them out.

The number and type of tracks in any type of multi-track framework would depend on the agreement itself. A multi-track framework could allow countries to make a commitment on emissions reduction as well as, for example, a commitment concerning the implementation of a particular national policy and a commitment on technology sharing. A country might decide that it preferred a particular mix of commitments because of its own national circumstances, costs, or even its sensitivity about entering international agreements.¹³¹ Such an agreement allows countries to move ahead within an international framework on some issues even if, for whatever reason, it is unable or unwilling to move ahead on others. Because of the variety of climate change issues that need to be addressed, and the varying interests and perspectives of the world's nations,

¹³⁰ DANIEL BODANSKY & ELLIOT DIRINGER, TOWARDS AN INTEGRATED MULTI-TRACK CLIMATE FRAMEWORK 3 (2007). On technology agreements, see also Stefan Baker, Energy Research Centre of the Netherlands, Technology-Oriented Agreements: Five Examples (2007), *available at* http://regserver.unfccc.int/seors/file_storage/9jsbdal400psytm.ppt#256,1, Technology Oriented Agreements: five examples.

¹³¹ *Id.* at 4-5.

multiple commitment paths or tracks would enable progress on more issues than the Kyoto approach. In fact, a single type of commitment may actually impede progress in reducing greenhouse gas emissions by precluding other types of international agreements on climate change.¹³²

An *integrated* multi-track agreement would mean that the different commitment tracks are structured coherently in a common framework. At a minimum, parties to an integrated agreement would agree up front to the rules or “terms of engagement” for different types of commitments and the countries to which these commitment types would apply. In addition, the different tracks would be part of a single package.¹³³ Done properly, an integrated agreement is likely to be more economically efficient, allow greater coordination, and more likely to encourage states to take actions in one area that encourage reciprocal behavior by other states in another area, than an agreement that is not integrated.¹³⁴

Two types of tracks are particularly significant--policy-based commitments, international sectoral agreements. A policy-based commitment is a national commitment to implement a particular policy that will have the effect of reducing greenhouse gas emissions; implementation of this policy is not linked to a quantitative limit on greenhouse gas emissions.¹³⁵ Policy-based commitments are rooted in the Framework Convention’s requirement that all parties implement national programs and measures to mitigate climate change and report to the Conference of the Parties on their progress in

¹³² Daniel Bodansky, *Targets and Timetables: Good Policy but Bad Politics?*, in ARCHITECTURES FOR AGREEMENT, *supra* note __, at 57, 65; PEW CENTER ON GLOBAL CLIMATE CHANGE, INTERNATIONAL CLIMATE EFFORTS BEYOND 2012: REPORT OF THE CLIMATE DIALOGUE AT POCANTICO 18 (2005).

¹³³ BODANSKY & DIRINGER, *supra* note __, at 3, 23.

¹³⁴ *Id.* at 3 & 5.

¹³⁵ DANIEL BODANSKY, INTERNATIONAL SECTORAL AGREEMENTS IN A POST-2012 CLIMATE FRAMEWORK 3 n.8 (2007). *See also* Pizer, *supra* note __, at 307-09 (describing a somewhat similar process of “bottom up” commitments).

carrying out these measures.¹³⁶ The implementation of policies and measures was considered a serious option under the Convention until parties began to prefer targets and timetables of the kind included in the Kyoto Protocol.¹³⁷ Indeed, in 1995, the parties developed a list of several hundred policies and measures that could be used to implement the Convention.¹³⁸ Among other things, policy-based commitments allow countries to tailor commitments to their own situations, promote synergies between climate change mitigation and other national goals, and, by recognizing specific national actions, encourage countries to take further actions.¹³⁹

International sectoral agreements, in partial contrast, are international or intergovernmental agreements that concern a particular economic sector.¹⁴⁰ They contrast with the Kyoto Protocol, which contains economy-wide emission reduction commitments for developed countries. Thus, international sectoral agreements could focus on a particular economic sector (transportation, industry, residential, or commercial), a particular type of energy production (e.g., electricity), or some component of a sector or form of energy production (e.g., biofuels for transportation). They may or may not be linked to quantifiable emission reduction goals, depending on how they are written. A post-Kyoto agreement could consist entirely of international sectoral agreements, or it could include a mix of economy-wide emission limitations, policy-

¹³⁶ Framework Convention, *supra* note __, arts. 4.1(b) & (j). *See also* art. 4.2(a) (commitment by developed countries to “adopt national policies” to mitigate climate change).

¹³⁷ LEWIS & DIRINGER, *supra* note __, at 3; OBERTHUR & OTT, *supra* note __, at 1103-08 (describing negotiating process that led to omission of harmonized or binding policies and measures in Kyoto Protocol).

¹³⁸ Ad Hoc Group on the Berlin Mandate, Synthesized List of Policies and Measures Identified by the Annex I Parties in their National Communications, FCCC/AGBM/1995/6 (Oct. 23, 1995), *available at* <http://unfccc.int/cop5/resource/docs/1995/agbm/06.htm>.

¹³⁹ LEWIS & DIRINGER, *supra* note __, at 6.

¹⁴⁰ INTERNATIONAL SECTORAL AGREEMENTS, *supra* note __, at 3.

based commitments, and international sectoral agreements.¹⁴¹ International sectoral agreements could broaden participation in a post-Kyoto agreement, simplify negotiations, allow countries to focus on priority issues, and reduce international competitiveness issues by bringing all competitors into the same agreement.¹⁴²

Unilateral commitments could be used to allow different countries to make different commitments under an international sectoral agreement or policy-based agreement. Unilateral commitments occur when a country determines its own level of commitment.¹⁴³ This commitment would then be folded into the appropriate track for a post-Kyoto agreement, where it would be legally binding and subject to other requirements of the agreement.¹⁴⁴ Interestingly, the Kyoto Protocol contains elements of this approach. The emissions targets for developed countries range from an eight percent reduction from 1990 levels (e.g., European Union) to a ten percent increase above 1990 levels (Iceland).¹⁴⁵ While some developed countries undertook their commitments on a more-or-less principled basis, the targets of other countries reflected their political concerns and circumstances.¹⁴⁶ Somewhat similarly, the level of commitment contained

¹⁴¹ *Id.* at 3.

¹⁴² *Id.* at 6.

¹⁴³ BODANSKY & DIRINGER, *supra* note __, at 12.

¹⁴⁴ *Id.*

¹⁴⁵ Kyoto Protocol, *supra* note __, Annex A.

¹⁴⁶ OBERTHUR & OTT, *supra* note __, at 128 (observing that the commitments of these other developed countries “reflect more their domestic interests, intransigence, and *chutzpah* than any sense of compromise in the international process.”). Nonbinding versions of unilateral commitments also exist. As part of the Washington International Renewable Energy Conference in March 2008, forty commitments made more than 100 individual commitments to increase their use of renewable energy. Lynn Garner, Countries Pledge to Boost Percentages Of Renewable Energy at International Summit, Daily Environment Report, March 7, 2008, at A-8.

Unilateral pledges can also be used as part of the negotiating process. The European Union pledged in 2007 that it would reduce its own greenhouse gas emissions by at least 20 percent from 1990 levels by 2020. But Europe also offered to cut up to 30 percent of its emissions if other industrialized countries committed to comparable efforts under the post-2012 global climate agreement. Jeff Mason, EU Backs Bold Climate Change Goals, Reuters, Feb. 20, 2007, <http://www.reuters.com/article/gc06/idUSL2052017020070220>.

in policy-based commitments and international sectoral agreements could vary from country to country, depending on the way the agreement is drafted.

The Oslo Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution illustrates how these additional commitments might work. This protocol, which was signed in 1994, was the second protocol adopted under the Convention to reduce sulfur dioxide emissions. The first protocol, which was adopted in 1985, reduced sulfur dioxide emissions by at least 30%. The 1994 Oslo Protocol established separate overall sulfur dioxide emission ceilings and compliance dates for each party.¹⁴⁷ These limits are akin to the overall quantitative limits contained in the Kyoto Protocol, and that are likely in any successor to the Kyoto Protocol. The Oslo Protocol also requires parties to meet specific limits for sulfur dioxide emissions for new large stationary combustion sources as well as sulfur limits in petroleum fuels.¹⁴⁸ These limits, which could be understood as either international sectoral agreements or harmonized policy-based commitments, are independent of, and supplemental to, the overall emissions required by the Protocol.

The Bali Plan of Action can be reasonably understood as creating a process that will lead to an integrated multi-track post-Kyoto agreement. It calls for enhanced action on mitigation, which can readily be understood as including another round of emissions reductions—steeper cuts achieved sometime after 2008-2012—and following the approach taken in the Kyoto Protocol. By the terms of the Action Plan, though, enhanced developed country action also includes other “[m]easurable, reportable, and verifiable” mitigation actions that may be nationally appropriate—which could result in mitigation agreements that go beyond the quantified economy-wide emission reductions required

¹⁴⁷ Oslo Protocol, art. 2.2 & Annex II.

¹⁴⁸ *Id.* arts. 2.5(a) & 2.5(c).

by Kyoto. These could include international sectoral agreements as well as policy-based commitments. Similarly, the commitment by developing countries to consider mitigation measures that are “supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner,” also appears to include international sectoral agreements and policy-based commitments. For developing countries, of course, these agreements and commitments would need to be supported by appropriate resources.

The Action Plan would also have the parties address adaptation, technology transfer and development, and provision of financial resources and investment, in much greater detail and specificity than the Kyoto Protocol. There could conceivably be separate agreements on each of these issues, or at least separate negotiations that are incorporated into a single agreement. In either case, the creation of what appears to be specific negotiating tracks for each of these issues indicates a broader and more robust approach than that contained in the Kyoto Protocol.¹⁴⁹

2. How a Multi-Track Framework Could Facilitate Early and Substantial Emission Reductions

An integrated multi-track framework could lead to early and substantial reductions because certain tracks could operate on a faster timetable than a trading program, because these tracks would include developing countries, and because the

¹⁴⁹ To be sure, parties to the Bali Action Plan kept their options open, agreeing only to address or consider this broad range of issues. The point is not that the plan requires the parties to reach agreement on a multi-track framework. Rather, the plan allows the parties to agree on a multi-track framework. Moreover, the several different issues that are described in detail in the plan—including mitigation, adaptation, finance, and technology transfer—mean that a multi-track post-Kyoto agreement addressing these issues would be considered a natural and logical result of the plan.

opportunity to take advantage of co-benefits will encourage countries to implement specified policies and measures as rapidly as they can. Yet the Bali Action Plan's language concerning the urgency of the situation suggests the appropriateness of a post-Kyoto agreement that contains tracks for early and substantial reductions.

As a starting point, it is worth recognizing that the earliest possible commitment period for an enhancement of the quantifiable emission reductions required by the Kyoto Protocol is 2013-2017, the five-year period immediately following the Kyoto Protocol's commitment period. The European Union's 2007 proposal for an emissions reduction of 20 percent from 1990 levels by 2020¹⁵⁰ suggests a later commitment period. The Bali Plan of Action contains no specific agreement on this issue. If the parties agree to stabilize greenhouse gas emissions by 2020, though, reductions will need to occur very soon.

We can assume that a post-Kyoto agreement will contain a further required reduction of greenhouse gas emissions under a trading regime that is similar to that of Kyoto. Regardless of when those reductions are required, and whether they apply to developed or developing countries, a multi-track framework is more likely to achieve early and substantial reductions, and is likely to achieve greater reductions, than a trading regime alone. Three different scenarios guide this analysis.

One scenario is that the post—Kyoto quantifiable emission reduction commitment period for developed countries is 2018-2022, but that the size of the required reduction is such that emissions reductions do not need to begin right away. Under an integrated multi-track agreement, the parties could also negotiate one or more international sectoral

¹⁵⁰ See *supra* note 173.

or policy-based agreements that have earlier implementation dates.¹⁵¹ Perhaps there is an international sectoral agreement on energy efficiency in buildings that would be implemented beginning in 2010 or 2012. Adoption of necessary laws and administrative mechanisms would need to begin right away, and reductions under such an agreement begin shortly thereafter. It even seems possible to have the national laws authorizing such early action take effect as early as the end of 2009, after the Copenhagen meeting. In that respect, tracks on a faster timetable would be similar to the deforestation agreement that was reached separately in Bali. These early actions would be designed to complement and enhance the overall emissions reduction goals that are established.

Another scenario is based on the same facts as above, but with one change: The post—Kyoto agreement requires significant emissions reductions by developed countries under a cap-and-trade program to begin right away. Because the trading program is limited to developed countries, but the policy-based and international sectoral agreements apply to both developed and developing countries, the applicability of these agreements to developing countries would increase the magnitude of the early reductions.¹⁵² As already noted, developing countries are projected to be emitting the great majority of the increased carbon dioxide emissions in the next several decades.

A third scenario is that a post-Kyoto agreement contains a cap-and-trade program involving key developing countries as well as developed countries, and that the agreement requires substantial early reductions. Even in this case, a multi-track

¹⁵¹ Other tracks for achieving early action are also available. These include science and technology cooperation, agreements to facilitate access to technology, and financial mechanisms. BODANSKY & DIRINGER, *supra* note __, at 3. There could also be tracks authorizing or encouraging unilateral industry initiatives. INTERNATIONAL SECTORAL AGREEMENTS, *supra* note __, at 4.

¹⁵² Under the Bali Action Plan, developing countries are more likely to agree to implement particular policies or take action in specific sectors if they can rely on appropriate developed country assistance.

framework would facilitate greater reductions to the extent it included agreements on energy efficiency and other problems that a cap-and-trade program is not likely to reach. In addition, a multi-track framework could achieve more substantial early reductions to the extent it included policies and measures that produce significant non-climate co-benefits.

More generally, international sectoral and policy-based commitments in a multi-track agreement are also likely to create significant energy and cost savings, reductions in other pollutants, job creation, technological development, and other co-benefits. The identification of these legal and policy tools, as well as their international endorsement in a post-Kyoto agreement, would likely ensure their relatively rapid implementation. In fact, the choice of attractive low-hanging fruit in a multi-track post-Kyoto agreement would make clear that some significant share of the mitigation activities are beneficial for reasons that are not limited to, and may even exceed, their climate change mitigation benefits.¹⁵³

E. Selecting Policies and Economic Sectors for Early Results

How should the parties prioritize policy-based agreements and international sectoral commitments for early action? This is no small task, as suggested above, because hundreds of such policies were identified more than a decade ago. In addition, policy commitments and international sectoral agreements can be formulated in a great many ways--greater or lesser stringency, more or less ambitious timetables, and broader or narrower scope. Still, the justifications for early and substantial emissions reductions

¹⁵³ This is, in fact, very much like the way U.S. states began addressing climate change. *Moving the Climate Debate from Models to Proposed Legislation*, supra note ____.

in Part II suggest many of the factors that should be considered in deciding which policies or economic sectors, or both, should be considered for such agreements.¹⁵⁴ The parties should apply these factors in a systematic matter to identify appropriate policy-based measures and international sectoral commitments, but should do so in time to have them included in a December 2009 post-Kyoto agreement.

1. Factors

The following factors (which tend to overlap to some degree and are often mutually reinforcing) should guide the priority-setting process. These are: greatest opportunities for early reductions, cost effectiveness, greatest opportunities to foster sustainable development, energy efficiency and conservation, measures that already being implemented in some places, avoidance of technological lock-in, and sources of greenhouse gas emissions that are unlikely to be affected by a cap-and-trade program.

Opportunity for early reductions that are substantial and quantifiable. An obvious first factor is policies and economic sectors where the greatest early reductions can be achieved. The potential for early reductions depends, in turn, on the ready availability of technology and know-how to accomplish these reductions at an early date. But these policies and measures should not be limited to those dependent on technological change; a variety of other policies and measures are now available that depend on changes in human behavior. To be credible, these reductions would also need to be quantifiable; otherwise there is no way of knowing whether they have contributed to

¹⁵⁴ Illustrative policies and measures will be identified for many of these factors, but this Article does not attempt any systematic analysis or ranking of available policies and measures according to these factors.

the international effort.¹⁵⁵ Another consideration is the time required for implementation, as well as financial and logistical challenges; some policies can be put in place and carried out much more rapidly than others.

Cost-effectiveness. Cost-effective or “no regrets” policies and measures are more likely to achieve immediate public and governmental support. The precautionary approach described in the Framework Convention expressly states that cost-effective policies should not be postponed because of scientific uncertainty.¹⁵⁶ The largest opportunity for cost-effective emissions reductions is probably in buildings, which are responsible for more than a third of the world’s energy-related carbon dioxide emission reductions.¹⁵⁷ According to a recent analysis of more than 80 studies around the world, carbon dioxide emissions from buildings could be cost-effectively reduced by 29% by 2020.¹⁵⁸ Significantly, the greatest opportunities for emissions reductions exist in developing countries (52% of building-related emissions), followed by economies in transition (37%) and developed countries (25%). Energy-efficient lighting was identified as the single most cost effective measure and the measure most capable of reducing emissions.¹⁵⁹

Opportunity to foster sustainable development. Policies and measures that foster development, especially sustainable development, will be attractive to both developed

¹⁵⁵ JOANNA LEWIS & ELLIOT DIRINGER, POLICY-BASED COMMITMENTS IN A POST-2012 CLIMATE FRAMEWORK: A WORKING PAPER 7 (2007). For an overview of how emissions reductions from various types of policy commitments could be quantified, *see id.* at 19-22.

¹⁵⁶ Framework Convention, *supra* note __, art. 3.3.

¹⁵⁷ Diana Urge-Vorsatz & Aleksandra Novikova, *Potentials and Costs of Carbon Dioxide Mitigation in the World’s Buildings*, 36 ENERGY POL’Y 642 (2008). *See also* MARILYN BROWN ET AL., TOWARD A CLIMATE-FRIENDLY BUILT ENVIRONMENT (2005) (finding that more energy efficient building codes and other efficiency measures would allow the United States to stabilize energy consumption in the residential and commercial sectors by about 2015 and, by 2025, reduced emissions to approximately 2004 energy consumption levels).

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

and developing countries. These policies and measures, in other words, would further economic and social development on one hand and mitigate climate change on the other. “The most promising policy approaches,” the IPCC has concluded, “will be those that capitalize on natural synergies between climate protection and development priorities to advance both simultaneously.”¹⁶⁰ Policies and measures should be implemented immediately to the extent that they also reduce other air pollutants, create jobs, provide for the development of new businesses, and produce additional non-climate co-benefits, including investment in new technologies. By including non-climate co-benefits as well as the benefits of climate change mitigation in the economic equation, policy makers can increase the range of policies and measures beyond those that would pass a narrow cost-effectiveness test.¹⁶¹

Energy efficiency and energy conservation. Energy efficiency and conservation¹⁶² provide a set of options that can be implemented right away, provide substantial cost savings and other co-benefits, and offer the potential for significant reductions. By improving their energy efficiency at an annual rate of 2.5% per year between 2012 and 2030, the G8 countries (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States) could return energy consumption to 2004 levels by 2030, saving consumers money, creating jobs, and enhancing productivity.¹⁶³ Efficiency and conservation are also likely to be more cost-effective than

¹⁶⁰ *Mitigation from a Cross-Sectoral Perspective*, *supra* note __, at 669.

¹⁶¹ Sources on sustainable development policies and measures.

¹⁶² Energy efficiency involves doing the same amount of work, or producing the same amount of goods or services, with less energy. NAT'L ENERGY POL'Y DEVELOPMENT GROUP, NAT'L ENERGY POL'Y 1-3 (2001), *available at* <http://www.whitehouse.gov/energy/National-Energy-Policy.pdf>. Energy conservation involves using less energy regardless of the whether energy efficiency has changed. *Id.*

¹⁶³ INTERNATIONAL ENERGY AGENCY, REALIZING THE POTENTIAL OF ENERGY EFFICIENCY: TARGETS, POLICIES & MEASURES FOR G8 COUNTRIES 2-3 (2007), *available at* http://www.unfoundation.org/files/pdf/2007/Realizing_the_Potential_Energy_Efficiency_full.pdf.

the other basic mitigation options--direct control of greenhouse gas emissions, long-term storage of carbon, adaption to climate, and energy efficiency and conservation—because they offer the prospect of cost savings. The G8 countries agreed at their 2007 summit, for instance, that “[i]mproving energy efficiency worldwide is the fastest, the most sustainable and the cheapest way to reduce greenhouse gas emissions and enhance energy security.”¹⁶⁴ Substantial energy saving opportunities exist for buildings, transportation, electricity generation, and industry, the G8 said, describing commitments made to improve efficiency in each of these sectors.¹⁶⁵

Energy efficiency and conservation also address the largest and fastest growing source of greenhouse gas emissions—carbon dioxide.¹⁶⁶ Carbon dioxide from fossil fuel use represented 56.6% of anthropogenic greenhouse gas emissions in 2004. Carbon dioxide from fossil fuel is also the fastest growing source of greenhouse gas emissions, having grown by about 80% between 1970 and 2004.¹⁶⁷

Finally, efficiency and conservation provide the most immediate means for developed countries to reduce their per capita greenhouse gas emissions. Developed countries have much higher levels of per capita greenhouse emissions. Developed countries, with 20% of the world’s population, are responsible for 46% of the greenhouse gas emissions. Developing countries, which contain the other 80% of the world’s population, contribute 54% of the greenhouse gas emissions.¹⁶⁸ No one seriously argues that we can successfully address climate change by allowing all countries to emit

¹⁶⁴ G8 Summit, Growth and Responsibility in the World Economy: Summit Declaration (7 June 2007), para. 46, <http://www.state.gov/documents/organization/92264.pdf>.

¹⁶⁵ *Id.* paras. 67-74.

¹⁶⁶ REALIZING THE POTENTIAL OF ENERGY EFFICIENCY *Supra* note __, at 27 & 28. Carbon dioxide is one of six gases covered under the Kyoto Protocol. Kyoto Protocol, *supra* note __, Annex A.

¹⁶⁷ REALIZING THE POTENTIAL OF ENERGY EFFICIENCY, *supra* note 191, at 2-3.

¹⁶⁸ *Id.* at 30.

greenhouse gases at the same per capita level as developed countries. Thus, any serious effort to mitigate climate change will require developed countries to reduce their per-capita emissions. Energy efficiency and conservation provide the most straightforward way of achieving that result. By reducing their per-capita emissions as part of their early and substantial greenhouse gas reductions, developed countries could exercise meaningful leadership while they strengthen their economies and reduce energy costs.

Similarly, developing countries, with less energy-efficient economies, could benefit from energy efficiency and conservation because they would be spending less money on energy. As already noted, the economic benefits to developing countries of efficiency and conservation are likely to be considerable. Developed countries could also exercise leadership by providing developing countries with financial, technical, and other assistance to facilitate greater use of efficiency and conservation

Policies and measures that some (but not all) countries have begun to implement.

In a rough sense, this factor likely tracks the cost-effectiveness and sustainable development factors, based on the assumption that countries would not now be implementing those policies unless those policies passed some kind of benefit-cost test. It is also a rough-and-ready yardstick for what is now politically acceptable and feasible, at least in some countries. In the Energy Independence and Security Act of 2007,¹⁶⁹ for example, the United States Congress upgraded fuel efficiency standards for automobiles and required the phase-in of a new generation of much more energy efficient lighting. The use of international agreements around such policies and measures would allow countries that are already engaging in particular policies and measures to claim international leadership—provided, of course, that their particular policies and measures

¹⁶⁹ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (2007).

are among the most stringent standards that exist. The ability to make such claims might help attract them to participate in such agreements and might also encourage international competition to reduce greenhouse gas emissions. It is also possible that international action aimed at enhancing the number of countries adopting particular policies and measures will lead to a “tipping point” after which the particular action will have been more or less universally adopted.¹⁷⁰

Avoidance of technological lock-in. This objective, as indicated above, is most important for technologies that have long lifetimes because investments made now will have greenhouse gas emission effects that will last for decades. Between 2006 and 2030, for example, China and India alone are projected to invest more than \$3 trillion in their electricity sectors, where most energy is now supplied by coal.¹⁷¹ The objective of avoiding technological lock-in is also less likely to be consistent with many of the other factors on this list, because cost-effective alternatives many current technologies do not now exist. On the other hand, this objective has enormous potential to reduce greenhouse gas emissions because of the long lifetimes of alternative and low-carbon emitting technologies.

Sources of greenhouse gas emissions that are unlikely to be affected by economy-wide measures, such as cap-and-trade (or taxation), because of market imperfections. A major challenge for any supplemental measure is ensuring that it does not undermine the

¹⁷⁰ MALCOM GLADWELL, *THE TIPPING POINT: HOW LITTLE THINGS CAN MAKE A BIG DIFFERENCE* (2000); INTERNATIONAL SECTORAL AGREEMENTS, *supra* note ___, at 11.

¹⁷¹ INTERNATIONAL ENERGY AGENCY, *WORLD ENERGY OUTLOOK 2007—EXECUTIVE SUMMARY 7 & 8* (2007), available at <http://www.iea.org/Textbase/npsum/WEO2007SUM.pdf>. “The primary scarcity facing the planet is not of natural resources nor money, but time. Investment now being made in energy-supply infrastructure will lock in technology for decades, especially in power generation. The next ten years will be crucial, as the pace of expansion in energy-supply infrastructure is expected to be particularly rapid. China’s and India’s energy challenges are the world’s energy challenges, which call for collective responses.” *Id.* at 13.

cost-effectiveness of any trading or similar program that is contained in a post-Kyoto agreement. Because the literature indicates that a trading program is not likely to be as effective in achieving energy efficiency, fostering the development of new technologies, or fostering co-benefits, such policies and measures should be given particular attention.

2. Process

To achieve short-term reductions in a post-Kyoto agreement, candidate policies and sectors would need to be identified and screened against these factors (or factors like them) very quickly. Specific policy commitments and sectoral agreements meeting these factors could be identified by the parties themselves, by one or more groups of experts specifically constituted for the purpose, or both.¹⁷² However the screening function is accomplished, it would be helpful if a candidate list of national policy commitments, international sectoral agreements, and other policies were finalized by the Conference of the Parties at its meeting at the end of 2008. Ideally, the approved list would provide a basis for concluding negotiations on the exact content of each agreement. That list would telegraph to the world the high likelihood that such policies and measures would be part of a post-Kyoto agreement, and would encourage countries to begin implementing such measures immediately. It would also encourage developed countries to begin preparations for financial and technological assistance to developing countries to adopt and implement these new standards.

F. Structure of Policy-Based or International Sectoral Agreements

¹⁷² One source of expertise is Working Group III of the Intergovernmental Panel on Climate Change, which produced MITIGATION OF CLIMATE CHANGE, *supra* note ____.

For each policy and measure, the final agreement should describe the measure and explain how it will be implemented, describe the minimum level of required performance, and provide an easy means for countries to join the agreement. These agreements should support, and be supported by, long-term and economy-wide agreements. They should also be supported by appropriate financial incentives, including a modified Clean Development Mechanism, in large part to encourage developing country participation. They should also include provisions for increasing their stringency over time, and be supported by appropriate trade incentives and restrictions. The following is a basic sketch of the characteristics of these agreements.¹⁷³

An agreement concerning a particular sector or policy should identify the policies and measures that need to be put in place to be counted toward that agreement, should require that governmental policies and measures should have the force and effect of law, require an explanation of how it will be implemented, and specify qualitative and quantitative reporting requirements to the Conference of the Parties. As the Bali Action plan indicates, policies and measures implemented by developed countries to reduce greenhouse gas must be “real, measurable, and verifiable.”¹⁷⁴ The commitment of developing countries to consider mitigation measures that are “supported and enabled by

¹⁷³ Policy-based or international sectoral agreements to achieve early results are likely, for all practical purposes, to be permanent. As already explained, the apparent inability of cap-and-trade programs to capture all of the greenhouse gas emission reductions available from energy efficiency suggests the importance of permanent agreements addressing that issue. An international framework based on cap-and-trade, but supplemented with efficiency agreements, is similar to what is now being proposed in Congress, where the major bills would do more or less the same thing. Victor Byers Flatt, *The Legislative Temperature for Climate Change*, 102 Nw. U. L. REV. (forthcoming 2008).

¹⁷⁴ Bali Action Plan, *supra* note ___, para. 1(b)(i).

technology, financing and capacity-building, in a measurable, reportable and verifiable manner”¹⁷⁵ is consistent with this approach, so long as sufficient assistance is provided.

The agreement should also describe the minimum required level of performance for each policy and measure. This minimum level of performance might be a minimum standard for energy efficiency, or a specific limit on the rate of deforestation. This minimum level of performance should correspond to an available means of measuring and evaluating achievement.¹⁷⁶ This minimum standard should also be capable of being met within a fixed but relatively short period of time after 2009.

Countries should be allowed to join such an agreement by adopting appropriate laws and submitting an appropriate instrument of ratification or accession to the Framework Convention secretariat. A country’s ratification or accession to the agreement would be considered presumptively valid, subject to validation of the projected emissions reductions by an independent review body.¹⁷⁷ This kind of approach would facilitate rapid participation in the agreement. Problems with the validation process could be alleviated by prescribing in advance the exact criteria that a particular measure must meet and how performance is to be evaluated. That could be done in a

¹⁷⁵ *Id.* para. 1(b)(ii). This paragraph explicitly links developing country emission reduction commitments to new developed country commitments on capacity building in developing countries. Summary of the Thirteenth Conference of the Parties to the UN Framework Convention on Climate Change and Third Meeting of the Parties to the Kyoto Protocol, 3-15 December 2007, EARTH NEGOTIATIONS BULLETIN, Dec. 18, 2007, at 20, available at <http://www.iisd.ca/download/pdf/enb12354e.pdf>.

¹⁷⁶ LEWIS & DIRINGER, *supra* note __, at 12. At the Asia-Pacific Economic Cooperation summit in September 2007, the United States, Japan, China, Russia, Australia, Chile, and other Pacific nations agreed to an “aspirational goal of increasing forest cover in the region by at least 20 million hectares of all types of forests by 2020.” Asia-Pacific Economic Cooperation, Sydney APEC Leaders’ Declaration on Climate Change, Energy Security and Clean Development (2007), <http://www.state.gov/g/oes/rls/prsr/2007/92037.htm> (last visited January 27, 2008). If the latter goal was achieved, they said, an amount of carbon would be stored that is equal to about 11% of global emissions in 2004. *Id.*

¹⁷⁷ LEWIS & DIRINGER, *supra* note __, at 11.

Copenhagen agreement, or authorized to be done immediately afterwards by appropriate working groups.

These agreements should include provisions that not only encourage but positively attract developing country participation as quickly as possible.¹⁷⁸ The Clean Development Mechanism, one of the emissions trading mechanisms authorized by the Kyoto Protocol,¹⁷⁹ could be modified to enable developed countries to be eligible for certified emissions reductions not only for projects, as they are now, but also for the implementation by developing countries of policies and measures identified in the multi-track framework agreement. Thus, developed countries that provide technical and/or financial assistance toward developing countries to assist those countries to take early action would be eligible for certified emissions reductions under the Clean Development Mechanism. The Clean Development Mechanism now requires that projects be directed toward sustainable development, that they produce “[r]eal, measurable, and verifiable emissions reductions,” and that emission reductions from the project be in addition to those that would otherwise occur.¹⁸⁰ Those requirements could apply to policies and measures identified in the multi-track agreement.¹⁸¹ This approach would help carry out language in the Bali Action Plan calling for developing countries to consider “[n]ationally appropriate mitigation actions” that are “supported and enabled by

¹⁷⁸ *Id.* para. 1(b)(ii). This paragraph explicitly links developing country emission reduction commitments to new developed country commitments on capacity building in developing countries. Summary of the Thirteenth Conference of the Parties to the UN Framework Convention on Climate Change and Third Meeting of the Parties to the Kyoto Protocol, 3-15 December 2007, EARTH NEGOTIATIONS BULLETIN, Dec. 18, 2007, at 20, available at <http://www.iisd.ca/download/pdf/enb12354e.pdf>.

¹⁷⁹ Kyoto Protocol, *supra* note __, art. 12.

¹⁸⁰ Kyoto Protocol, *supra* note 2, arts. 12.2 & 12.5(b) & (c). Another requirement—voluntary participation by each involved party—would also be maintained. *Id.* art. 12.5(a).

¹⁸¹ LEWIS & DIRINGER, *supra* note __, at 13-15.

technology, financing and capacity-building,” and carried out in “a measurable, reportable and verifiable manner.”¹⁸²

Unhappily, there is evidence that the CDM has not implemented the additionality requirement effectively; many projects in China have received credits even though they would likely have occurred anyway.¹⁸³ If the CDM is to be employed for this purpose, baselines will need to be estimated so that emissions reductions resulting from particular measures can be accurately and reliably stated. It may also be appropriate to provide some kind of discount on emissions calculations to account for the possibility of overstatement or other error. Under this approach, for example, a claimed emissions reduction of three tons of greenhouse gases might qualify for credit for two tons.

Other international financial institutions should also be enlisted on behalf of developing country mitigation measures. These include multilateral development banks such as the World Bank, which provide much official development assistance from governments and also help steer private financial flows to developing and transition economies.¹⁸⁴ One set of lending and grant opportunities for energy efficiency that is likely to be effective involves “(a) development of commercial banking windows for energy efficiency; (b) support for developing energy service companies (ESCOs); (c) guarantee funds for energy efficiency investment financing; and (d) equity funding for

¹⁸² Bali Action Plan, *supra* note 5, para. 1(b)(ii). *See also* G8 Summit, Growth and Responsibility in the World Economy: Summit Declaration (7 June 2007), para. 51, <http://www.state.gov/documents/organization/92264.pdf> (“Action of emerging economies [to address climate change] could take several forms, such as sustainable development policies and measures, an improved and strengthened clean development mechanism, the setting up of plans for the sectors that generate most pollution so as to reduce their greenhouse gas emissions compared with a business as usual scenario.”). Ensuring that these policies and measures actually achieve their intended reductions would be a significant challenge, just as it is now for projects.

¹⁸³ Michael Wara, Measuring the Clean Development Mechanism’s Performance and Potential (2006), available at http://iis-db.stanford.edu/pubs/21211/Wara_CDM.pdf.

¹⁸⁴ Frances Seymour et al., *Private Finance*, in *STUMBLING TOWARD SUSTAINABILITY* 173, 184 (John C. Dernbach ed. 2002).

ESCOs or energy efficiency projects.”¹⁸⁵ The availability of these mechanisms might be particularly attractive to developing countries as a way of overcoming up-front costs and allowing payback over time from the money saved. In addition, most developed countries and a growing number of developing countries use bilateral export and investment promotion agencies to provide a variety of financial services to the private sector in order to foster national commercial interests in other countries.¹⁸⁶ These agencies should be directed to support, or at least not undermine, the framework of early and substantial results that is proposed here.¹⁸⁷ Agreements for technical assistance and training to developing countries in establishing and carrying out these policies and measures might also be of value.¹⁸⁸

These agreements should also contain mechanisms for making the goal more stringent over time. This could be done by regular meetings of the Conference of the Parties, as it is now done (or attempted to be done). Alternatively, it could be accomplished by allowing a party to the agreement to unilaterally increase the stringency of its goal through a legally enforceable instrument, and allow that country to gain some kind of economic benefit as a result. To gain the same benefit, other country parties would make their goal or standard at least as stringent. In consequence, there would be continued pressure over time to reduce greenhouse gas emissions in order to gain that

¹⁸⁵ FINANCING ENERGY EFFICIENCY, *supra* note __, at 31.

¹⁸⁶ Seymour et al., *supra* note __, at 176.

¹⁸⁷ In *Friends of the Earth v. Mosbacher*, plaintiffs have challenged the Overseas Private Investment Corporation and the Export-Import Bank, the U.S. export and investment promotion agencies, for funding international fossil fuel projects that contribute to climate change without fully considering their environmental impact.. 2007 U.S. Dist. LEXIS 24268 (March 30, 2007) (denying defendants’ motion for summary judgment). .

¹⁸⁸ The Lawrence Berkeley National Laboratory, for example, provides technical and other assistance to countries that are interested in developing energy efficiency standards for appliances and in building codes. Lawrence Berkeley National Laboratory, Energy Codes and Standards Worldwide, <http://eetd.lbl.gov/EA/ecsw/ecsw.html> (last visited January 30, 2008).

economic benefit.¹⁸⁹ One option would be to allow a policy innovating country receive a small fraction of the certified emissions reductions generated by other countries from reductions these other countries achieve by adopting the innovating country's policy. These certified emissions reductions would be in addition to the certified reductions it earns from its own actions.

Alternatively, this downward pressure could be accomplished by allowing businesses engaged in a particular sector or producing certain goods or services to obtain some kind of economic advantage by exceeding the goal. A business might, for example, produce and sell an automobile or light bulb that exceeds any nation's energy efficiency standard. That company should be able to earn offsets for greenhouse gas reductions created in countries where its products are sold and used that are in addition to those that would be achieved by products that simply meet that nation's standard.¹⁹⁰ Those offsets would, of course, need to meet certain standards to ensure that they are real, nonduplicative, and reflect additional reduction beyond those that would otherwise have been achieved. The ability of the private sector to generate marketable offsets by exceeding an international standard would, in turn, create pressure on governments to make their standard more stringent, if for no other reason than make sure the standard has some effect.¹⁹¹ The potential for downward adjustments in particular standards would likely encourage continued private investment in new and improved technologies for more efficient goods and services.

¹⁸⁹ This idea is adapted from DAVID M. DRIESEN, *THE ECONOMIC DYNAMICS OF ENVIRONMENTAL LAW* (2003).

¹⁹⁰ Again, this borrows from *id.*

¹⁹¹ In a broad sense, such approaches track the idea that private sector partnerships established to promote sustainable development should help governments achieve national and international goals. Ira R. Feldman, *Business and Industry*, in *AN AGENDA FOR A SUSTAINABLE AMERICA* (John C. Dernbach ed. Forthcoming 2008).

Finally, the agreements should prevent or control leakage. Leakage occurs when the manufacture of a particular product occurs in a country other than the country in which it is used or consumed, and the emissions from the manufacture of that product are not charged to the consuming country. Leakage can seriously undermine the effectiveness of any post-Kyoto agreement. One option is to count in any country's overall emissions the emissions that occur to produce goods that are imported for use or consumption in that country. Another option is to prohibit any country from exporting to any other country any technology or equipment that would be unlawful in the exporting country under the agreement. The agreement could also prohibit the manufacture or export of any technology or equipment that met less a much less stringent standard. Parallel negotiations under the General Agreement on Tariffs and Trade could lead to agreements that reinforce and enhance these restrictions.

G. Objections

Apart from criticisms of specific elements of this proposal, at least two general objections may be raised. First, it can be said that the proposal is a distraction from the main objective—which is to secure binding quantified emissions reductions from developed countries and some kind of emissions reduction commitment from major emitting developing countries. According to this objection, the distraction is at best needless (because the proposal is inconsequential) and at worst harmful (because the proposal would distract states and stakeholders from their most important task). Second, it can be said that the proposal is not politically feasible. These objections identify problems that need to be avoided, but they are not insurmountable.

The first objection assumes that the goal of substantial short-term emissions reductions, and the mechanisms chosen for carrying out that goal, are completely separate from the other goals and mechanisms that the Parties will be negotiating. This is untrue. Short-term reductions contribute to medium- and long-term reductions, as well as the overall goal of avoiding or minimizing dangerous interference with the climate system. The mechanisms or tracks suggested here for achieving this short-term goal, principally national policy commitments and international sectoral agreements, are the same mechanisms that have been proposed for other purposes under a post-Kyoto agreement. In fact, many of the goals that these mechanisms or tracks would achieve, most notably encouraging developing country participation, would be furthered by agreements concerning early reductions that gave particular emphasis to cost effective actions that also foster sustainable development. Thus, the goal of short-term and substantial reductions is not a marked departure from the discussion of a post-Kyoto framework; it is a way of strengthening and increasing the effectiveness of any agreement that is reached. Nor does the suggested approach involve the kind of either/or choice that some parties are suggesting. This is not about policies and measures in lieu of targets and timetables; it would have policies and measures supplement targets and timetables.

Nor does it appear that this framework would be an inappropriate or harmful distraction. The distraction issue presupposes the importance of quantifiable and economy-wide emission reduction targets by developed and perhaps other countries. It also seems to presuppose the inability of the parties to manage more than a small number of issues at the same time. Even assuming that quantifiable economy-wide reduction targets are the main event, it is far from clear that it needs to be the only event. The Bali

Action Plan contains many moving parts, as already explained, and thus contemplates that the parties will address multiple issues at the same time. In some ways, moreover, the forestry agreement is a model for the kind of framework suggested here.

It is possible, even likely, that a properly crafted short-term emissions reductions goal, coupled with appropriate policies and measures, could galvanize worldwide public and governmental support for greenhouse gas reductions. It would show more or less immediate results, something we have yet to see under the Framework Convention or Kyoto Protocol. It would also provide a platform for cost-effective actions that achieve other benefits. The commitments that governments, businesses, and individuals make for these early reductions would establish momentum for further reductions. This is hardly an inappropriate or harmful distraction from the main event. It may even make the main event more likely.

With respect to the second objection, there does not appear to be any obvious threshold reason for considering the framework suggested here to be politically infeasible. It is consistent with, and would further, the procedures and goals contained in the Bali Action Plan. The political feasibility of this framework would likely turn on the specific policies and measures—the particular national commitments and international sectoral agreements—that come out of the negotiating process. The factors for selecting policies and measures should ensure that the great bulk of them would be attractive. Still, it does not seem appropriate to rule out the analytical and screening process in advance based on political considerations that will only be clear after the process is completed.

IV. CONCLUSION

The Bali Action Plan establishes a process for concluding negotiations on a post-Kyoto agreement by December 2009. There is a growing consensus that this agreement should provide a structure for steep long-term reductions in greenhouse gas emissions. This Article raises an issue that has received much less attention. It argues that this agreement *also* needs to achieve substantial short-term reductions in greenhouse gas emissions. This argument has three parts.

First, the Framework Convention on Climate Change authorizes a variety of approaches to addressing climate change. The availability of multiple approaches gives the negotiators more flexibility in designing a legal architecture that can achieve substantial short-term results. The Bali Action Plan also contemplates multiple approaches, which lends itself to this objective. Yet the climate change negotiations prior to, during, and in the immediate aftermath of Bali reflect a lot of dissonance about how to proceed. On one hand, the scientists describe the urgency of the problem in stronger and stronger terms. That urgency is reflected in the preamble to the Bali Action Plan. On the other hand, the means chosen to address this problem have thus far not matched that urgency, particularly the need for short-term action. Of course, the Bali Action Plan's focus on the need for a long-term goal, coupled with the multiple facets of that plan, are welcome developments. But the need for a long-term goal as well as action on many fronts does not negate the need for short-term action based on developed country leadership.

Second, there is a strong case for substantial short-term emissions in any post-Kyoto agreement. This case is grounded first on increasingly clear and compelling

scientific evidence that we need to stabilize greenhouse gas concentrations at the lowest possible level in order to reduce the impacts of climate change on humans and their environment. The case is also grounded on ethical responsibilities contained in the Framework Convention that developed countries should take the lead in addressing climate change and that the needs of developing and vulnerable countries—the very countries that will be most adversely affected by climate change—require special attention. But even as urgent as this issue is, it also provides many opportunities. A great many policies and measures exist that can and have reduced energy costs, fostered technological innovation, reduced other air pollutants, and created jobs. Early and substantial action to reduce climate change is also a development opportunity for all countries—a *sustainable* development opportunity.

Third, and finally, this Article suggests a legal structure that could achieve short-term reductions in a post-Kyoto agreement. It includes an explicit goal for stabilizing greenhouse gas emissions by not later than 2020 and a framework in which both developed and developing countries would find ways to reduce their emissions. This framework includes an extension and deepening of the Kyoto Protocol's quantified emission reductions under a cap-and-trade program. It also includes supplemental international policy-based or economic sectoral agreements that would apply to both developed and developing countries. These additional agreements, which are authorized by the Bali Action Plan, would be designed to achieve early results concerning specific policies or in specific economic sectors. The combination of a cap-and-trade program with these supplemental agreements would achieve greater emission reductions more quickly than a cap-and-trade program alone.

Substantial and short-term emissions reductions need to be part of a post-Kyoto agreement. This approach could transform the international climate discussion by building confidence in our ability to foster sustainable development and improve human quality of life, even in the face of the enormous challenge presented by climate change.