

*MIT Joint Program on the Science
and Policy of Global Change*



Climate impasse: How The Hague Negotiations failed*

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This report is one of a series intended to communicate research results and improve public understanding of climate issues, thereby contributing to informed debate about the climate issue, the uncertainties, and the economic and social implications of policy alternatives.

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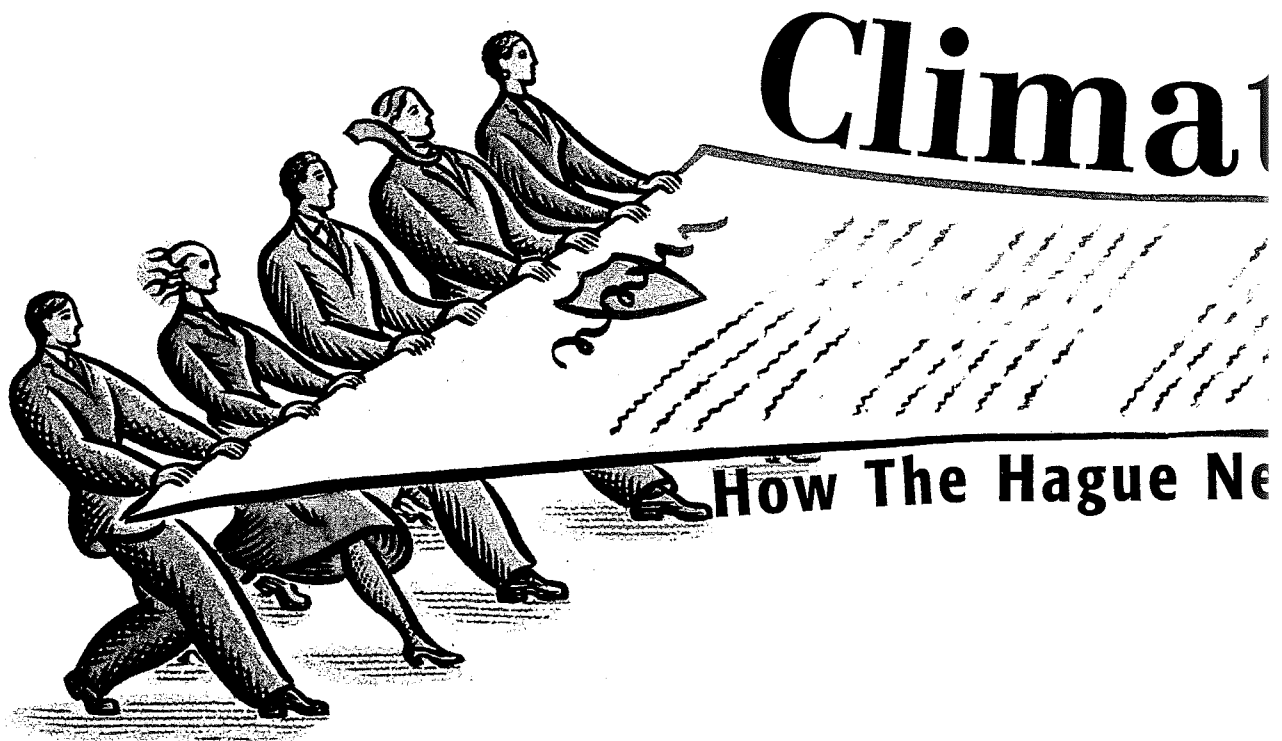
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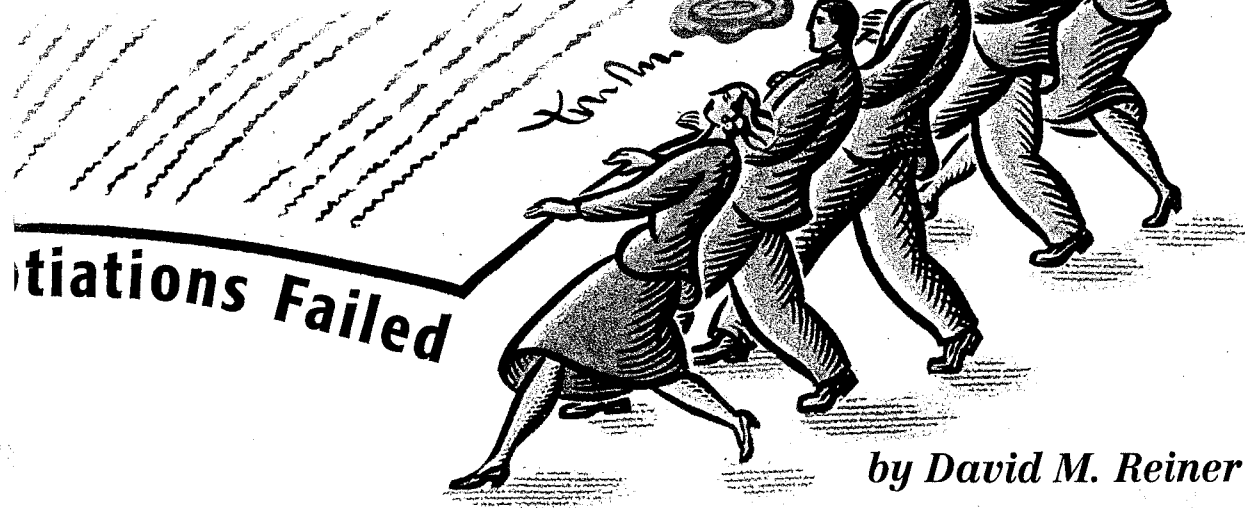
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As in Kyoto three years earlier, after weeks of acrimonious debate, the climate negotiations at The Hague in November 2000 culminated in the need for a compromise between Europe and a U.S.-led coalition in the wee morning hours of the final day. This time, however, no deal could be brokered. The Kyoto Protocol, prepared in December 1997, had masked irreconcilable differences among participants by papering over many fundamental disagreements among and within the negotiating parties. In Kyoto, nations had specified only the overall national emissions reduction targets, but they had left vague the definitions and had not stipulated the mechanisms available to reach those targets. In so doing, nations had not so much come to agreement as postponed disagreement. It was this vagueness that would ultimately doom the Sixth Conference of the Parties (COP-6) at The Hague.

e Impasse



by David M. Reiner

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Tensions at COP-6 could be discerned along virtually every line of intersection: between Europe and the rest of the developed world, between developed and developing world governments, within the developing world, within the European Union (EU), between the executive and legislative branches in the United States, within industry, and even within the environmental movement.

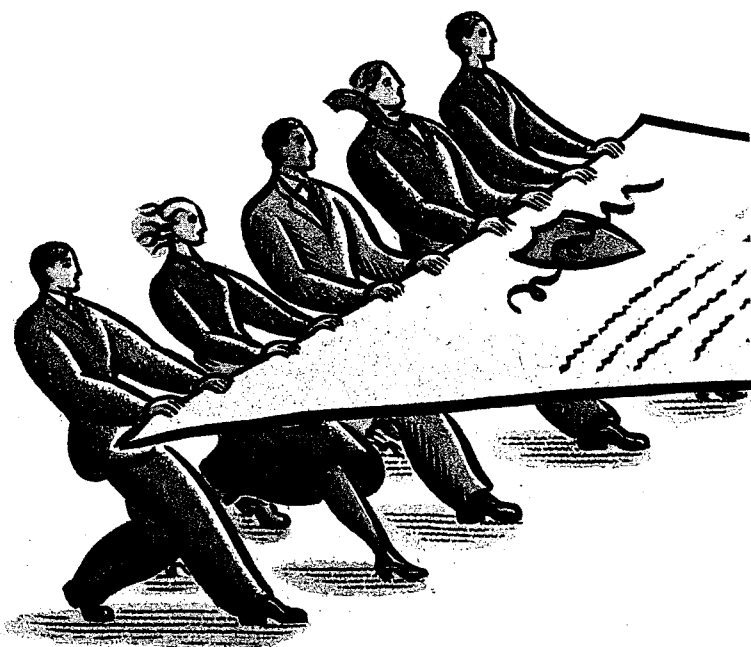
The ostensible cause of the failure at The Hague was along the interface between the U.S.-led "umbrella group" (including Japan, Canada, Australia, and, more tentatively in The Hague, New Zealand and Norway) and the EU, but many other dimensions contributed to the result and could as easily have set in motion the downfall of the agreement, if not at The Hague, then at some point in the not-too-distant future. One sticking point between the United States and Europe concerned the terms under which nations could

use carbon "sinks," such as forests and agricultural soils, which absorb carbon dioxide, to offset their emissions.¹ Another was over the extent to which nations would be required to implement domestic action to meet reduction goals instead of seeking credits for emissions reductions achieved abroad. Controversy surrounded the terms under which trading of emissions permits would be conducted among developed nations. In addition, the rules were not settled governing individual emissions reductions projects through which countries or firms could seek credit for activities carried out in other countries, either under Joint Implementation (which was restricted to the developed world) or the Clean Development Mechanism (CDM) (for projects conducted in developing countries).² These mechanisms would allow credit-bearing projects to be undertaken in developing countries. The umbrella group argued for liberal interpreta-

tions that would enable countries to meet their emissions reductions at lower cost, while the Europeans supported strict rules that would guarantee significant domestic cuts in fossil fuel consumption—a goal they believed to be more in keeping with the essence of climate policy. In spite of last-minute efforts, the gap was simply too pronounced, and nations decided to let the talks fail and then reconvene in Bonn in mid-2001 to sift through the pieces and decide how to proceed.

From Rio to Kyoto

The Framework Convention on Climate Change (FCCC), agreed to in 1992 at the Earth Summit in Rio de Janeiro and quickly ratified by almost every nation in the world, committed signatories to stabilizing greenhouse gas concentrations “at a



level that would prevent dangerous anthropogenic interference with the climate system.” Developed nations also agreed to “take the lead” in combating climate change by assuming a voluntary aim to return national emissions in 2000 to 1990 levels and by offering to provide some financial support to developing countries.³

In one sense, any agreement to stabilize concentrations is a remarkably ambitious, long-term undertaking. Stabilizing atmospheric concentrations would require not only slowing or freezing global emissions but reversing trends until global emissions begin to decline sharply. The most commonly cited stabilization scenario—550 parts per million of carbon dioxide or roughly a doubling of pre-industrial levels—would require dramatic cuts in emissions to between 60 and 80 percent of cur-

rent levels by 2100. By contrast, carbon emissions in the developed world have been growing at a rate of roughly 1 percent per year during the 1990s and are expected to continue at these rates absent significant domestic action. Further, growth rates in the developing world, which have been increasing by 4.5 percent annually, are expected to slow only slightly between 1997 and 2020 to 3 percent.⁴ However, the goal of stabilizing concentrations does not require nations to reduce emissions now or at any specific date in the future; that is, less aggressive reduction programs in the near-term can be traded off against a presumed commitment to steeper reductions in the future.⁵

The real question facing nations in the wake of the Rio Summit was what first steps would be taken to move the global economy onto a less carbon-intensive path. Since Rio, many alternative approaches have been proposed, ranging from technology strategies that focus primarily on advanced clean energy alternatives to adaptation strategies that emphasize preparedness for climate-related disasters and compensation for those populations most likely to be severely affected by climate change.⁶ The success of the sulfur dioxide trading program under the 1990 U.S. Clean Air Act Amendments led to proposals for emissions trading systems at the national and multinational level.⁷ Even more ambitious was a proposal to create a “sky trust” that would redistribute the proceeds from the revenues generated by auctioning off carbon permits to meet an emissions target.⁸

Instead, in the period between Rio and Kyoto, the climate negotiators took the most straightforward path—but perhaps the one that predestined the resulting accord for failure. Meeting in the first conference of parties (COP-1) in Berlin in 1995, after enough countries had ratified the FCCC for it to come into force, participants decided to continue toward the goal set out in the voluntary aim taken at Rio to return emissions to historical levels by endeavoring to create a legally binding instrument that called for comparable emissions reductions below the base year of 1990. The United States and Japan, the nations that had been the most reluctant to embrace such an approach early in the negotiations, eventually acquiesced. From the beginning, acceptance of these legally binding constraints was contingent upon allowing some flexibility in the manner by which those targets could be achieved. At COP-2 in Geneva, Tim Wirth, then U.S. Undersecretary of State, recommended “that future negotiations focus on an agreement that sets a realistic, verifiable and binding medium-term emissions target . . . met through maximum flexibility in the selection of implementation measures.”⁹

The failures and successes in meeting the voluntary aim should, perhaps, have signaled the true level of commitment by developed country governments and the inherent problems of a target based on historical emissions levels (1990 for both Rio and Kyoto).¹⁰ Since 1990, each nation had followed a different trajectory in its pattern of energy consumption and economic growth, and therefore national trends in greenhouse gas emissions were far more dependent on macroeconomic growth than

on climate policy per se. Success was governed not by ambitious national programs but rather by luck: Russia met its target through economic collapse; Germany met its target because of the fall of the Berlin Wall and the subsequent reintegration of East Germany; and Great Britain met its target through the discovery of North Sea oil and natural gas, the changeover from coal to gas-fired electric power, and the defeat of the coal-mining unions. By contrast, the Netherlands, which has perhaps the most ambitious domestic climate program, came nowhere near its Rio target.¹¹

If the basic notion of the Kyoto Protocol was to extend the commitments made at the Rio summit by implementing similar cuts from historical emissions levels, then it should have seemed even more problematic that the largest emitter, the United States, appeared less prepared to undertake serious action. Prior to Kyoto, in July 1997, the U.S. Senate unanimously passed the Byrd-Hagel resolution, a non-binding resolution demanding that any climate agreement be contingent upon the participation of developing countries and result in minimal harmful effects on the U.S. economy.¹² Moreover, many U.S. legislators were notably skeptical of the validity of climate science that had already been accepted without question in the rest of

the developed world.¹³ The United States had already exceeded its 1990 targets by 10 percent at the time of COP-3 in Kyoto in 1997,¹⁴ and President Bill Clinton's administration was constantly fighting to maintain congressional funding even for the voluntary programs designed to encourage energy efficiency through subsidies and education. These programs were consistently underfunded and have produced only minor reductions in carbon emissions.¹⁵

In contrast to the relatively minor actions taken throughout the 1990s by developed nations, many hoped that the binding commitments agreed to in Kyoto would produce far more effective domestic regulatory action. In spite of national differences, agreement in Kyoto was facilitated on a number of fronts. Raul Estrada, the Argentine chair of the proceedings, had the benefit of having led frequent meetings over the two-year period between the conferences in Berlin and Kyoto. The rapport he had developed allowed him to use humor, a quick gavel, and a good sense

of pacing to advance proceedings. When it came to the final political tradeoffs, Vice President Al Gore flew to Kyoto in the last hours to ensure that some sort of agreement emerged; the Japanese were unwilling to scuttle any agreement held in their ancient capital; and the British deputy prime minister, John Prescott, who also happened to be the chief environment minister, had the job of negotiating with the United States and its allies. Moreover, although Kyoto did assign numbers to the overall commitment, an agreement was possible only because none of the details of how to achieve these numbers were specified. The text on the appropriate balance between domestic and external measures simply stated that the various flexibility mechanisms would be "supplemental to domestic actions," and the articles on sinks offered the perverse possibility that forest companies could be rewarded for clearing plantations and replanting, a clearly untenable result. Thus, the fundamental differences between the United States and Europe over the extent to which sinks or trading could be used were left awaiting resolution.

With so many contentious, unresolved issues remaining between the United States and Europe, the need for negotiations with developing countries at times appeared as an

afterthought, even though emissions are growing most rapidly in the developing world. The Byrd-Hagel resolution, however, placed developing country participation center-stage and thus forced the Clinton administration, including the president himself, to plead with and cajole nearly every developing country to assume some sort of commitment to reduce emissions. Because they started from much lower levels of development (and emissions per capita), many developing countries were loath to assume anything resembling binding commitments in the short- to medium-term; however, most of them did fulfill their obligations under the FCCC (with financial support from the developed world) by creating emissions inventories and developing the institutions and technologies essential to implement climate control programs.

Although some developing countries, such as the small island states, supported the strongest possible agreement and others, such as the oil-exporting nations, sought to obstruct the pro-

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ceedings, most remained ambivalent to greater involvement in the climate regime. Key nations, such as India and China, were attracted by the possibility of the transfer of more advanced technologies and financial and technical support for domestic efforts to reduce local pollution, though they were concerned with the implications for national sovereignty, economic development, and by the hint of what some referred to as "eco-imperialism."¹⁶ Though developing countries sought to speak with one voice through the group of 77 (G-77) and did a remarkable job considering their divergent interests, by the time of the final debate over emissions trading held at Kyoto, the divisions among developing countries were evident.¹⁷ At The Hague, these differences would only multiply.

From Kyoto to The Hague

The disparate negotiating positions taken by the nations at Kyoto and later at The Hague reflected differences over the anticipated material gains from alternative formulations of the agreement, but they also were reinforced by deeper divisions in political agendas in both domestic and foreign affairs, in national cultures, in the level of media attention devoted to the question, in the consensus (or lack thereof) regarding the costs of reducing emissions domestically, and over the perceived severity of the potential threat from global warming. All of these factors fueled differences in beliefs regarding the economic and political costs of measures to reduce emissions of greenhouse gases and the fairness of any particular approach. Unlike the United States, where climate change receives scant attention when describing or explaining extreme weather, virtually every extreme weather event in Europe is related back to climate change. Deeply consumed by their own internal priorities, nations seemed as if they were negotiating with studied indifference to the internal divisions that governed the national positions of others. The beginnings of the difficulties that lay ahead for the negotiations could be seen a year later at COP-4 in Buenos Aires, when the task of rearranging the elements of the protocol into an action plan turned into a very contentious and ill-humored two-week marathon.¹⁸ In addition, changes in domestic political alignments boded ill for agreement. First, consider Europe: Since Kyoto, a new Red-Green government had come to power in Germany, and whereas the more pragmatic (or "realo") leader of the Greens, Joschka Fischer, had been named foreign minister,

Germany was represented at the ministerial meetings from Buenos Aires to The Hague by Jurgen Trittin, the environment minister from the more fundamentalist wing of the party. Unlike Kyoto, where the British spoke on behalf of the EU, at the time of The Hague meeting, the rotating presidency had fallen to France, which was led by Dominique Voynet, the Green Party Environment Minister (with strong backing of President Jacques Chirac). As such, the lead negotiators for the two

nations that have often been described as "Europe's engine" were keenly interested in maintaining the strongest possible position, even if it meant sacrificing the flexibility needed for reaching agreement with the United States and the umbrella group. Though the Europeans arrived with a unified position, they had spent many contentious meetings prior to The Hague meeting in debate over burden-sharing and their willingness to accept the inclusion of flexibility. Within the EU, differing views were held concerning the absolute necessity of U.S. participation in the Kyoto regime. The more conciliatory Dutch and British argued adamantly for U.S. inclusion, while the French and the Germans remained for the most part silent on this point. Even more remarkable, though, was the willingness for contin-

ued pursuit of tough domestic actions in spite of the fuel protests that had plagued Europe throughout the summer.

Another unimagined complication that loomed over the talks at The Hague was the unresolved presidential race in the United States. Though the first issue of *Eco*, the daily newsletter published by major environmental groups in attendance at COP-6, urged negotiators to "Ignore Florida,"¹⁹ the uncertainty over the presidential race did influence the process in odd ways. Aware of the potential complications presented by a change in administrations, the U.S. negotiators had argued in vain at COP-5 in Bonn in late 1999 to delay COP-6 until the new year so that an agreement could be negotiated by the administration that would have to sell it to a skeptical U.S. Senate. The awkwardness for the administration's negotiating team stemmed from the almost complete lack of attention given to the negotiation by the incoming administration and the media. A victorious Gore might well have arrived in The Hague to "save" the negotiations in a manner similar to that orchestrated in Kyoto. By contrast, George W. Bush, who was seen as the likely victor by the time COP-6 was concluding, could have

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sent his emissaries to indicate his continued opposition to the agreement negotiated at Kyoto, had he been a clear victor on 7 November. Instead, both Gore and Bush were hunkered down with their legal advisors and, perhaps more importantly, the U.S. media was focused almost exclusively on the drama in Florida. During the meeting at Kyoto, the mainstream U.S. media had briefly spotlighted a significant number of climate change-related stories. In the long shadow of Florida, no similar opportunity for media coverage would be replayed.

The departing Clinton administration did have a clear interest in an agreement that might offer a legacy and possibly saddle an incoming Bush administration with a diplomatic dilemma. The disadvantage, from the narrow perspective of reaching an agreement, was that many in the administration recognized that the use of the sizable contribution from forests and agricultural soils to offset U.S. emissions might prove attractive in the Senate, where forest and farm states hold a disproportionate number of votes.²⁰ Thus, the U.S. negotiators realized that every concession made, though bringing them closer to agreement with the Europeans and the developing countries, moved them further from a document that even remotely met the Senate's conditions for ratification.

In spite of all this, was failure at The Hague inevitable? Remarkably, no. In the wee morning hours of the final day, Britain's Prescott felt he had won concessions from the United States, most notably an agreement to leave sinks out of the CDM.²¹ Many in the French delegation clearly wanted an agreement at Kyoto, because it had been one of the priorities of their turn at the EU presidency. The British and Dutch, who were more inclined to see the virtues of trading, had voiced support for reaching agreement, particularly with the incumbent U.S. administration, which they believed to be more cooperative. Ultimately, the French and German environment ministers, both Green party members who have had to make compromises on a whole host of other issues in government, were unwilling to make further concessions to the "profligate" United States on an issue they held dear.

The choice to adjourn COP-6 and reconvene in mid-2001 also revealed the fissures in the international environmental community. European-dominated groups, such as Greenpeace and the World Wide Fund for Nature, quickly blamed the umbrella group and their demands for flexibility—which had been described by these nongovernmental organizations as "loopholes." By contrast, U.S.-based groups, such as Environmental Defense and National Environmental Trust, were more sympathetic to market mechanisms and sensitive to the possible resistance of a likely Bush administration to go even as far as the Clinton administration had been willing to in seeking compromise with the Europeans and the developing countries.

Though the divisions between Europe and the umbrella group dominated the media coverage and most of the negotiations at COP-6, there was little basis for assuming that if the EU and umbrella group had somehow arrived at a compromise, the developing world would happily have gone along. As part of the

compromise proposal put forward by the conference chairman, Jan Pronk, an adaptation fund was to be created specifically to meet the needs of the small island states and the least developed countries, and a general convention fund was to be created, amounting to an additional \$1 billion per year that had already been pledged through the Global Environmental Facility. Though the head of G-77, the Nigerian Environment Minister, Sani Zango Daura, considered the compromise to be unacceptable, offering no fair basis for agreement,²² it is not



clear that his views were shared by the entire G-77, which had many internal divisions.

Korea and Mexico joined with Switzerland to form an "Environmental Integrity Group" in the hopes that cohesion would prevent their marginalization. The former Soviet Union and its satellites split into two groups—the Central Group 11 (Central and Eastern Europe), which generally supported the EU, and Russia, the Ukraine, and the CAC-M (Central Asia, Caucasus and Moldova), which usually sided with the umbrella group. China and India were slightly less aggressive than they had been in Kyoto, although Nigeria, as chair of G-77, did engage in long, scathing attacks on developed country tactics and ethics. But while seeking to speak with one voice, divisions could be found even among sub-groups within the G-77. The least developed countries joined the small island states in seeking adaptation funds and as a moral voice for action, but Bangladesh, which is often cited for its vulnerability to flooding and typhoons, had not even signed the Kyoto Protocol. The Saudis sought to slow the process, while the Iranians offered constructive suggestions. Even forested Latin American coun-

tries frequently found themselves at odds. For example, Bolivia and Costa Rica, who supported significant use of forests and conservation activities in the CDM, were strongly opposed by Brazil.²³ Ironically, the tentative compromise that removed the option to obtain credits for sinks from CDM was bound to antagonize those forest-rich developing countries that had been the most ardent supporters of the international climate regime within the developing world. How these divisions may have affected the outcome remains unclear. Perhaps these simmering divisions would have come to the forefront if the United States and the European Union had reached an agreement and then turned to negotiate more seriously with the developing nations, but that time never arrived.

Aftermath

The failure resulted in feelings of acrimony—at least within Europe—where the media devoted many reports both during and after the conference to explaining the causes of failure. Many observers instinctively blamed the United States for its wasteful ways and for its stubborn insistence upon the inclusion of carbon sinks. Those who focused on the last few hours of the conference and the demise of the tentative deal laid the blame on the unwillingness of French and German Greens to compromise, or the British or Pronk for moving too far in the direction of the U.S. position. Prescott had stormed out of the Congress Center claiming that he had been “gutted” and accusing Voynet of having been too tired to understand the final compromise. In turn, Voynet accused Prescott of grandstanding and machismo.²⁴ Although within a few days Prescott spoke more positively of French leadership, a clear side benefit of the conference for the deputy leader of the British government was the opportunity to position New Labour, for the consumption of his domestic audience, on the same side as the United States against extremist forces within the EU. In the United States, senators who had never much cared for the Kyoto process and who still voiced skepticism at the science behind global warming, nevertheless blamed the Clinton administration for having surrendered too much to the Europeans on carbon sinks and flexibility mechanisms.

A final effort to revive the tentative EU-umbrella group agreement before the Clinton administration left office was held in Ottawa a few weeks after The Hague talks ended. By

moving outside of the UN process, key developed countries hoped to resolve some of their larger differences. If the Ottawa talks had been positive in tone or content, a ministerial-level meeting in Oslo the following week would have sought to finalize a deal at least within the developed world. Instead, both European and U.S. negotiators accused each other of pulling back from positions already agreed to at The Hague, and once again negotiations ground to a halt.²⁵ Some would argue that if developed countries had ever been serious about reaching agreement, they should have met among themselves a decade earlier and then later, only after an agreement had been reached, incorporated the developing world into the regime. Because no agreement could be reached even among the developed nations, developing countries might properly have wondered why they were being pressured to make concessions and negotiate with developed-country partners who were in a stalemate themselves.

Perhaps the simplest explanation for the failure at The Hague was presciently offered by a senior official in Japan’s Ministry of Foreign Affairs, who early in the conference said: “To be honest, we should have made the rules first.”²⁶ The divisions between the parties were to be expected. The European negotiators—facing greater media scrutiny, a more favorable situation with respect to their Kyoto target, Green parties within government, and some decision-

making power vested in environment ministries—wanted a more stringent deal than the United States, Japan, and their allies could accept. Because the targets had been enshrined at Kyoto and were unmovable, the United States and its allies sought to reduce their commitment by maximizing sinks and seeking opportunities for emissions reductions abroad. If the Europeans truly wanted tougher rules on sinks, CDM, and perhaps even trading, they should have been willing to trade off stringency in the rules by reducing the emissions targets. But strangely, targets were the only numbers taken off the table, even though their exclusion led to the exacerbation of the differences in national positions by placing the United States—one of the nations least likely to meet its target—in a worse position than if, say, nations had agreed to use 2000 as the base year instead of 1990 or to revise the arrangement for sharing national emissions targets. With the incoming U.S. administration likely to be an even tougher negotiating partner, Europe

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and developing nations must decide at an interim meeting in Bonn in June, or perhaps at COP-7 in Marrakech, whether to reopen the Kyoto Protocol, let it fail, try to somehow cobble together an agreement without the United States, or be willing to revisit and perhaps substantially modify the negotiating positions that had become entrenched since COP-1 in Berlin.

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NOTES

1. On the question of the role of sinks in the Kyoto Protocol, see H. E. Ott, "The Kyoto Protocol: Unfinished Business," *Environment*, July/August 1998, 16-20, 40-44; and B. Schlamainger and G. Marland, "Land Use and Global Climate Change: Forests, Land Management, and the Kyoto Protocol," Pew Center on Global Climate Change, June 2000, 13-26, 44-48.

2. L. D. D. Harvey and E. J. Bush, "Joint Implementation: An Effective Strategy for Combating Global Warming," *Environment*, October 1997, 14-20, 36-43; and J. Lanchbery, "Expectations for the Climate Talks in Buenos Aires," *Environment*, October 1998, 16-20, 42-45.

3. Framework Convention on Climate Change articles 4.3, 4.2(b), and 12.1 (Rio, 1992).

4. Energy Information Administration (EIA), *International Energy Outlook 2000*, Report No. DOE/EIA-0484 (2000), Table 22, 167.

5. T. M. L. Wigley, R. Richels, and J. A. Edmonds, 1996. "Economic and Environmental Choices in the Stabilization of Atmospheric CO₂ Concentrations," *Nature* 379 (18 January 1996): 240-243.

6. J. Edmonds and M. Wise, "Exploring a Technology Strategy for Stabilizing Atmospheric CO₂," in C. Carraro, ed., *International Environmental Agreements on Climate Change* (Dordrecht: Kluwer Academic, 1999); and D. Sarewitz and R. Pielke Jr., "Breaking the Global-Warming Gridlock," *Atlantic Monthly*, July 2000, 54-64.

7. Denmark has proposed a cap-and-trade system for carbon dioxide emissions that would come into force by 2001. In the United States, proposals have explicitly been designed to be independent of Kyoto. Sen. James Jeffords (R-VT) proposed trading in carbon dioxide emissions as part of his proposed electricity restructuring bill in 1998. Presidential candidates Bush and Gore proposed a four-pollutant trading scheme that would include carbon dioxide, in addition to mercury, particulates, and nitrogen dioxide. See also J. Naimon and D. S. Knopman, "Reframing the Climate Change Debate: The United States Should Build a Domestic Market Now for Greenhouse Gas Emissions Reductions," *Progressive Policy Institute Policy Report*, 1 November 1999; and W. J. McKibbin and P. J. Wilcoxon, "A Better Way to Slow Global Climate Change," *Brookings Policy Brief No. 17* (June 1997).

8. P. Barnes, "The Pollution Dividend," *The American Prospect* 10 (May/June 1999): 61-67.

9. Undersecretary of State Timothy Wirth at COP-2 in Geneva in July 1996, cited in M. Grubb, with C. Vrolijk and D. Brack, *The Kyoto Protocol: A Guide and Assessment* (London: Royal Institute of International Affairs, 1999), 54.

10. For early warnings of the dangers of placing emissions targets at the core of climate policy, see T. C. Schelling, "Some Economics of Global Warming," *American Economic Review* 82 (March 1992): 1-14; and D. G. Victor and J. E. Salt, "Keeping the Climate Treaty Relevant," *Nature* 373 (26 January 1995): 280-282.

11. For a study of the evolution of carbon emissions in developed countries, see L. J. Schipper et al., "The Road from Kyoto: The Evolution of Carbon Dioxide Emissions from Energy Use in IEA Countries," *Proceedings of the 1998 Summer Study on Energy Efficiency in Buildings*, August 23-27, 1998, vol. 9, 147-160.

12. S. Res. 98, 105th Congress, 1st session. Senate Report No. 105-54. See also the debate in J. Passacantando, "A Pothole in the Ozone Layer," *The Washington Post*, 15 March 1998, C5; and R. Byrd and C. Hagel, "Advice to Heed on the Kyoto Treaty," *The Washington Post*, 6 May 1998, A19.

13. E. B. Skolnikoff, "Same Science, Differing Policies: The Saga of Global Climate Change," Joint Program on the Science and Policy of Global Change Report No. 22 (Cambridge, Mass., August 1997), 3-7.

14. EIA, note 4 above. In 1997 U.S. emissions were 1,480 million metric tons of carbon (mmtC) compared to 1,345 mmtC in 1990 or an increase of 10.0 percent.

15. For example, EIA estimates that in 2010, all of the tax incentives combined will have reduced carbon emissions by just 1.3 million metric tons (mmtC) at a cost in reve-

nue loss over the period 2001-2005 of \$3.6 billion (1998\$). EIA, "Analysis of the Climate Change Technology Initiative: Fiscal Year 2001," Report No. SR/OIAF/2000-01, April 2000, Table ES1, xiii.

16. V. Houlder, "Explorers on the Trail of 'Carbon Sinks' Stir Spectre of Imperialism," *Financial Times*, 22 November 2000, 10.

17. C. Clover, "3am: When India Took Talks to the Brink of Collapse," *The Daily Telegraph*, 12 December 1997, 18.

18. D. M. Reiner, "Progress at Buenos Aires?" *Environment*, December 1999, 4; and J. Depledge, "Coming of Age at Buenos Aires: The Climate Change Regime After Kyoto," *Environment*, September 1999, 15-19.

19. "Ignore Florida!" *Eco*, 13 November 2000, 4.

20. See National Environmental Trust, "Farm Organizations May Shift Stance on Kyoto Protocol: Senate Ratification Chances Improve," press release (17 November 2000). Senators Pat Roberts (R-KS) and Sam Brownback (R-KS), along with other conservative, anti-Kyoto colleagues, in fact had introduced a number of bills in the 106th Congress to study carbon sequestration and to begin to provide incentives to farmers for increasing sequestration efforts.

21. C. Clover, "Saving the World Was Never Going To Be Easy," *The Daily Telegraph*, 27 November 2000, 12; and "Negotiators Find Little Agreement in Ottawa," *Global Environmental Change Report*, vol. 12, 15 December 2000, 1-3.

22. J. A. Dillon, "Pronk Draws up Paper to Salvage Climate Change Talks," *Earth Times*, 23 November 2000; and J. Socolovsky, "With Clock Ticking, Climate Talks Deadlocked over U.S. Position," Associated Press, 23 November 2000.

23. Summary of the Sixth Conference of the Parties to the Framework Convention on Climate Change: 13-25 November 2000, *Earth Negotiations Bulletin*, vol. 12, no. 163, 27 November 2000, accessed via <http://www.iisd.ca/vol12/enb12163e.html>.

24. R. McKie, "Climate Talks End in Disarray: Prescott Storms Out of Hague Summit: U.S. Refuses to Cut Global Warming Gases," *The Observer*, 26 November 2000, 1.

25. "Climate Talks Go from Bad to Worse," *Global Environmental Change Report*, vol. 12, 29 December, 2000, 1-3.

26. M. Goel, "The Japanese Perspective Three Years after Kyoto," *Earth Times*, 16 November 2000.

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