

# Achieving Early and Substantial Greenhouse Gas Reductions Under a Post-Kyoto Agreement

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## INTRODUCTION

It has been more than 15 years since the United Nations Framework Convention on Climate Change<sup>1</sup> was opened for signature in 1992, and more than a decade since the Kyoto Protocol<sup>2</sup> 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 little evidence exists to indicate that either agreement has had any significant effect on overall greenhouse gas emissions,<sup>3</sup> 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.<sup>4</sup>

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1. United Nations Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107 (entered into force March 21, 1994) [hereinafter Framework Convention].

2. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 11, 1997, U.N. Doc. FCCC/CP/1997/L.7/Add.1 (entered into force Feb. 16, 2005), available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf> [hereinafter Kyoto Protocol].

3. Scott Barrett, *A Multitrack Climate Treaty System*, in 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. EUR. ENVTL. AGENCY, ANNUAL EUROPEAN COMMUNITY GREENHOUSE GAS INVENTORY 1990-2005 AND INVENTORY REPORT 2008: SUBMISSION TO THE UNFCCC SECRETARIAT 8 (2007), available at [http://reports.eea.europa.eu/technical\\_report\\_2008\\_6/en](http://reports.eea.europa.eu/technical_report_2008_6/en). Emissions dropped between 1990 and 2005 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 13-14. 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

The Bali Action Plan,<sup>5</sup> 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 have been in office for less than a year. If the parties 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. This delay means, in practical terms, that significant measurable reductions in greenhouse gas emissions could be at least a decade away.

We cannot 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 furthering long term emissions reductions.

Climate change is a critical problem. Greenhouse gas emissions have risen 24 percent around the world since 1990.<sup>6</sup> Unless new policies and measures are implemented, greenhouse gas emissions are projected to increase at least 25 percent, and as much as 90 percent, by 2030.<sup>7</sup> 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.<sup>8</sup> Yet the lack of international agreement has likely often prevented action or has been used as an excuse for not

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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. U.N. Framework Convention on Climate Change, Conference of the Parties, Thirteenth Session, Bali Action Plan, Decision 1/CP.13, U.N. Doc. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) available at <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf>.

6. Hans-Holger Rogner et al., *Introduction*, in INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION 95, 103 (2007), available at <http://www.ipcc.ch/ipccreports/ard.wg3.htm>. 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. See Velders et al., *supra* note 4, at 4,818.

7. Rogner et al., *supra* note 6, at 111.

8. William A. Pizer, *Practical Global Climate Policy*, in ARCHITECTURES FOR AGREEMENT, *supra* note 3, at 280, 284.

taking action. More importantly, the sum of unilateral national, regional, state, and 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 substantial short-term emissions reductions? In a sense, the Kyoto Protocol attempted to answer this question by requiring developed countries to reduce their greenhouse gas emissions by about 5 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 early and significant results still have considerable value, and the Kyoto Protocol does not provide the only path for achieving them.<sup>9</sup>

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 Framework Convention is limited to essentially one approach – quantified emissions reductions for developed countries coupled with 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 what a post-Kyoto agreement should contain.

Part II explains why policy makers should seriously consider substantial early reductions in greenhouse gas emissions as part of any post-Kyoto framework. These reasons include the growing urgency of climate change science, the precautionary approach identified in the Convention as a decision-making principle, the fact that cost-effective emissions reductions measures are now available, and the significant non-climate benefits (security, economic, social, and environmental) that can be achieved by implementing these measures. As a practical matter, long-term greenhouse gas emissions are virtually impossible without short-term reductions. The Framework Convention also includes ethical obligations for developed countries – to take leadership in addressing climate change and to reduce impacts on developing and vulnerable countries – which require early and substantial action.

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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.

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, 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 it provides for the adoption of protocols that can articulate more precise legal rules for the parties to follow in reducing their greenhouse gas emissions.<sup>10</sup> 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 2007<sup>11</sup> can be understood as restoring the multiple tracks provided by the

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10. Framework Convention, *supra* note 1, arts. 7 & 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 5 (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. See United Nations Framework Convention on Climate Change, Status of Ratification, [http://unfccc.int/essential\\_background/convention/status\\_of\\_ratification/items/2631.php](http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php) (last visited Aug. 11, 2008). Thus, the United States was a party to the negotiations that led to the Bali Action Plan.

Framework Convention. Multiple tracks or paths for reducing greenhouse gases increase the likelihood of substantial early action, particularly by 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 [human caused] interference with the climate system."<sup>12</sup> The Convention creates an international platform for achieving that goal that has a variety of paths or tracks to address climate change, including mitigation, adaptation, reporting, and scientific and technological research. 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.<sup>13</sup> 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."<sup>14</sup>

In addition, the Convention contains requirements that are applicable only to developed countries, and it does not limit these countries to any particular mitigation approach. The 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."<sup>15</sup> 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 refers to two broad approaches that developed countries can take in reducing their greenhouse gas emissions: (1) quantified emissions reductions and (2) "policies and measures." Developed countries did not commit to reduce greenhouse gas emissions by a certain amount by a date certain;

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

13. *Id.* art. 4.1(b).

14. *Id.* art. 4.1(c).

15. *Id.* pmb., para. 3.

developed countries agreed only to the “aim” of reducing their greenhouse gas emissions to 1990 levels by 2000.<sup>16</sup> On the other hand, the Convention also contains a requirement to review the adequacy of developed country commitments, including the “aim” commitment.<sup>17</sup> Developed countries also agreed to adopt “policies and measures” that will demonstrate that they “are taking the lead” in addressing climate change.<sup>18</sup> The duty to adopt such “policies and measures” is independent of any target and timetable for reducing greenhouse gas emissions.<sup>19</sup>

Thus, nothing in the Framework Convention 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 effectively limits the parties to essentially one emissions reduction pathway. Under the Kyoto Protocol, developed countries agreed to reduce their net greenhouse gas emissions by at least 5 percent from 1990 levels by 2008-2012.<sup>20</sup> A key feature of the Kyoto Protocol is its use of market mechanisms, particularly different forms of emissions trading, to achieve the required reductions.<sup>21</sup> The Protocol contains somewhat different commitments for individual developed countries; the U.S. commitment is 7 percent below 1990 levels.<sup>22</sup> The Kyoto Protocol went into effect in 2005; the United States is now the only developed country that is not a party.<sup>23</sup> By capping emissions reductions at specific levels in individual coun-

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16. *Id.* art. 4.2(b).

17. *Id.* art. 4.2(d).

18. *Id.* art. 4.2(a). Developed countries 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. See R.A. Reiner, *The Framework Convention on Climate Change: Developed Country Commitments on Greenhouse Emissions* 35 (1995) (copy on file with author). Reiner describes the commitment by developed countries to adopt policies and measures as one of the “two essential commitments by developed countries” in the Convention. *Id.* The other is the requirement to communicate detailed information about the effectiveness of these measures to the Conference of the Parties.

20. Kyoto Protocol, *supra* note 2, 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 histories and assessments of the Kyoto Protocol, see SEBASTIAN OBERTHUR & HERMANN E. OTT, *THE KYOTO PROTOCOL: INTERNATIONAL CLIMATE POLICY FOR THE 21<sup>ST</sup> CENTURY* (1999); MICHAEL GRUBB ET AL., *THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT* (1999); Joanna Depledge, *Tracing the Origins of the Kyoto Protocol: An Article-by-Article Textual History*, FCCC/TP/2000/2 (2000), available at <http://unfccc.int/resource/docs/tp/tp0200.pdf>.

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. See United Nations Framework Convention on Climate Change, Parties to the Kyoto Protocol, <http://maindb.unfccc.int/public/country.pl?group=kyoto> (last visited Aug. 11, 2008).



tries, and authorizing a trading system, the Kyoto Protocol makes a cap-and-trade program the centerpiece of national and regional programs for its implementation. Most prominent among these regional programs is the European Union emissions trading system, which began in 2005.<sup>24</sup>

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 generally require or authorize international agreement on any specific policies and measures or particular economic sectors, and it does not create any international structure for developed or developing countries to cooperate on such matters.<sup>25</sup> Finally, the Protocol contains no quantitative emissions reduction commitment for developing countries.<sup>26</sup> As most observers have long recognized, the Kyoto Protocol is only a first step to reducing greenhouse gas emissions.

### 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.<sup>27</sup> 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.

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.<sup>28</sup> 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.

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24. ROBINSON ET AL., *supra* note 4.

25. Two exceptions exist. Developed countries listed in Annex I “shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.” Kyoto Protocol, *supra* note 2, art. 2.2.

26. 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.

27. Bali Action Plan, *supra* note 5, para. 1.

28. 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 Aug. 11, 2008).

The Action Plan's preamble states that it is responding 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."<sup>29</sup> The preamble twice uses "urgency" or "urgently" to describe the challenge.<sup>30</sup> The preamble contains a footnote to three separate pages in the 2007 Intergovernmental Panel on Climate Change report, *Mitigation of Climate Change*.<sup>31</sup> These pages describe a range of different stabilization scenarios for atmospheric concentrations of greenhouse gases, each representing a level at which greenhouse gas concentrations are ultimately set. These scenarios range from 445-490 parts per million to 885-1130 parts per million of carbon dioxide equivalent gases.<sup>32</sup> To achieve low to medium stabilization levels, IPCC concluded, developed countries would need to reduce their greenhouse gas emissions by 10 to 40 percent below 1990 levels by 2020 and by 40 to 95 percent below 1990 levels by 2050.<sup>33</sup> Achieving a higher stabilization level could require reductions from developed countries by as much as 25 percent by 2020 and 80 percent by 2050.<sup>34</sup>

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."<sup>35</sup> In addition, the parties agreed to consider "enhanced" action on climate change mitigation, adaptation, technology development and transfer, and provision of financial resources and investment.<sup>36</sup> Developed country parties agreed to consider "[m]easurable, reportable, and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives."<sup>37</sup> Developing countries agreed to consider "[n]ationally appropriate mitigation actions;" there is no reference to quantified emission reductions.<sup>38</sup> Developing countries also agreed to consider mitigation measures that are "supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner."<sup>39</sup> To improve implementation of Article 4.1(c) of the Convention, all

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29. Bali Action Plan, *supra* note 5.

30. *Id.* The plan states the need "to urgently enhance implementation of the Convention" and "the urgency to address climate change."

31. *Id.* n.1, citing CLIMATE CHANGE 2007: MITIGATION, *supra* note 6, at 39, 90 & 776.

32. *Id.* at 39.

33. *Id.* at 90.

34. *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 percent below 1990 levels by 2050).

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

36. *Id.* paras. 1(b)-1(e).

37. *Id.* para. 1(b)(i).

38. *Id.* para 1(b)(ii).

39. *Id.* This paragraph explicitly links developing country emission reduction commitments to new developed country commitments on capacity building in developing countries. Summary of the Thirteenth



parties are also to consider “[c]ooperative sectoral approaches and sector-specific actions.”<sup>40</sup> In addition, all parties are to consider opportunities to improve and promote the cost-effectiveness of mitigation actions.<sup>41</sup>

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 in the Kyoto Protocol.

Yet the Bali Action Plan 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. The Bali Plan represents an incremental step towards a post-Kyoto agreement – and an agreement in which the United States is still willing to participate – but only that.<sup>42</sup>

In addition to broadening the potential scope of a post-Kyoto agreement, the conference of the parties also agreed to establish immediately a process for reducing greenhouse gas emissions from deforestation, which are estimated to contribute to 20 percent of world greenhouse gas emissions.<sup>43</sup> The aim of this agreement is to encourage developed countries to provide funding to avoid deforestation by, among other things, resolving the methodological issues of accounting for greenhouse gas emissions reduction from avoided deforestation. The process for addressing these issues began in the spring of 2008.<sup>44</sup> This

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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 BULL., Dec. 18, 2007, at 20, available at <http://www.iisd.ca/download/pdf/enb12354e.pdf>.

40. Bali Action Plan, *supra* note 5, para. 1(b)(iv).

41. *Id.* para. 1(b)(v).

42. 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 . . .”).

43. Raymond E. Gullison et al., *Tropical Forests and Climate Policy*, 316 SCIENCE 985 (2007).

44. 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/cop\\_redd.pdf](http://unfccc.int/files/meetings/cop_13/application/pdf/cop_redd.pdf). See also Niels Anger & Jayant Sathaye, Centre for European Economic Research, Reducing Deforestation and Trading Emissions: Economic Implications for the Post-Kyoto Carbon Market (2008) (incorporation of avoided deforestation in international emissions trading considerably decreases the costs of post-Kyoto climate policy), available at <ftp://ftp.zew.de/pub/zew-docs/dp/dp08016.pdf>.

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.<sup>45</sup> 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 for several reasons. These reasons include the climate 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 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 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.”<sup>46</sup> Other commonly mentioned criteria are continued use of market mechanisms and quantified emission reduction targets, participation by more countries, including developing countries, and compliance.<sup>47</sup> Environmental effectiveness ordinarily refers to overall reductions, and does not connote any

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45. 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>.

46. Terry Barker et al., *Technical Summary*, in CLIMATE CHANGE 2007: MITIGATION, *supra* note 6, at 25, 89 [hereinafter *Technical Summary*].

47. 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, Proposal for a Post-Kyoto Framework ii (Oct. 15, 2007) (21st Century Pub. Policy Inst. working paper), available at <http://www.21ppi.org/english/pdf/071112.pdf> (identifying environmental effectiveness; science-based analysis; equity; inclusiveness; political feasibility; and sustainable, long-term perspective as principles for a post-Kyoto agreement).

preference for short-term or long-term reductions.<sup>48</sup> In fact, the criterion of significant short-term emissions reductions is not included on many (perhaps most) lists.<sup>49</sup> Policy makers should nonetheless consider significant short-term emissions reductions as an additional criterion for a post-Kyoto agreement.<sup>50</sup> As IPCC has concluded, the “need for immediate short-term action in order to make any significant impact in the longer term has become apparent.”<sup>51</sup>

#### A. RATIONALES FOR REQUIRING SUBSTANTIAL SHORT-TERM REDUCTIONS

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 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 percent probability that increases in global average temperatures are due to increases in anthropogenic greenhouse gas concentrations.<sup>52</sup> In addition, the pace of warming around the world has accelerated in the last several decades compared with prior decades.<sup>53</sup> 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 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.<sup>54</sup> This last concern addresses the real but relatively small

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

49. One exception is Frankel, *supra* note 47, at 35-39, who explains the need for short-term reductions in the context of “dynamic consistency.”

50. 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.

51. *Technical Summary*, *supra* note 46, at 47.

52. See Richard B. Alley et al., *Summary for Policymakers*, in INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 3 (2007); Herve Le Treut et al., *Historical Overview of Climate Change Science*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS at 93, 119.

53. James Hansen et al., *Global Temperature Change*, 103 PROC. NAT’L ACAD. SCI. 14288, 14288 (2006), available at <http://www.pnas.org/cgi/reprint/103/39/14288.pdf>.

54. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT, SUM-

risk of catastrophic sea level rise, an issue that emerges when we consider not only the probability that something might happen but also the consequences of its occurrence.

It is also becoming clearer that the quest for a “safe” level of atmospheric greenhouse gases is likely to prove illusory. The Framework Convention’s objective—“stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”<sup>55</sup>—suggests the existence of a level that is safe. Yet no “safe” level of projected greenhouse gas concentrations exists; there are only higher and lower levels of risk. The Framework Convention’s objective acknowledges both the problem of climate change and the need for international action to address it.<sup>56</sup> This 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 “safe” 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.<sup>57</sup> But that is not what the science tells us. The determination of what is “dangerous” or “safe” is a political or risk management decision.<sup>58</sup> That decision should be informed by science, but it is not something that science can decide. What the science indicates, by contrast, is that growing concentrations of greenhouse gases bring increasing risks of adverse effects.<sup>59</sup> 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.<sup>60</sup> 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 it is increasing about 2.5 ppm annually.<sup>61</sup> If the concentra-

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MARY FOR POLICYMAKERS (2007), available at [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf) [hereinafter SUMMARY FOR POLICYMAKERS].

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

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

57. See Barrett, *supra* note 3, at 238-39.

58. *Technical Summary*, *supra* note 46, at 32 (“[A]ny judgment on ‘dangerous interference’ is necessarily a social and political one, depending on the level of risk deemed acceptable . . .”).

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

60. Barrett, *supra* note 3, at 238-39.

61. UNITED KINGDOM, HER MAJESTY’S TREASURY, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 193 (2007), available at [http://www.hm-treasury.gov.uk./media/2/5/Part\\_III\\_Introduction\\_Group.pdf](http://www.hm-treasury.gov.uk./media/2/5/Part_III_Introduction_Group.pdf) [hereinafter STERN REVIEW]. The Kyoto Protocol, and most analyses of greenhouse gases, focus on six different gases:

tion 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.”<sup>62</sup> 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%.<sup>63</sup> 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).<sup>64</sup> Substantial short-term reductions in greenhouse gas emissions would reduce the risk of very bad outcomes.

## 2. Precautionary Approach

A precautionary approach to climate change mitigation, which is identified by the Framework Convention as a decision-making principle,<sup>65</sup> 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.<sup>66</sup> “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.<sup>67</sup>

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.<sup>68</sup> Indeed, IPCC concludes that uncertainty about climate sensitivity may be the most important justification for short-term action.<sup>69</sup> Two studies published early in 2008 indicate that stabilizing global temperatures likely requires almost no greenhouse new gas emissions;

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carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Kyoto Protocol, *supra* note 2, Annex A. These gases have different global warming potential (e.g., a ton of methane represents 23 times the warming potential of a ton of carbon dioxide). STERN REVIEW at 198. The term “carbon dioxide equivalent” creates a common metric for quantifying and understanding the total effect of all six gases.

62. *Id.* at 194.

63. *Id.*

64. Indeed, the stabilization level should probably not exceed 550 ppm. *Id.*

65. Framework Convention, *supra* note 1, art. 3.3. The precautionary approach is a basic principle of sustainable development. See John C. Dernbach, *Sustainable Development as a Framework for National Governance*, 49 CASE W. RES. L. REV. 1, 60-63 (1998) [hereinafter Dernbach, *Sustainable Development*].

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

67. *Id.*

68. Andrew Revkin, *In Greenland, Ice and Instability*, N.Y. TIMES, Jan. 8, 2008, at F1.

69. Brian Fisher et al., *Issues Related to Mitigation in the Long-Term Context*, in CLIMATE CHANGE 2007: MITIGATION, *supra* note 6, at 169, 234.

they also indicate that the climate will continue to warm significantly even if concentrations are stabilized at 2000 levels.<sup>70</sup> It is possible that letting greenhouse gas 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 impact of greater short-term emissions than it may actually be or if the “overshoot” is limited.<sup>71</sup>

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 realized.”<sup>72</sup> 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 Framework 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 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.

### 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

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70. Andreas Schmittner et al., *Future Changes in Climate, Ocean Circulation, Ecosystems, and Biogeochemical Cycling Simulated for a Business-as-Usual CO<sub>2</sub> Emissions Scenario Until Year 4000 A.D.*, 22 GLOBAL BIOGEOCHEMICAL CYCLES 1013, 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”); H. Damon Matthews & Ken Caldeira, *Stabilizing Climate Requires Near-Zero Emissions*, 35 GEOPHYSICAL RES. LETTERS L04705, L04705 (2008) (“[F]uture anthropogenic emissions would need to be eliminated in order to stabilize global-mean temperatures.”). For a nontechnical summary of these articles, see Leora Falk, *Studies Find Large Emissions Cuts Needed for Temperature Stabilization*, DAILY ENV’T REP., Mar. 11, 2008, at A-6.

71. 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. 17931 (2007).

72. *Technical Summary*, *supra* note 46, at 32.



human behavior and lifestyle.

According to IPCC, energy efficiency could produce a 30 percent reduction in projected greenhouse gas emissions from new and existing buildings by 2030.<sup>73</sup> Substantial greenhouse gas reduction and cost saving opportunities are also available in the industrial sector.<sup>74</sup> 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.<sup>75</sup> 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.<sup>76</sup> Other policies and measures include expanded use of rail freight, public benefit funds for electricity, real-time pricing for electricity use, fuel taxation, and transit-oriented development.<sup>77</sup> 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.<sup>78</sup> Because carbon dioxide emissions from fossil fuels constitute the overwhelming majority of U.S. greenhouse gas emissions,<sup>79</sup> 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,<sup>80</sup> 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 technolo-

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73. *Id.* at 13. See also INTERNATIONAL ENERGY AGENCY, PROMOTING ENERGY EFFICIENCY—INVESTMENTS IN THE PRIVATE SECTOR 15 (2008) (noting that while existing buildings account for 24 percent of the world’s greenhouse gas emissions, and “despite the proven cost-effective opportunity to reduce energy consumption, a large portion of the potential for energy efficiency in the existing residential building sector remains untapped”).

74. *Id.* at 14.

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

76. *Id.* at 10,014-10,017.

77. *Id.* at 10,017-10,027.

78. *Id.* at 10,028-10,030.

79. U.S. ENVTL. PROT. 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>.

80. MCKINSEY & CO., 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](http://www.mckinsey.com/client-service/ccsi/pdf/US_ghg_final_report.pdf).

gies.”<sup>81</sup> This reduction would mean that U.S. greenhouse gas emissions in 2030 are 7 to 28 percent lower than 2005 emissions.<sup>82</sup> Forty percent of these reductions, the study concluded, could be accomplished at a negative marginal cost over their life cycle.<sup>83</sup> The study then recommended the following as one of three action principles for the United States in addressing global warming:

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.<sup>84</sup>

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 percent of the world’s GDP, have a greenhouse gas intensity of 1.06 kilograms of carbon dioxide equivalent per U.S. dollar of GDP; with 57 percent 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.<sup>85</sup> 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).”<sup>86</sup>

Changes in human lifestyle and behavior involve another set of currently available policies and measures.<sup>87</sup> These policies and measures are particularly

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81. *Id.* at ix.

82. *Id.* at xii.

83. *Id.* at xii-xiii.

84. *Id.* at xvi.

85. Rogner et al., *supra* note 6, at 30.

86. ROBERT P. TAYLOR ET AL., THE WORLD BANK, FINANCING ENERGY EFFICIENCY: LESSONS FROM BRAZIL, CHINA, INDIA AND BEYOND 5 (2008), available at <http://go.worldbank.org/IDJ3DMJUW0>.

87. 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), available at <http://www.energy.ca.gov/2006publications/CEC-999-2006-027/CEC-999-2006-027.PDF>; Loren Lutzenhiser, *Social and Behavioral Aspects of Energy Use*, 18 ANN. REV. ENERGY & ENV’T 247 (1993).

important because, for example, about one-third of the energy consumed in the United States “is directly controlled by households.”<sup>88</sup> 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.<sup>89</sup> 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.<sup>90</sup> 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 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.<sup>91</sup>

#### 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,<sup>92</sup> 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.<sup>93</sup> 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

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88. Paul C. Stern & Gerald T. Gardner, *Psychological Research and Energy Policy*, AM. PSYCHOLOGIST, Apr. 1981, at 332, 336.

89. Vandenbergh & Steinemann, *supra* note 87, at 1673, 1690.

90. See John C. Dernbach, *Harnessing Individual Behavior to Address Climate Change: Options for Congress*, 26 VA. ENVTL. L. J. 107 (2008).

91. SUMMARY FOR POLICY MAKERS, *supra* note 54, at 12.

92. *Id.* at 8.

93. STERN REVIEW, *supra* note 61, at 239, 450

medium- and long-term benefits.<sup>94</sup>

The co-benefits of climate change – economic, environmental, security, and social benefits other than climate change mitigation – are also considerable.<sup>95</sup> Co-benefits include reductions in other air pollutants (e.g., sulfur dioxide and particulates), improved human health, higher agricultural productivity, reduced stress on natural ecosystems, lower air pollution control costs, higher employment, and greater security.<sup>96</sup> Other co-benefits include lower energy prices for the poor, new jobs, improved technology, and new business opportunities.<sup>97</sup> The health benefits alone “may offset a substantial fraction of mitigation costs,” and other co-benefits “would further enhance cost savings.”<sup>98</sup> Co-benefits are so significant that policies and measures are most often adopted for the primary purpose of achieving them, not mitigating climate change.<sup>99</sup> Because these co-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. Additionally, because these policies do not 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 emissions reduction goal and give credibility to the governments making those commitments.<sup>100</sup> 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 actions can be based, and they help convince investors and others that that the commitments being made are real.<sup>101</sup>

To be sure, a government’s credibility also depends on its ability to keep abatement costs as low as possible.<sup>102</sup> But when cost-effective options exist in

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94. *Technical Summary*, *supra* note 46, at 33.

95. Terry Barker et al., *Mitigation from a Cross-Sectoral Perspective*, in CLIMATE CHANGE 2007: MITIGATION, *supra* note 6, at 619, 669-77.

96. *Id.*

97. John Dernbach & the Widener Univ. Law Sch. Seminar on Global Warming, *Moving the Climate Debate from Models to Proposed Legislation: Lessons from State Experience*, 30 ENVTL. L. REP. 10,933 (2000) [hereinafter *Moving the Climate Debate*].

98. *Summary for Policy Makers*, *supra* note 52, at 12.

99. Barker et al., *supra* note 95, at 669; *Moving the Climate Debate*, *supra* note 97, at 10,974.

100. Frankel, *supra* note 47, at 35-39 (explaining the reasons for “dynamic consistency” as a criterion for a post-Kyoto agreement).

101. *Id.* at 37-39.

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

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 will not even take actions 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 percent reduction in greenhouse gas emissions from current levels requires the country to meet its interim target of a 20 percent 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 environmental costs."<sup>103</sup> 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.<sup>104</sup>

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. IPCC concluded that "mitigation actions need to start in the short term" to avoid lock-in of carbon-intensive technologies."<sup>105</sup>

#### 7. Ethical Responsibilities Under the Framework Convention

Substantial short-term reductions are also warranted by ethical principles

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103. ROUNDTABLE ON THE ENV'T AND THE ECON., 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-low-res-eng.pdf>. "Early action offers the best guarantee of maximum success at minimum cost." *Id.*

104. D.P. van Vuuren & H.J.M. de Vries, *Mitigation Scenarios in a World Oriented at Sustainable Development: The Role of Technology, Efficiency, and Timing*, 1 CLIMATE POL'Y 189, 195, 205 (2001), available at [http://dx.doi.org/10.1016/S1469-3062\(01\)00007-9](http://dx.doi.org/10.1016/S1469-3062(01)00007-9).

105. *Technical Summary*, *supra* note 46, at 33.

stated in the Framework Convention as decision-making principles for the parties, and even as a legal duty. Ethical principles include developed country leadership, equity for developing and vulnerable countries, and the national right to promote sustainable development. These principles are entitled to particular respect for a post-Kyoto agreement that would, after all, be entered under the Framework Convention itself.<sup>106</sup>

Developed country leadership is an outgrowth of the principle of common but differentiated responsibilities.<sup>107</sup> The idea is that all countries are responsible for addressing climate change, but that developed countries have to play a leadership role in addressing it. Developed country leadership is expressed as a decision-making principle in the Framework Convention and as a duty, by developed countries, to adopt appropriate policies and measures. The Framework 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.”<sup>108</sup> As previously explained, the Framework 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 . . . .”<sup>109</sup>

Developed countries could 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 of emissions in 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 make similar cuts. Early reductions would enable developed countries to make substan-

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106. 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 INST., PENN STATE UNIV., WHITE PAPER ON THE ETHICAL DIMENSIONS OF CLIMATE CHANGE 18 (2006). As already noted, lower stabilization levels require substantial early action.

107. The term is referred to three times in the convention. *See* Framework Convention, *supra* note 1, para. 6; art. 3.1; art. 4.1. The principle of common but differentiated responsibilities was affirmed at the United Nations Conference on Environment and Development (or Earth Summit) in 1992. *See* United Nations Conference on Environment and Development, Rio Declaration on Environment and Development, Principle 7, June 14, 1992, UN Doc. A/CONF.151/5/Rev.1 (“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.”).

108. Framework Convention, *supra* note 1, art. 3.1.

109. *Id.* art. 4.2(a).



tial 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 their long-term commitments by making it more likely that developed countries will follow through on them. 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 the 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.<sup>110</sup> The Framework Convention thus 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.”<sup>111</sup> In this regard, the Framework Convention is supported by a growing body of scholarly work and citizen action on human rights under other treaties.<sup>112</sup>

Early reductions would 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. By definition, developing countries have fewer resources to adapt to climate change. They are already more adversely affected by climate change than developed countries.<sup>113</sup>

The Framework 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

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110. UNITED NATIONS DEV. PROGRAM, HUMAN DEVELOPMENT REPORT 2007/2008 vii (2007), available at [http://hdr.undp.org/en/media/hdr\\_20072008\\_en\\_complete.pdf](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*, 105 PROC. NAT’L ACAD. SCI. 1768, 1768 (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).

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

112. 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).

113. See sources cited *supra* note 110.

development, human rights, peace and security, and environmental protection.<sup>114</sup> It focuses not only on the current generation but to future generations as well. Sustainable development is the officially recognized international approach for maintaining and improving the human condition.<sup>115</sup> The Framework Convention states: “The Parties have a right to, and should, promote sustainable development.”<sup>116</sup>

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, environmental, and security 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.<sup>117</sup> 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 accomplish some of these objectives – would create a track record of achievement that would build confidence in our ability to successfully address climate change. In turn, short-term reductions would make it easier to achieve the further reductions that are required over the longer term.

#### B. OBJECTIONS TO ACHIEVING EARLY AND SUBSTANTIAL RESULTS

Some analysts appear to oppose short-term reductions.<sup>118</sup> Many analysts argue that the temporal distribution of greenhouse gas reductions should be guided by

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114. See generally Dernbach, *Sustainable Development*, *supra* note 65, at 17-32.

115. *Id.*

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

117. This is different from the confidence building and trust among negotiators that is needed to reach and implement an agreement.

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

cost-benefit analysis.<sup>119</sup> Such analyses tend to indicate that the great bulk of the necessary emissions reductions are most appropriately achieved after 2030.<sup>120</sup> 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 the climate change 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 a 37 percent growth in GDP during the 1990s. The Kyoto Protocol, which would have required the United States to reduce its greenhouse gas emissions 5 percent from 1990 levels by 2008-2012, would have forced the United States to reduce its greenhouse gas emissions by 25-30 percent from business-as-usual levels. “Thus,” some argue, “the Kyoto Protocol’s targets are too little, too fast.”<sup>121</sup>

To a significant degree, this line of analysis has merit. Some reductions 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 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 – co-benefits, 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.<sup>122</sup>

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

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119. See, e.g., Weiner, *supra* note 102, at 72.

120. Fisher et al., *supra* note 69, at 235-237.

121. Olmstead & Stavins, *supra* note 118, at 36.

122. See *Technical Summary*, *supra* note 46, at 8.

now or in the near future, and ample reasons exist to accomplish those reductions in a post-Kyoto agreement.

### 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 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, the agreement should contain 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. Goals provide coherent organizing principles for the great many tasks that are necessary to achieve them. They are also essential in motivating action by a variety of actors.<sup>123</sup> If the Parties are to identify substantial and short-term reductions as a goal, then they should say so as clearly as possible.

This short-term emissions stabilization goal would be consistent with scientific evidence indicating that early action is needed and that lower stabilization levels involve lower costs and risks than higher stabilization levels. It would also be consistent 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.”<sup>124</sup> 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

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123. See John C. Dernbach, *Targets, Timetables and Effective Implementing Mechanisms: Necessary Building Blocks for Sustainable Development*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 79, 100-01 (2002).

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

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.<sup>125</sup> 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 developing countries.<sup>126</sup> 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.<sup>127</sup>

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 percent higher than European Union production. This results from the fact that Europe imports are more energy-intensive and pollution-intensive than the products that it exports.<sup>128</sup>

Finally, engaging developing countries to implement policies and measures that save energy, produce other benefits, and reduce the impacts of climate change would further 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.<sup>129</sup> Indeed, focusing early action on such measures could help overcome the perception existing throughout the developing world that "environmental controls are a luxury."<sup>130</sup>

It is, of course, possible to limit the focus of early and substantial reductions on

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125. 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.

126. Rogner et al., *supra* note 6, at 111.

127. See Maximillian Auffhammer & Richard T. Carson, *Forecasting the Path of China's CO2 Emissions Using Province Level Information* (Univ. Cal. Berkeley Dept. of Agric. & Res. Econ. CUDARE Working Paper No. 971, Aug. 7, 2007), available at [http://repositories.cdlib.org/are\\_ucb/971/](http://repositories.cdlib.org/are_ucb/971/).

128. JOHN KORNERUP BANG ET AL., WORLD WILDLIFE FUND, EU CONSUMPTION, GLOBAL POLLUTION 2, 11 (2008), available at [http://assets.panda.org/downloads/eu\\_consumption\\_global\\_pollution.pdf](http://assets.panda.org/downloads/eu_consumption_global_pollution.pdf).

129. *Technical Summary*, *supra* note 46, at 31.

130. Ruth Greenspan Bell, *What to do About Climate Change*, FOREIGN AFF., May/June 2006 at 110, 111.

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.

### 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 addition, relying solely on a cap-and-trade approach reduces the likelihood of accomplishing early and substantial emission reductions and attaining 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, the 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.<sup>131</sup> 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.<sup>132</sup>

Fourth, even in developed countries, market imperfections mean that a cap-and-trade program by itself is unlikely to effectively reach certain major

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

132. Bell, *supra* note 130, at 110-13.



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.<sup>133</sup> According to conventional economic wisdom, the economic pressure created by either a carbon tax or a cap-and-trade 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, the economic pressure caused by a cap-and-trade program 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.<sup>134</sup> 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 emissions.<sup>135</sup> 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.<sup>136</sup> 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.<sup>137</sup> 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 essentially provides for only one type of commitment – absolute nation-wide 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

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133. 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 4, 36 (2007), available at [http://ksghome.harvard.edu/rstavins/Papers/Stavins\\_Hamilton\\_Working\\_Paper\\_on\\_Cap-and-Trade.pdf](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.

134. *Id.* at 30.

135. *Id.*

136. *Id.* See also David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading Under the Kyoto Protocol*, 83 IND. L. J. 21, 52-57 (2008).

137. See Driesen, *supra* note 136, at 52-57.

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.

### 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.<sup>138</sup> A post-Kyoto agreement whose objectives included significant short-term emissions reductions would need to be based on a multi-track framework. To explain why, it is first necessary to briefly explain such a framework agreement 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.<sup>139</sup> Such an agreement allows a country 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, 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.<sup>140</sup>

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

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138. See DANIEL BODANSKY & ELLIOT DIRINGER, TOWARDS AN INTEGRATED MULTI-TRACK CLIMATE FRAMEWORK 3 (2007). On technology agreements, see also Stefan Baker, Technology-Oriented Agreements: Five Examples (Dec. 7, 2007), available at [http://regserver.unfccc.int/seors/file\\_storage/9jsbdal400psytm.ppt](http://regserver.unfccc.int/seors/file_storage/9jsbdal400psytm.ppt) (PowerPoint presentation).

139. See BODANSKY & DIRINGER, *supra* note 138, at 4-5.

140. Daniel Bodansky, *Targets and Timetables: Good Policy but Bad Politics?*, in ARCHITECTURES FOR AGREEMENT, *supra* note 3, at 57, 65; PEW CTR. ON GLOBAL CLIMATE CHANGE, INTERNATIONAL CLIMATE EFFORTS BEYOND 2012: REPORT OF THE CLIMATE DIALOGUE AT POCANTICO 18 (2005).

a single package.<sup>141</sup> Done properly, an integrated agreement is likely to be more economically efficient, allow greater coordination, and 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.<sup>142</sup>

Two types of tracks are particularly significant – policy-based commitments and 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.<sup>143</sup> 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 carrying out these measures.<sup>144</sup> The implementation of policies and measures was considered a serious option under the Framework Convention until parties began to prefer targets and timetables of the kind included in the Kyoto Protocol.<sup>145</sup> Indeed, in 1995, the parties developed a list of several hundred policies and measures that could be used to implement the Framework Convention.<sup>146</sup> 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.<sup>147</sup>

International sectoral agreements, in partial contrast, are international or intergovernmental agreements that concern a particular economic sector.<sup>148</sup> They contrast with the Kyoto Protocol, which contains economy-wide emissions 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

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141. BODANSKY & DIRINGER, *supra* note 138 at 3, 23.

142. *Id.* at 3 & 5.

143. *See also* Pizer, *supra* note 8, at 307-09 (describing a somewhat similar process of “bottom up” commitments).

144. Framework Convention, *supra* note 1, arts. 4.1(b) & (j). *See also id.* art. 4.2(a) (commitment by developed countries to “adopt national policies” to mitigate climate change).

145. JOANNA LEWIS & ELLIOT DIRINGER, POLICY-BASED COMMITMENTS IN A POST-2012 CLIMATE FRAMEWORK: A WORKING PAPER 7 (2007); OBERTHUR & OTT, *supra* note 20, at 103-08 (describing negotiating process that led to omission of harmonized or binding policies and measures in Kyoto Protocol).

146. U.N. Framework Convention on Climate Change, 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>.

147. LEWIS & DIRINGER, *supra* note 145, at 6.

148. DANIEL BODANSKY, INTERNATIONAL SECTORAL AGREEMENTS IN A POST-2012 CLIMATE FRAMEWORK, 3 (2007) [hereinafter INTERNATIONAL SECTORAL AGREEMENTS].

could consist entirely of international sectoral agreements, or it could include a mix of economy-wide emission limitations, policy-based commitments, and international sectoral agreements.<sup>149</sup> 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.<sup>150</sup>

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.<sup>151</sup> 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.<sup>152</sup> Interestingly, the Kyoto Protocol contains elements of this approach. The emissions targets for developed countries range from an 8 percent reduction from 1990 levels (e.g., European Union) to a ten percent increase above 1990 levels (Iceland).<sup>153</sup> While some developed countries undertook their commitments on a more-or-less principled basis, the targets of other countries reflected their political and economic concerns and circumstances.<sup>154</sup> Somewhat similarly, the level of commitment contained 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<sup>155</sup> to the 1979 Convention on Long-Range Transboundary Air Pollution<sup>156</sup> 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.<sup>157</sup> The first protocol, which was

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149. *Id.* at 3.

150. *Id.* at 6.

151. BODANSKY & DIRINGER, *supra* note 138, at 12.

152. *Id.*

153. Kyoto Protocol, *supra* note 2, Annex A.

154. See OBERTHUR & OTT, *supra* note 20, 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 countries 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 ENV'T REP., 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>.

155. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Further Reduction of Sulphur Emissions, June 14, 1994, 33 I.L.M. (1994) [hereinafter Oslo Protocol].

156. Convention on Long-Range Transboundary Air Pollution, Nov. 13, 1979, T.I.A.S. No. 10,540, 1302 U.N.T.S. 217.

157. PATRICIA W. BIRNIE & ALAN E. BOYLE, INTERNATIONAL LAW AND THE ENVIRONMENT 510 (2d ed. 2002).

adopted in 1985, required reductions in sulfur dioxide emissions of at least 30 percent.<sup>158</sup> The 1994 Oslo Protocol established separate overall sulfur dioxide emission ceilings and compliance dates for each party.<sup>159</sup> 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 required parties to meet specific limits for sulfur dioxide emissions for new large stationary combustion sources as well as sulfur limits in petroleum fuels.<sup>160</sup> 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 should 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 – following the approach taken in the Kyoto Protocol. Because the Bali Action Plan calls on all parties to consider “[c]ooperative sectoral approaches and sector-specific actions,”<sup>161</sup> sectoral agreements are specifically contemplated as part of a multi-track approach. By the terms of the Action Plan, moreover, 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 by Kyoto. Thus, these mitigation actions 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,”<sup>162</sup> 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. The parties could conceivably make separate agreements on each of these issues, or at least undertake 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

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158. *Id.*

159. Oslo Protocol, *supra* note 155, art. 2.2 & Annex II.

160. *Id.* arts. 2.5(a) & 2.5(c).

161. Bali Action Plan, *supra* note 5, para. 1(b)(iv).

162. *Id.* para 1(b)(ii).

in the Kyoto Protocol.<sup>163</sup>

## 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 opportunity to take advantage of co-benefits will encourage countries to implement specified policies and measures as rapidly as they can. 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 2020<sup>164</sup> 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. An analysis of three different scenarios shows how this is so.

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 or policy-based agreements that have earlier implementation dates.<sup>165</sup> Perhaps, for example, the parties conclude an interna-

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163. 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.

164. See EUR. ENVTL. AGENCY, *supra* note 4, at 7; Presidency Conclusions, Brussels European Council (May 2, 2007) at 12, available at <http://register.consilium.europa.eu/pdf/en/07/st07/st07224-re01.en07.pdf> (last visited Aug. 11, 2008) (describing reduction plans).

165. Other tracks for achieving early action are also available. These include science and technology



tional 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; indeed, the deforestation agreement could be considered as one kind of policy-based or international sectoral agreement. 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.<sup>166</sup> 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 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

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cooperation, agreements to facilitate access to technology, and financial mechanisms. BODANSKY & DIRINGER, *supra* note 138, at 3. There could also be tracks authorizing or encouraging unilateral industry initiatives. INTERNATIONAL SECTORAL AGREEMENTS, *supra* note 148, at 4.

166. 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.

limited to, and may even exceed, their climate change mitigation benefits.<sup>167</sup>

#### 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 have been identified. 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 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.<sup>168</sup> 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 the international effort.<sup>169</sup> Another consideration is the time required for implementation, as well as financial and logistical challenges; some policies can be put in place and carried

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167. *Technical Summary*, *supra* note 46, at 83-87. This is, in fact, very much like the way U.S. states began addressing climate change. *Moving the Climate Debate*, *supra* note 97, at 10,935.

168. 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.

169. LEWIS & DIRINGER, *supra* note 145, at 7. For an overview of how emissions reductions from various types of policy commitments could be quantified, see *id.* at 19-22.

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.<sup>170</sup> 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 emissions.<sup>171</sup> According to a recent analysis of more than eighty studies around the world, carbon dioxide emissions from buildings could be cost-effectively reduced by 29 percent by 2020.<sup>172</sup> Significantly, the greatest opportunities for emissions reductions exist in developing countries (52 percent of building-related emissions), followed by economies in transition (37 percent) and developed countries (25 percent). Energy-efficient lighting was identified in the study as the single most cost-effective measure and the measure most capable of reducing emissions.<sup>173</sup>

*Opportunity to foster sustainable development.* Policies and measures that foster development, especially sustainable development, will be attractive to both developed 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.<sup>174</sup> “The most promising policy approaches,” IPCC has concluded, “will be those that capitalize on natural synergies between climate protection and development priorities to advance both simultaneously.”<sup>175</sup> 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

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

171. See Diana Ürge-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, reduce emissions to approximately 2004 energy consumption levels).

172. Ürge-Vorsatz & Novikova, *supra* note 171, at 642.

173. *Id.*

174. The World Resources Institute has an online data base of sustainable development policies and measures. World Resources Institute, SD-PAMs Database, <http://projects.wri.org/sd-pams-database> (last visited Aug. 11, 2008). See also JANE ELLIS ET AL., ORGANIZATION FOR ECONOMIC CO-OPERATION & DEVELOPMENT & INTERNATIONAL ENERGY AGENCY, SD-PAMs: WHAT, WHERE, WHEN, AND HOW? (2007), available at <http://www.iea.org/textbase/papers/2007/SD-PAMs.pdf> (explaining how sustainable development policies and measures could be used under the Framework Convention); Harald Winkler et al., Sustainable Development Policies and Measures: Institutional Issues and Electrical Efficiency in South Africa (2002), available at <http://www.erc.uct.ac.za/publications/SDPAMs%20ind%20EE%20in%20SA%20final.pdf> (explaining that these policies and measures address both development and climate change mitigation).

175. Barker et al., *supra* note 95, at 669.

increase the range of policies and measures beyond those that would pass a narrow cost-effectiveness test.<sup>176</sup>

*Energy efficiency and energy conservation.* Energy efficiency and conservation<sup>177</sup> 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 emissions reductions. By improving their energy efficiency at an annual rate of 2.5 percent 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.<sup>178</sup> As previously noted, efficiency and conservation are also likely to be more cost-effective than the other basic mitigation options – direct control of greenhouse gas emissions, long-term storage of carbon, and adaptation to climate change – 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.”<sup>179</sup> Substantial energy saving opportunities exist for buildings, transportation, electricity generation, and industry, the G8 said, and it described commitments made to improve efficiency in each of these sectors.<sup>180</sup>

Energy efficiency and conservation also address the largest and fastest growing source of greenhouse gas emissions – carbon dioxide.<sup>181</sup> Carbon dioxide from fossil fuel use represented 56.6 percent 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 percent between 1970 and 2004.<sup>182</sup>

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.

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176. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding*, *supra* note 138, at 38-40.

177. 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, REPORT OF NAT'L ENERGY POL'Y DEVELOPMENT GROUP, 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.*

178. INT'L 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](http://www.unfoundation.org/files/pdf/2007/Realizing_the_Potential_Energy_Efficiency_full.pdf) [hereinafter REALIZING THE POTENTIAL OF ENERGY EFFICIENCY].

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

180. *Id.* paras. 67-74.

181. *Technical Summary*, *supra* note 46, at 27-28; REALIZING THE POTENTIAL OF ENERGY EFFICIENCY, *supra* note 178, at 27, 28. Carbon dioxide is one of six gases covered under the Kyoto Protocol. Kyoto Protocol, *supra* note 2, Annex A.

182. REALIZING THE POTENTIAL OF ENERGY EFFICIENCY, *supra* note 178, at 2-3.

Developed countries, with 20 percent of the world's population, are responsible for 46 percent of the greenhouse gas emissions.<sup>183</sup> Developing countries, which contain the other 80 percent of the world's population, contribute 54 percent of the greenhouse gas emissions.<sup>184</sup> No one seriously argues that we can successfully address climate change by allowing all countries to emit 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,<sup>185</sup> for example, the United States Congress upgraded fuel efficiency standards for automobiles and required the phase-in of a new generation of more energy efficient lighting. The use of international agreements to further 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 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.<sup>186</sup>

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183. *Id.* at 30.

184. *Id.*

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

186. MALCOLM GLADWELL, *THE TIPPING POINT: HOW LITTLE THINGS CAN MAKE A BIG DIFFERENCE* (2000);

*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.<sup>187</sup> The objective of avoiding technological lock-in is less likely to be consistent with many of the other factors on this list because cost-effective alternatives to 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 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, policies and measures that do one or more of these things 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 consistent with these factors could be identified by the parties themselves, by one or more groups of experts specifically constituted for the purpose, or both.<sup>188</sup> 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 sectoral or policy-based agreement. The list would telegraph to the world the high likelihood that such policies and measures would be part of a post-Kyoto agreement, and it would

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INTERNATIONAL SECTORAL AGREEMENTS, *supra* note 148, at 11.

187. INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2007, CHINA AND INDIA INSIGHTS, 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.

188. One source of expertise is Working Group III of the Intergovernmental Panel on Climate Change, which produced CLIMATE CHANGE 2007: MITIGATION, *supra* note 6.



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

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 ratify or accede to 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, to encourage developing country participation. The agreements should include provisions for increasing their stringency over time, and they should be supported by appropriate trade incentives and restrictions. The following is a basic sketch of the characteristics of these agreements.<sup>189</sup>

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, require that governmental policies and measures have the force and effect of law, require an explanation of how the agreement 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.”<sup>190</sup> The commitment of developing countries to consider mitigation measures that are “supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner”<sup>191</sup> 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.<sup>192</sup> This minimum

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189. 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. *See, e.g.*, S. 2191, 110<sup>th</sup> Cong. Title V (as reported by S. Comm. on Env't and Pub. Works, Dec. 5, 2007) (strengthening existing energy efficiency provisions for appliances and buildings and imposing a cap-and-trade program).

190. Bali Action Plan, *supra* note 5, para. 1(b)(i).

191. *Id.* para. 1(b)(ii). *See* source cited *supra* note 39.

192. Cf. LEWIS & DIRINGER, *supra* note 145, at 12 (describing similar option). At the Asia-Pacific Economic

standard should also be capable of being met within a fixed but relatively short period of time after 2009.

Countries should be allowed to ratify or accede to 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.<sup>193</sup> 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 national measure implementing the agreement must meet and how performance is to be evaluated. That could be done in a Copenhagen agreement or authorized to be done immediately afterwards by appropriate working groups.

These agreements should include provisions that positively attract developing country participation as quickly as possible. The Clean Development Mechanism, one of the emissions trading mechanisms authorized by the Kyoto Protocol,<sup>194</sup> 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.<sup>195</sup> Those requirements could apply to policies and measures identified in the multi-track agreement.<sup>196</sup> This approach would help carry out the Bali Action Plan language that developing country mitigation actions be "supported and enabled by technology, financing and capacity-building," and carried out in "a measurable, reportable and verifiable manner."<sup>197</sup>

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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 Aug. 11, 2008). If the latter goal was achieved, they said, an amount of carbon would be stored that is equal to about 11 percent of global emissions in 2004. *Id.*

193. LEWIS & DIRINGER, *supra* note 145, at 11.

194. Kyoto Protocol, *supra* note 2, art. 12.

195. 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).

196. *Cf.* LEWIS & DIRINGER, *supra* note 145, at 13-15 (explaining how CDM could be modified to apply to policy commitments).

197. Bali Action Plan, *supra* note 5, para. 1(b)(ii). *See also* G8 Summit, Growth and Responsibility in the

Unhappily, there is evidence that the Clean Development Mechanism has not effectively implemented the requirement that emissions reductions be in addition to those that would otherwise occur.<sup>198</sup> If the Clean Development Mechanism is to be employed for this purpose,<sup>199</sup> 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 to governments and also help steer private financial flows to developing and transition economies.<sup>200</sup> 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 ESCOs or energy efficiency projects.”<sup>201</sup> 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.<sup>202</sup> These agencies should be directed to support, or at least not undermine, the framework of early and substantial results proposed here.<sup>203</sup> Agreements for technical

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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.

198. Michael W. Wara & David G. Victor, *A Realistic Policy on International Carbon Offsets* 8 (2008), available at [http://iis-db.stanford.edu/pubs/22157/WP74\\_final\\_final.pdf](http://iis-db.stanford.edu/pubs/22157/WP74_final_final.pdf) (“CDM and other offset schemes are unable to determine reliably whether credits are issued for activities that would have happened anyway”).

199. Even if the Clean Development Mechanism is not used to provide certified emissions reductions from policies and measures, it is likely that some other entity or mechanism would need to make similar judgments about claimed reductions.

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

201. TAYLOR ET AL., *supra* note 86, at 31.

202. Seymour et al., *supra* note 200, at 176.

203. 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

assistance and training to developing countries in establishing and carrying out these policies and measures might also be of value.<sup>204</sup>

These policy-based or international sectoral agreements should also contain mechanisms for making the emissions reduction goal more stringent over time. This could be done by regular meetings of the Conference of the Parties, as 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 allowing that country to gain some kind of economic benefit as a result. To gain the same benefit, other countries would have to 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 economic benefit.<sup>205</sup> Another option would be to allow a policy-innovating country to receive a small fraction of the certified emissions reductions generated by other countries from reductions achieved 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.<sup>206</sup> Those offsets would, of course, need to meet certain standards to ensure that they are real, non-duplicative, 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.<sup>207</sup> 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.

Finally, the agreements should prevent or control leakage. Leakage occurs

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impact. See *Friends of the Earth v. Mosbacher*, 488 F.Supp. 2d 889 (N.D. Cal. 2007).

204. 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 Aug. 11, 2008).

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

206. Again, this borrows from *id.*

207. 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. See Ira R. Feldman, *Business and Industry*, in *AGENDA FOR A SUSTAINABLE AMERICA* (John C. Dernbach ed. forthcoming 2008).

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 make a country responsible for 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 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. Policy-based or international sectoral agreements that have these characteristics are likely to help achieve substantial and early reductions of greenhouse gas emissions.<sup>208</sup>

#### G. OBJECTIONS

Two general objections may be raised to the proposal in this Article. First, it can be said that the proposal is a distraction from the main objective, which is to secure binding quantified emissions reductions, whether there are substantial short-term reductions or not. According to this objection, the distraction is at best needless (because the proposal is inconsequential) and at worst harmful (because

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208. The likelihood of noncompliance with these or similar rules, of course, means that appropriate enforcement provisions will be needed. See generally Erik B. Bluemel, *Unraveling the Global Warming Regime Complex: Competitive Entropy in the Regulation of the Global Public Good*, 155 U. PA. L. REV. 1981 (2007) (explaining challenges of different liability systems in various emissions trading programs under Kyoto Protocol and European emissions trading system). The approach proposed in this Article may have fewer challenges than the Kyoto Protocol, however. As already explained, the instrument of ratification or accession for a particular policy-based or international sectoral agreement would need to include the actual legal measure as well as projected emissions reductions. Methodologies are available to quantify the emissions reductions and other benefits of sustainable development policies and measures. Harald Winkler et al., *Methods for Quantifying the Benefits of Sustainable Development Policies and Measures (SD-PAMs)*, 8 CLIMATE POL'Y 119 (2008). The existence of non climate benefits from particular policies and measures that cannot occur with attendant greenhouse gas reductions should reduce the incidence of cheating. In many cases, too, developed countries or multilateral lending institutions such as the World Bank will have a continuing relationship concerning climate change mitigation with the developing countries in which such policies and measures are being implemented. As a consequence, there may be incentives on both sides to ensure that the claimed reductions are real. Still, some compliance problems are likely to occur. One of the challenges with enforcement under the Kyoto Protocol is that emissions reductions may be certified before the existence of reductions from a particular project or activity can be fully certain. See Bluemel at 2004-07. One option is to require the use of performance bonds. Such bonds have been used in coal mining regulation in the United States to provide a means of guaranteeing that mine operators pay for problems that occur after the mining operation has ended. Sections 509 & 519, Surface Mining Control and Reclamation Act, 30 U.S.C. §§ 1259 and 1269. Under this approach, buyers or sellers of certified emissions reductions from such policies or measures would post a surety or other bond to guarantee the integrity of the claimed reductions. If it later turns out that the claimed reductions were not achieved, the bond would be forfeit in an amount equal to the cost of making up the shortfall. For another option, see Bluemel at 2045-48.

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—that the proposal is a distraction—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 they need 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, as already suggested, the forestry agreement is a model for the kind of framework suggested here; it sets up a process to significantly reduce greenhouse gas emissions from a specific source (deforestation) in the short term.

The first objection also 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, agreements concerning early reductions that give particular emphasis to cost effective actions and also foster sustainable development would further many of the other goals stated for a post-Kyoto agreement, most notably encouraging developing country participation. Thus, the goal of short-term and substantial reductions is not a marked departure from the other goals 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.<sup>209</sup> The proposal in this Article is not about policies and measures in lieu of targets and timetables; policies and measures should supplement targets and timetables.

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

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209. Japan has proposed the use of internationally agreed policies and measures in specific sectors rather than economy-wide quantitative emission limitations. Toshio Aritake, *Japan Proposal on Post-Kyoto Accord Calls for Targets in Eight Key Sectors*, DAILY ENV'T REP., Mar. 17, 2008, at A-12.



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.

The second objection—that the framework suggested here is not politically infeasible—is also incorrect. The proposal 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 particular national commitments and international sectoral agreements that come out of the negotiating process. In fact, the factors for selecting policies and measures should ensure that the great bulk of them are attractive. 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 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 responsibili-

ties contained in the Framework Convention stating 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. While climate change is an urgent issue, 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 change 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.