


Beyond Kyoto

Getting Serious
About Climate Change

By Robert N. Stavins





The Day After Tomorrow, last summer's

blockbuster film about the apocalyptic consequences of the greenhouse effect, had less scientific basis than *The Wizard of Oz*. Reality, however, is disturbing enough. There is now a near-consensus that man-made emissions of greenhouse gases are very likely to change the earth's climate in ways that most people will regret.

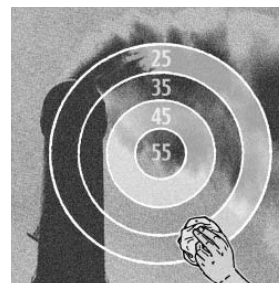
You've heard the story before, but it's worth repeating. Two trace constituents of the atmosphere, carbon dioxide and water vapor, create a thermal blanket for the planet, much the way glass on a greenhouse traps the sun's energy within. And a good thing, too: without greenhouse warming, the planet would be far too cold to be livable.

But the balance between too much and too little greenhouse effect is fairly delicate. Massive quantities of carbon dioxide are produced from the combustion of fossil fuels – coal, petroleum and natural gas. Meanwhile, the direct warming effects

of carbon dioxide and other greenhouse gases – methane, nitrous oxide and halocarbons – are being indirectly amplified because the warming increases the evaporation of water, thereby increasing atmospheric concentrations of yet another greenhouse compound – water vapor.

Average global surface temperatures have risen by about one degree Fahrenheit since 1970. This fits the predictions of climate-change computer models that also take account of increases in atmospheric dust (which cools by reflecting sunlight) and variations of the sun's energy output. Changes in mid-continent temperatures and those at high latitudes have been two to four times greater than the global averages – also as predicted.

Balmier temperatures (which would be welcome in some places) are only a part of the story. The most important consequences of greenhouse



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gas concentrations are likely to be changes in patterns of precipitation and runoff, the melting of glaciers and icebergs, increases in sea level and changes in storm frequency and intensity. That's why scientists talk about global climate change rather than global warming.

But moving from predictions of average global temperature changes to regional climate impacts is problematic. The best computer models cannot yet produce reliable estimates of impacts on a localized basis.

What is obvious, though, is that emissions in one country affect the climate in every other. Hence the logic of the global pact on emissions hammered out in Kyoto, Japan in December 1997.

Four years later, the Bush Administration announced that it would not submit the Kyoto Protocol, which had been initialed by the Clinton White House, to the Senate for ratification. Of course, the Clinton Administration had chosen not to submit the agreement to the Senate either, and it is very unlikely that Al Gore, had he been elected in 2000, would have done so. For, even before the Kyoto conference, the Senate had resolved by a vote of 95-0 that it would not approve a climate-control pact along the lines of the Kyoto accord. More about the reasons for this Bronx cheer later.

The key requirement for implementing the Kyoto Protocol is that a minimum of 55 nations, representing 55 percent industrialized economies' emissions of carbon dioxide in 1990, must ratify the agreement. The United States accounted for more than a third of

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total carbon emissions in that year. But with Canada, Japan and Russia (which respectively produced 3 percent, 6 percent and 17 percent of the world's emissions) now on board, the Protocol takes effect this quarter.

The impact on total emissions, however, will be much less than anticipated in 1997. First, non-participation by the United States is critical because it is the largest emitter. Second, the targets were revised in 2001 in ways that lowered the costs for Canada, Japan and



Russia in order to induce them to ratify the Protocol. The original Kyoto Protocol – if extended to the year 2050 – would have led to a 13 percent emissions reduction compared to 1990 emissions. Without the United States on board and with the 2001 revisions of the rules, the anticipated aggregate emission reduction for the year 2050 is only 1 to 2 percent.

What, then, can and should be done? Start with the fact that the cost of containing emis-

sions varies enormously from country to country. And as long as global incremental benefits exceed every nation's benefits from its own effort to contain emissions, countries will either want to avoid participating or avoid complying if they do participate. Successful international cooperation must somehow change these incentives.

FUNDAMENTALS FIRST

To be worth the parchment it is written on,



a post-Kyoto framework must be based on sound science and economics, as well as on realistic politics. Thus, it is hard to imagine a viable strategy that doesn't include (a) the means to ensure that all significant economies – both those industrialized and those on the way – are eventually involved, (b) a detailed schematic for getting to where good science and good economics say we ought to be in a reasonable amount of time, and (c) an emphasis on market-based (rather than centrally directed) policy instruments.

Near-Universal Participation

Broad participation is essential to address the “global commons” problem – the fact that greenhouse emissions from anywhere affect everywhere. The share of global emis-

sions coming from relatively poor countries is significant and growing. In fact, developing countries may well account for more than half of global emissions by the year 2020. To some, the idea of making demands on poor countries seems unfair – the “haves” rather than the “have-nots” ought to do the heavy lifting, at least at first. But the simple reality is that developing countries provide the greatest opportunities for relatively low-cost emissions reductions. Hence, it would be unnecessarily costly to focus emissions-reductions activities exclusively in the developed world.

It's true that industrialized countries are responsible for the bulk of man-made concentrations of greenhouse gases in the atmosphere. But if the developing countries are not included from the beginning, producers

of goods and services that generate a lot of emissions will have incentives to move plants outside of the coalition of participating countries. Thus, rather than helping developing countries shift to less-carbon-intensive paths of economic development, the industrialized world would actually be pushing them the other way.

Fear of this emissions-leakage phenomenon – and the associated movement of jobs – was the central reason behind the 1997 Byrd-Hagel Resolution in the United States Senate, which called for treating industrialized and developing countries similarly in any international agreement on global climate change. The resolution said that the United States should not be a signatory to any agreement under the Framework Convention on Climate Change that would “mandate new commitments to limit or reduce greenhouse gas emissions for [industrialized countries], unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period.” Indeed, the resolution refers to five developing countries by name: China, Mexico, India, Brazil and South Korea.

Still, on grounds of fairness, it is unreasonable to expect lower-income nations to pay the bill for emissions reduction in the short term. Hence, the policy dilemma. On the one hand, for purposes of environmental effectiveness and economic efficiency, developing countries need to participate. On the other, they cannot be expected to incur the consequent costs. But there is a way around this seeming anomaly.

First, a mechanism is needed for voluntary accession of developing countries into the group of nations pledged to meet specific emissions targets. Second, and much more im-

portant, an automated trigger is needed – for example, success in reaching some minimum standard of living – to bind new members to undertake needed emissions reduction.

An even better approach would be to set emissions targets for all countries, which would gradually become more stringent as individual countries become richer. Such targets could start at business-as-usual emissions levels. For that matter, the targets could be set above business-as-usual – although such headroom has been denigrated as “hot air” in the case of Russia’s less-than onerous target created to draw the country into the Kyoto Protocol. If the program were combined with international emissions trading, in which one country could buy emissions-reduction credits from another, it could provide cash windfalls for poor countries even as they play a role in emissions control.



What’s more, an emissions growth target need not be a one-size-fits-all number, but an equation that relates targeted emissions to per capita income and possibly to other factors as well. If a developing country were doing particularly well economically, its target would become proportionately more stringent. However, if it suffered an economic setback, the emissions target would be relaxed.

This is a natural extension of the division

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of obligations built into the Kyoto Protocol. A Brookings Institution report by Jeffrey Frankel, a former Clinton White House economic adviser, calculated that for every 10 percent increase in per capita GDP, the Kyoto targets (on average) become about 1 percent more stringent. In 1999, the Argentine government offered to make the relationship explicit, tying its emissions commitment to economic growth.

In any event, two necessary characteristics of any formula for setting emissions targets are (a) that it not create perverse incentives to increase relatively low levels of emissions, and (b) that it is relatively simple, so as not to create impediments to negotiation. It also makes sense to combine emissions targets with a well-designed international tradable-permit program. That way, cost-effectiveness as well as the distribution of the burden could be addressed.

An Extended Time-Path for Emissions Reduction

Global climate change is a long-term problem because greenhouse gases remain in the atmosphere for decades or even centuries. The Kyoto Protocol does not sufficiently reflect this important reality – that is, the cumulative nature of the problem. The protocol has only short-term targets: an average 5 percent reduction from 1990 levels by 2008–2012. This may sound like a modest reduction, but it translates into a 25–30 percent reduction for the United States from its business-as-usual emissions path. That’s because the U.S. economy grew exceptionally rapidly during the 1990s – a remarkable 37 percent growth for the decade. As a consequence, U.S. carbon emissions increased by more than 12 percent over the period, while Western European emissions increased by only 1 percent.

Thus, the contrast between Europe and elsewhere is dramatic. Emissions of carbon dioxide from the United Kingdom, Germany and Russia fell significantly after 1990 (the Kyoto Protocol’s baseline year), for reasons having nothing to do with environmental policy. Emissions fell in Britain because of the downsizing of the domestic coal industry initiated by Prime Minister Margaret Thatcher’s government (1979–1990), in Germany because reunification led to the closure of plants that gulped energy (and produced little of value) in the former East Germany, and in Russia because of its economic collapse.

Accordingly, some 80 percent of the European Union’s carbon dioxide reductions under the Kyoto Protocol will be achieved by two countries – Germany and the UK – and is thus really only possible because the EU was counted as one emitting nation. This goes a long way to explaining why the resistance to Kyoto was so much greater in the United States.

The Kyoto Protocol’s targets thus amount to too little, too fast: they will have very modest overall impact, yet still manage to be unreasonably stringent for countries that enjoyed significant economic growth after 1990. Two elements are needed for a workable fix: (a) moderate targets in the short term to avoid rendering trillions of dollars worth of machinery and energy infrastructure prematurely obsolete, and (b) more-stringent targets for the long term to motivate technological change, which in turn is needed to bring down the costs of reducing emissions. The longer-term targets should be flexible, because there is still considerable uncertainty about the consequences of emissions on climate and the cost-effectiveness of various abatement measures.

Specifically, emissions targets ought to start at business-as-usual levels, then gradual-

ly depart from these, so that the absolute level of emissions would increase in the near term – but at slower rates. In the long term, though, countries would have to reduce the total amount of gases emitted. For a conservative goal of stabilizing atmospheric concentrations of carbon dioxide at twice pre-industrial levels, it has been estimated that the cost-effective time path would lead to peak global emissions in 2030. Major emission reductions would take place in the second half of the century.

Such a time path, put in place now, would be consistent with what is often dismissed as politics as usual. In representative democracies, there are strong incentives to place costs on future voters and, if possible, future generations. But in the case of climate policy, gradual containment amounts to good science and good economics as well as pragmatic politics.

Market-Based Reduction Mechanisms

In principle, the Kyoto Protocol calls for working through the market rather than against it. There is widespread agreement that conventional regulatory approaches – so-called “command-and-control” policies – cannot do the job at acceptable costs. To keep costs down in the short term and bring them down even lower in the long term through technological change, policymakers will have to harness the power of decentralized markets driven by private incentives.

For some countries, this means using tradable permits (which less-economically-sophisticated environmentalists used to dismiss as permissions to pollute) to achieve national targets. In a trading system, emitters have the choice of meeting targets on their own or paying other emitters to do it for them. Thus, emitters with low costs of control – for example, manufacturers using

aging boilers – have an incentive to take on added reductions, so that they can sell their excess permits to emitters that face relatively high control costs. This is the mechanism that was used in the United States in the 1980s to eliminate leaded gasoline from the market, at



a savings in refining of more than \$250 million dollars per year. It is also the mechanism now being used to cut the sulfur emissions that cause acid rain in the United States by 50 percent, at a savings estimated at about \$1 billion annually.

For some countries, carbon taxes that create incentives to switch away from carbon-rich fuels (notably coal) may be a more attractive approach, although there is serious doubt about the political feasibility of such

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taxes. Norway, for example, introduced a very hefty carbon tax in 1991, but the impact on carbon dioxide emissions was nonetheless modest because major emitters lobbied successfully for tax exemptions.

Another promising market-based approach is a hybrid of tax and tradable-permit systems – that is, an ordinary tradable permit system, plus a government promise to sell additional permits at a fixed price. This guarantees that an adequate number of permits will be available at a reasonable cost, and thus has been labeled a safety-valve system. The approach reduces uncertainty on the cost side without undermining incentives to reduce emissions, and therefore addresses concerns frequently voiced by private industry.

International containment mechanisms are also required, of course. The Kyoto Protocol outlines a system whereby governments can engage in trading their reduction targets. International tradable permits – even a system in which trading was only permitted among the industrialized countries – could reduce compliance costs by as much as half. If trading were expanded to include major developing countries, compliance costs could be lowered to just one-quarter of what they otherwise would be.

An undisputed attraction of an international trading approach is that how and where emissions are reduced is determined by who has the lowest costs of emissions reductions, regardless of how the permits are initially handed out. There is one catch, however: it assumes that no country buying or selling permits has market power. This is a real concern in the context of Kyoto. If, for example, the majority of excess permits (allowable emissions in excess of business-as-usual emissions, or so-called “hot air”) were owned by a relatively small number of nations in East-

ern Europe and the former Soviet Union, the possibility of collusion among permit sellers would become quite likely.

In any event, the initial allocation of emissions permits can be highly significant in terms of equity. But the alternative, in which countries must meet targets without trading, wouldn't serve anyone's interest.

If international trading is used, it must be integrated with domestic policies that nations use to achieve their respective domestic targets. If all countries use domestic tradable permit systems to meet their national targets – that is, allocate shares from the international permit system to private domestic parties – an international system could certainly be efficient. However, if some countries use non-trading approaches domestically – which seems likely – cost minimization would be more difficult. In such cases, achieving all the potential cost savings of international trading would require some form of international project-by-project credit program that reaches within national economies, such as the Kyoto Protocol's Clean Development Mechanism. But experience with such credit programs suggest that they are less likely to generate major savings because they are difficult to negotiate and implement.

Thus, the way individual nations choose to meet their targets could substantially limit the cost-saving potential of international trading. There's a trade-off between the degree of domestic sovereignty permitted under a global emissions pact and the degree of cost-effectiveness. This is a severe problem for the Kyoto Protocol, which explicitly provides for sovereignty regarding national emissions policies.

Not long ago, most observers would have predicted that few, if any, European countries would employ tradable permit systems internally in light of the European Union's strenuous opposition to such approaches dating



back to the 1990s. But the EU has now launched its own continent-wide trading system. Furthermore, by the time of the 2001 negotiations over the implementation of Kyoto, China and the G-77 (the coalition of less-industrialized economies) had, in effect, dropped their opposition to international emissions trading. Combined with the strong United States preference for trading, this bodes well for making trading part of a viable global climate policy.

Emissions trading is no panacea. Indeed, the more I look to tradable-permits to address climate change, the more I have come to believe that it is the worst possible approach – except for all the others.

THE HARD ROAD AHEAD

Without the United States or the emerging

Asian powerhouses on board, and with past concessions to Russia and Canada that undermine the value of the treaty, the Kyoto Protocol is in deep trouble even as it takes on the force of international law. It doesn't much matter whether one labels the next round of a climate control agreement an addition to Kyoto or a substitute. What does matter is that we get the structure right the next time. And, at a minimum, that structure has to include a means for making the pact truly global, a realistic time path for implementation, and a sensible system of market-based incentives for keeping costs under control.

Getting serious about greenhouse emissions won't be easy. But if the state-of-the-science predictions about the consequences of another few decades of inaction are correct, the alternatives are grim, indeed. **M**