

# Science & Technology

---

## Whither Kyoto?

*Ten years of climate change policymaking*

David M. Reiner

Global climate change has been on the international environmental agenda for the last decade, but policymakers are still struggling to develop an effective solution to this looming problem. Climate change concerns are based on the idea that greenhouse gases (GHGs), produced primarily from the burning of fossil fuels, accumulate in the earth's atmosphere, trapping heat and causing global temperatures to rise. Although a coordinated global effort to reduce emissions is the preferred starting point, initial efforts to devise an equitable and cost-effective international regime to lower GHG emissions have yielded only mixed results.

The most ambitious international regime to be developed thus far, the Kyoto Protocol, suffered a severe setback when the United States announced its withdrawal in 2001. Ironically, U.S. intransigence enabled the European Union (EU) to rally support for the Protocol, and the agreement appears likely to obtain the signatures necessary to enter into force. Russian ratification of the Protocol, anticipated for 2003, will be key to its success. The paradox is that Russia's participation and the United States's absence moves the agreement from one requiring costly emissions reductions for most to one that can be accomplished with little real effort for some countries—though others will still have to enact costly domestic measures—and

**David M. Reiner** is a post-doctoral associate in the Laboratory for Energy and Environment at the Massachusetts Institute of Technology. In January 2003, he will be a lecturer in technology policy at the Judge Institute of Management Studies, University of Cambridge.

with very little overall environmental benefit. As the Kyoto Protocol nears the requirements for entry into force, there is a pressing need for a look backward at how we arrived at our current predicament, and a look forward to whether the current agreement can evolve into a truly global regime that brings about real reductions from all major emitters.

**Looking Backward.** A decade ago at the 1992 United Nations Conference on Environment and Development (UNCED)—better known as the Rio Earth Summit—world leaders, including President George H.W. Bush, signed the UN Framework Convention on Climate Change (FCCC). Under the FCCC, industrialized nations agreed to a voluntary target to return GHG emissions to 1990 levels by 2000. Wealthy countries also agreed to support transfers of technologies and financial resources to developing countries in order to facilitate emissions reductions and help them adapt to the adverse effects of climate change. The FCCC was given more teeth in 1997 with the drafting of the Kyoto Protocol, which specified mandatory emissions reduction targets for industrialized nations.

To understand the Kyoto Protocol as it stands today, one must first understand the positions of member countries during the negotiations, as well as the politics behind and evolution of their emissions. A stylized view of the negotiations from 1995 to 2000 would be a three-sided contest between the EU, the United States and its industrialized allies—the so-called “Umbrella Group,” and developing countries.

The most aggressive advocate of action was the EU. Spurred on by a core group

of Green and Scandinavian environment ministers from Germany, France, Denmark, and Sweden, the EU’s Council of Environment Ministers both led the Union’s negotiating team and constituted its supreme decision-making body on climate change. Also, with Rio coming on the heels of the Maastricht accord in 1992, the timing of the negotiations defined the issue as an internal and external test of strength for the EU.

Historical happenstance facilitated the EU’s hard-line position. Because the EU member states were able to negotiate for a single target under a European “bubble,” Europe as a whole was able to meet its Rio target by virtue of German reunification and the British “dash to gas.” The 20% decline in German emissions from overhauling East German industry and the 10% drop-off in Britain’s emissions owing to its shift from coal to North Sea natural gas barely offset rapid growth in emissions from economically vibrant countries such as Spain, Ireland, and the Netherlands. Excluding Germany and Britain, EU emissions between 1990 and 2000 actually grew by 8%.<sup>1</sup>

If steady overall European emissions buttressed the inclination towards an aggressive negotiating position on the part of EU ministers, then robust emissions growth meant that other developed countries preferred rules that would ease their burdens. Emissions for 2000 in the United States, Japan, Canada, and Australia exceeded 1990 levels (and the Rio targets) by 14.2%, 11.2%, 19.6%, and 18.2% respectively.<sup>2</sup> At Kyoto, national circumstance and differing willingness to accept caps on emissions led Canada and Japan to accept relatively steep cuts of 6% below 1990 levels by the commitment period of 2008–12, while Norway and Aus-

tralia lobbied for +1% and +8 % targets respectively (compared to -8% for the EU and -7% for the United States).

The Umbrella Group then spent the next four years lobbying for maximum flexibility in meeting its targets. The group's key demands included accounting rules that expanded the scope of the agreement to include the so-called "sinks" of carbon in forests and soils, and the ability to seek lower-cost emissions

trade and perceived debates over trading rules or including sinks as a zero-sum game between domestic reductions and credits acquired abroad. By agreeing to fixed numerical targets before tackling the details, any credit gained from abroad substituted, on roughly a one-to-one basis, for any reductions needed domestically. Fearing the erosion of incentives to reduce domestic carbon dioxide emissions, the EU strove to place

---

## Russian participation and U.S. absence moves the [Kyoto Protocol] from one requiring costly emissions reductions to one that can be accomplished with little real effort.

---

reductions wherever they lay. The Protocol's text incorporated several flexibility mechanisms including, (1) emissions trading across all GHGs; (2) joint implementation (JI) and the clean development mechanism (CDM), which provide emissions reduction credits for carrying out projects in industrialized or developing nations, respectively; and (3) a market-based system of international emissions permit trading. Liberal rules for these mechanisms were especially important to the Umbrella Group negotiators because they would allow developed countries to "buy" emission reductions at the lowest cost. The proposal for an emissions trading system envisioned the creation of permits for GHG emissions, which could be sold across borders based on a single market-determined world price.

Because the Kyoto negotiations were structured around quantitative emissions reductions, environmental groups and several governments downplayed the possible efficiency gains from emissions

limits on the flexibility mechanisms during the series of negotiating meetings from Kyoto in 1997 until The Hague in 2000.<sup>3</sup> The EU took a hard line on all matters that might undermine the integrity of the system, opting to walk away from a comprehensive deal at The Hague with the outgoing Clinton administration.

Rapid growth in the U.S. economy and emissions throughout the 1990s, coupled with the inability to gain accounting and trading concessions from other Kyoto signatories, reinforced fears among conservative and business groups in the United States that accepting emissions reductions targets based on 1990 levels would be very expensive. For this reason, President George W. Bush announced in 2001 that he would not submit the Protocol to the Senate for ratification.

After U.S. withdrawal from the Kyoto process, EU leaders set aside technical concerns over flexibility mechanisms in

an effort to isolate the isolationist by demonstrating that progress was indeed possible in the face of the U.S. snub. In so doing, the previously hard-line Europeans offered concessions to Japan, Canada, and Russia on precisely the questions that had led to the failure at The Hague: using emissions trading and accounting rules to offset their Kyoto targets.

The stringency of the overall Kyoto system depends critically on a country that is struggling to establish its own market economy—Russia. Ironically, Russia's importance to the emissions market stems from the collapse of its economy (and hence its emissions) following the break-up of the Soviet Union. At Kyoto, Russia and Ukraine took on targets to meet their 1990 levels by 2008–2012, but as of 1996, Russian emissions were already 35% below 1990 levels. Ukraine's emissions in 1998 were fully 50% below 1990. Both nations' emissions are expected to remain well below 1990 levels until long after 2010.<sup>4</sup> This means that, in addition to enjoying cheap reduction opportunities due to its inefficient and slowly reforming industrial sectors, Russia and other former Soviet bloc states have excess emissions permits to sell, which are derisively referred to by some as "hot air."

Finally, developing countries were not part of the debate over binding targets for the first commitment period, but since fast-growing developing countries such as China and India drive global emissions growth, they are inevitably central to the longer-term success of any climate regime. An additional driver was the U.S. Senate's pre-Kyoto Byrd-Hagel Resolution, which demanded developing country participation before the United States would ratify a climate accord with binding reduction targets.

Instead of discussing commitments, progress in developing countries focused on assembling emissions inventories, securing financial resources through the Global Environment Facility, and "prompt start" of the CDM.

**Looking Forward.** Several key elements will determine the actual and perceived success of the Kyoto Protocol: (1) the role of Russia and international emissions trading; (2) the domestic programs industrialized nations are creating to meet their Kyoto commitments; (3) future U.S. involvement; (4) and the path to drawing in developing countries.

For the Protocol to come into force, it must be ratified by at least 55 nations, who together accounted for more than 55% of developed world carbon dioxide emissions in 1990. As of the Eighth Conference of the Parties to the FCCC (COP-8) in New Delhi, the Kyoto Protocol had been ratified by 95 nations.<sup>5</sup> Since both Japan and the EU ratified in June 2002 on the eve of the Johannesburg Summit, the United States, which accounted for 36.1% of 1990 emissions, does not constitute a veto by itself, nor would even a U.S. led bloc of Canada and Australia—two other countries where opposition is strong. Therefore, the entire agreement now revolves around Russia, which accounts for 17.4% of the 55% target.

Russian hot air, U.S. participation, the world price for emissions permits, and the need for domestic emissions reductions are intimately linked. Nevertheless, since few acknowledge the likely Russian windfall from emissions trading, many developed nations have begun the difficult process of designing domestic measures that will, they hope, put them on the road to meeting their Kyoto tar-

---

## Since fast-growing developing countries such as China and India drive global emissions growth, they are inevitably central to the longer-term success of a climate regime.

---

gets. The early efforts do not augur well. Most schemes reflect a misplaced belief in either voluntarism or the ability of subsidies to jump-start the emissions trading market. Many firms and governments remain more comfortable with voluntary arrangements to reduce emissions than binding targets. Britain's emissions trading market first required a £215 million enticement to encourage firms to sign up. By subsidizing capital costs or guaranteeing a high price, Germany, Spain, and Denmark have managed to install some 15 gigawatts of wind power in the past few years. Nevertheless, according to the European Environment Agency, the sum of all such measures barely adds up to a credible effort to keep emissions at 1990 levels by 2010, let alone reduce them by an additional 8%.<sup>6</sup>

Outside the EU, there is even less seriousness of purpose. Hoping to avoid binding measures, conservation and voluntarism still dominate, supplemented by often generous subsidies. Canada has asked its citizens to reduce personal emissions by one metric ton and Japan encourages measures such as limiting the duration of showers.

It is possible to dismiss some early measures too lightly. Many nations have moved forward with critical experiments. Sub-national programs in the United States, carbon taxes in the Netherlands and Scandinavia, and emissions trading schemes in Britain and Denmark are all laudable and important first steps. Most

ambitious of all is the development of an EU-wide trading system for industrial emissions that would begin a trial period in 2005 and would come into being along with the international trading regime in 2008.

Despite broad agreement on the need for action on climate change in Europe, the recent rightward tilt and ouster of leading environmental hard-liners in Denmark and France would seem to dampen the enthusiasm for measures needed to actually accomplish the Kyoto targets domestically. Rightist governments pledge fealty to Kyoto, but they are less likely to impose serious costs or disregard the concerns of industry over competitiveness. The infusion of hot air from the accession of Eastern European countries and potential emissions trading with Russia will help the EU avoid many hard decisions.

The United States is likely to carry out major initiatives in research and development, carbon capture and storage, and even renewables, but it has firmly signaled its distaste for binding commitments of the kind imposed by the Kyoto Protocol. U.S. withdrawal amounts to the largest potential buyer of emissions permits exiting the market, leaves the supply of hot air alone roughly in balance with demand. This should cause prices of carbon emissions permits to collapse to a few dollars per ton.<sup>7</sup> With Russia's ability to control supply, prices could plausibly increase ten-fold, but the resulting world

price would still be relatively inexpensive.<sup>8</sup> Such a low world price will result in diminished interest in JI and CDM, since the rationale for overseas projects was that there would be a significant shortfall of low-cost reduction opportunities at home.

While most major developing countries, including Mexico, India, China, South Africa, and Brazil, have ratified the Protocol, actual emissions paths vary significantly depending on circumstance. China has made remarkable strides by removing coal subsidies and economy-wide reforms, thereby holding annual growth of carbon dioxide emissions over the course of the 1990s to 1%.<sup>9</sup> By contrast, developing country emissions as a whole have grown at 3.5%, or three times the rate of the developed world, while Indian emissions grew at 6.5% per annum. Thus, Indian emissions grew from being the size of Canada to the size of Canada plus Spain. While impressive, the average Indian still emits just 4% of an average American.

Eventual re-integration of the United States and other non-participants, and accession of developing countries remain significant obstacles. Negotiation of the second commitment period for 2013–2017 will inevitably provoke demands for both U.S. and developing country participation. It is difficult to envision the United States adopting commitments without some level of developing country participation, and it is even harder to imagine that poorer countries will assume commitments before the richest and largest emitter of all.<sup>10</sup>

Ironically, one possibility for reconciling Kyoto adherents and non-participants would be to take up the Bush administration's call for emissions intensity targets that tie emissions to

economic output, since fixed historical targets such as those currently used in the Kyoto Protocol are wholly unacceptable to developing countries. The specific Bush target is not binding and merely calls for a slowing of the growth rate. While feeble for a wealthy country, the commitments are in line with what the international community might ask of poor developing countries with low levels of per capita emissions. European hostility towards any aspect of the Bush climate policy and the common American difficulty of ratifying international agreements—especially one touching on energy, consumer preferences, and national sovereignty—will make both developing country and American accession exceedingly difficult. As seen in the final Delhi Declaration at COP-8, even discussing developing country obligations is currently impossible.<sup>11</sup> While difficult to envision, future commitment periods will be weak without the eventual expansion of the regime to all major emitters. Just beginning the discussion may take a decade or more.

**Conclusion.** Ten years after the signing of the FCCC, the 2002 World Summit on Sustainable Development (WSSD or "Rio+10") at Johannesburg offered the opportunity—largely missed—to assess progress on the Rio commitments and the ensuing Kyoto Protocol. So what has transpired? The past decade has seen remarkable progress in building new institutions and moving climate change into the public consciousness as a matter for serious domestic and international debate. Scientific and economic analyses have offered new insights, and the sheer number of programs, and pilot activities attest to a clamor for solutions. In a few short years, GHG inventories have been

developed for almost every nation. Actual progress in reducing emissions, however, has been elusive and what passes for climate initiatives are often simply relabeled or warmed-over policies used for other purposes: energy security, local air pollution, or international development. For Kyoto to succeed, a daunting number of elements need to be put in place by 2008—functioning emissions trading systems, rigorous emissions inventories and review—with billions of dollars at stake and public sensitivity to rising energy prices compounding the delicate balancing act. While a flawed start, the sheer volume of activities will produce considerable evidence of what makes for more and less successful climate policy.

U.S. withdrawal meant that other nations confirmed their commitment to Kyoto at the very highest level. Nevertheless, there remains a tension between the spirit and the letter of the Kyoto Protocol. For either Canada or Portugal to meet its target by buying Russian and Ukrainian hot air calls into question the entire exercise. Exclusive emphasis on rich country emissions

caps discourages important efforts such as capacity building in developing countries and long-term investments in non-fossil energy sources in the face of looming gaps between current trajectories and Kyoto targets.

Moving towards a regime that encourages substantial reductions in emissions and engages both the largest emitter, the United States, and the largest source of emissions growth, the developing world, will require better aligning effort and accomplishment. Targeted climate policies that will cause economic dislocation are essential, but the evidence does not support the facile conclusion that countries are ready to make serious sacrifices for a long-term problem. For the international climate regime to truly succeed, a path needs to be found to bring all nations aboard, including the United States, which has left the Kyoto framework, and developing countries, where most growth in emissions is likely to occur. The Hobson's choice seems to be either hoping for consensus to somehow emerge or reconciling to perhaps decades of divergent paths.

## NOTES

1 UNFCCC, "Methodological Issues. National communications from Parties included in Annex I to the Convention. Report on national greenhouse gas inventory data from Annex I Parties for 1990 to 2000. Note by the secretariat," FCCC/SB/2002/INF.2, (11 October 2002).

2 Ibid.

3 A.D. Ellerman and I. Sue Wing, "Supplementarity: an invitation to monopsony?" *Energy Journal* 21 (2000): 29-59.

4 Energy Information Administration, *International Energy Outlook 2002*, Report DOE/EIA-0484 (2002): 189, Table A10.

5 UNFCCC, "Status of Ratification of the Convention and Its Kyoto Protocol", (18 October 2002), Report FCCC/CP/2002/INF.1. Available at: <http://unfccc.int/resource/docs/cop8/inf01.pdf>.

6 Robin Pomeroy, "EU will miss Kyoto target – top energy economist," *Reuters*, (4 October 2002).

7 William D. Nordhaus, "Global Warming Economics," *Science* 294 (9 Nov. 2001): 1283-1284.

8 Mustafa H. Babiker, Henry D. Jacoby, John M. Reilly, and David M. Reiner, "The Evolution of a Climate Regime: Kyoto to Marrakech," *Environmental Science and Policy* 5 (June 2002): 195-206; M.G.J. Den Elzen, and A.P.G. de Moor "The Bonn Agreement and Marrakech Accords: an updated analysis," RIVM Report 728001017 (2001).

9 Energy Information Administration, *International Energy Outlook 2002*, Report DOE/EIA-0484 (2002): 189, Table A10.

10 Richard B. Stewart and Jonathan B. Wiener, "Reconstructing Climate Policy: The Paths Ahead," *Policy Matters*, AEI-Brookings Joint Center for Regulatory Studies Report (August 2001): 01-23.

11 "Summary of the Eighth Conference of the Parties to the UN Framework Convention on Climate Change: 23 October – 1 November 2002," *Earth Negotiations Bulletin* 12, (4 November 2002).