Toward a Real Global Warming Treaty

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THE CHALLENGE AFTER KYOTO

In December 1997 the world's nations met in Kyoto to grapple with the problem of global warming. The Kyoto conference garnered a wide variety of assessments, ranging from "a notable success" through "a useful first step" to "a grave disappointment and setback" for those concerned with the future of the planet. Whatever one thinks of Kyoto in terms of environmentalist politics, the troubling fact remains that its underlying approach is bound to fail. Because it is premised on setting national emissions targets, the Kyoto strategy will not be able to solve the alleged problem of global climate change resulting from greenhouse gas emissions. The likely failure of Kyoto should be used as the impetus for a hard look at the prospects for a treaty on global climate change.

The Framework Convention on Climate Change signed in 1992 in Rio de Janeiro drew wide international attention to the danger of gradual global warming from humanity's use of fossil fuels and other activities. Rio committed signatory governments to do something about global climate change, but it did not commit them to take any specific actions. Since Rio, governments of most rich countries undertook to reduce their levels of carbon dioxide emissions to estimated 1990 levels—within the relatively near, but unspecified future. In 1995 the rich nations further committed themselves to agree at Kyoto in 1997 on a set of binding emissions targets to last beyond the year 2000.

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Since Rio, actions actually taken to reduce emissions of greenhouse gases—carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons—have not matched stated intentions. Emissions of CFCs have slowed due to the Montreal Protocol of 1987 to protect the ozone layer, and carbon dioxide emissions are growing less quickly because of lower-than-expected economic growth since 1992 in Europe, Japan, and the former Soviet Union. Nevertheless, one projection shows that energy-related carbon dioxide emissions will grow by fully 30 percent between 1990 and 2010.

At Kyoto, the 24 rich members of the Organization of Economic Cooperation and Development (OECD) as of 1992 and the European countries of the former Soviet Union pledged to cut their greenhouse gas emissions by 2010. The reduction targets, which also give credit for planting trees that remove carbon dioxide from the atmosphere, are eight, seven, and six percent below 1990 emission levels for the European Union, the United States, and Japan, respectively. Such reductions will be difficult to achieve, at least for the United States, whose emissions are otherwise expected to grow by over 30 percent between 1990 and 2010.

Unfortunately, Kyoto's approach cannot solve the problem.[1] International treaties designed to realize commonly held goals fall into two categories: those that set agreed-upon national objectives but then leave each signatory country to pursue those goals in its own way, and those that define mutually agreed-upon actions. The Kyoto treaty belongs to the first category. The essence of the Kyoto framework is negotiations to allocate national rights to greenhouse gas emissions. Targets low enough to be effective in halting man-made climate change mean that these emission rights will be worth trillions of dollars, even if such rights were traded among countries. Stabilizing the amount of greenhouse gases in the atmosphere will eventually require reducing carbon emissions to levels that cannot be reached

[1]The alleged problem is that large volumes of greenhouse gases—mainly carbon dioxide from burning fossil fuels but also methane generated by rice cultivation and cattle raising—will gradually warm the earth's surface, with countless implications for natural ecosystems as well as for human habitation. There is still serious scientific disagreement on both the magnitude and the timing of such warming. This essay does not enter this debate, but for the sake of argument simply stipulates that there is a problem serious enough for governments to address in the next few decades.

without the engagement of the developing countries, but the framework of the proposed treaty is unacceptable to them. There is unlikely to be any generally acceptable principle for allocating valuable emission rights between rich and poor countries, making the success of the Kyoto approach a probable impossibility. We would do better to adopt an alternative strategy that, while difficult, at least has some prospect of bringing man-made climate change under effective control. A successful attack on global warming will only happen through mutually agreed-upon *actions*, such as a nationally collected tax on greenhouse gas emissions, rather than through national emission targets.

A GLOBAL CHALLENGE

MITIGATING GLOBAL warming through formal collective action will not be easy, for three key reasons. First, climate change from an increased atmospheric concentration of greenhouse gases is a global issue since, whatever their earthly origin, the gases are widely dispersed in the upper atmosphere. Effective restraint must therefore involve all actual and prospective major emitters of greenhouse gases. Today's rich industrialized countries currently account for most of the emissions. The Soviet Union was a major contributor before its collapse in 1991, and an economically resurgent Russia can be expected to follow suit. Moreover, rapidly growing poor countries will soon become major contributors. By 2010 developing countries are expected to contribute 45 percent of total greenhouse gas emissions, and China and India alone will experience greater growth in emissions than all the OECD countries combined. Thus effective action cannot be taken by a small group of countries alone, as was possible with the recent agreement to cease testing of nuclear weapons. Here, while the same requirements need not be imposed on all countries from the beginning, the agreement must be structured from the beginning so that all significant countries will eventually participate.

Second, the rewards from restraints on greenhouse gas emissions will come in the politically distant future, while the costs will be incurred in the political present. Moreover, those rewards are highly uncertain. Much controversy still surrounds the expected impact of

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Don't do it: Vice President Al Gore and Japanese Prime Minister Ryutaro Hashimoto at the Kyoto summit.

further greenhouse gas emissions on the earth's ecosystems. The residents of some countries, such as Canada and Russia, may even expect to benefit from some surface warming. It will thus be difficult to persuade people that they should make sacrifices in the level or growth of living standards today for the sake of uncertain gains for their grandchildren or great-grandchildren. The wide distribution of expected but distant benefits in response to collective action provides an incentive for every country to encourage all to act but then to shirk itself—the so-called free-rider problem.

Third, the pervasive sources of greenhouse gas emissions—notably burning fossil fuels, cultivating wetlands, and raising cattle—imply that restraint will involve changes in behavior by hundreds of millions if not

billions of people, not merely the fiat of 180 or so governments. Thus the most important part of an effective regime to limit climate change involves not an agreement among governments but the effective influence of governments on their publics.

No major legally binding regulatory treaty involves all of these characteristics to a similar degree. Typically, as with the halt to nuclear weapons testing or the Montreal Protocol to limit production of CFCs, the major actors are either governments themselves or a relatively few firms in a relatively few countries. The Convention on International Trade in Endangered Species perhaps comes closest in its comprehensiveness; it requires states to prohibit international trade in the covered products. Various agreements for managing international fisheries require cooperation of thousands of fishermen, but with a few exceptions they have not been notably successful.

The currently preferred approach to a treaty limiting greenhouse gas emissions centers around imposing agreed national targets on emissions—possibly permitting some of the allowed emissions to be sold from one nation to another, a feature that would significantly reduce the costs of a given reduction in emissions. A second approach, which has received less emphasis, stresses agreement on a set of actions that countries would undertake with a view toward reducing emissions. The latter option has been unwisely marginalized. Mutually agreed-on actions have better prospects of success than national targets.

NATIONAL TARGETS

IF TARGETS are to be set, on what basis should they be set? When quantitative targets are imposed within countries, they almost always reflect recent history. Such targets are allocated roughly in proportion to, say, recent emissions of pollutants or recent catch of fish. Targets based on emissions in some past year (e.g., a given country's 1990 emission levels) have a similar character. In effect, they allocate property rights to the existing tenants, conferring ownership on recent users. Targets allocated on this basis will be completely unacceptable, however, to countries that are or expect to be industrializing rapidly. Such nations' demand for fossil fuels grows with

disproportionate speed. They will argue that most of the existing greenhouse gases generated by humans were emitted by today's rich countries and that those countries should therefore bear more responsibility for cutting back. Thus, developing countries did not commit themselves to reduce emissions at Rio; in Europe, Portugal and Greece have expressed similar reservations.

At the other extreme, some observers have suggested that simple distributive justice would require that emissions targets be based on population. This would favor heavily populated poor countries such as China, India, Indonesia, Bangladesh, and Nigeria. To be meaningful in limiting climate change, application of this principle would require drastic cutbacks in emissions by today's rich countries, implying radical changes in living conditions there. Targets based on population would, of course, be insensitive to varying resource endowments, which make nations with, say, large capacities for hydro-electric power less reliant on fossil fuels. Such targets would also ignore the fact that countries depend on vastly different fuel mixes as well as different levels of fuel consumption. Reductions in living standards could be mitigated, but not avoided, by the sale of unused emission rights by poor countries to rich ones. But the financial transfers involved would be far more than is likely to be politically tolerable. A typical American family of four could be expected to pay $2,200 a year to sustain its current level of emissions, and total U.S. transfers to the rest of the world could amount to $130 billion a year—over 10 times America's current foreign aid expenditure.[2] Of course, such payments and transfers would diminish insofar as they encouraged reductions in emissions, but significant reductions would take years. Moreover, the transfers would be made to governments, despite the underlying moral rationale for basing targets on the fundamental equality of all individuals. Many governments would object to transferring large sums to repressive regimes such as Iraq or Nigeria.

A combination of historical rights and population-based rights, phasing from one to another, will not solve the problem. Perhaps

[2]This calculation values carbon emissions rights at $100 per ton, amounting to a 38 percent levy on oil selling at $20 per barrel. The $100 figure is a rather low one.

the most reasonable basis for allocating emission rights and the obligation for reducing emissions would be to calculate a "business-as-usual" trajectory of emissions for each country on the basis of recent history, development prospects, and past experience with the impact of economic development on the evolution of greenhouse gas emissions. Then each country could be charged with reducing emissions by a uniform percentage, chosen in relation to some measure of global reduction requirements, relative to its assigned trajectory. But of course even if this principle was accepted, the debate would simply shift to the choice of trajectories for each country. While impartial scholars might agree on a range of such trajectories, the economic consequences are large enough to make it extremely implausible that the assessments could be negotiated by the interested parties. Developing countries would almost certainly argue for implausibly high growth rates—based not on reality but on their aspirations for development, encouraged by the example of the four Asian tigers in the 1970s and 1980s. To complicate matters further, the principle of reduction by a uniform percentage would also be controversial. Many would no doubt argue for an element of progressivity in the required cuts, whereby rich countries would cut proportionately more rather than accept equally proportioned cuts.

IMPLEMENTATION

ONCE NATIONAL targets have been established, they must be translated into conditions that induce firms and households to change their consumption patterns away from activities that emit greenhouse gases. For most economic actors, the only practical way to alter behavior is to create price disincentives—that is, to make the activities that generate the emissions more expensive. An effective treaty to inhibit greenhouse gas emissions needs the cooperation of consuming publics.

In principle, all significant greenhouse gases should be covered, as was agreed to at Kyoto. In practice, however, given the many actors involved and the many sources of emissions, such broad coverage would be impossible to monitor and police. For practical reasons,

therefore, the main target is usually fossil fuel consumption, plus a few other high-emission activities like cement production. Monitoring the consumption of fossil fuels is more or less manageable since most of it must pass through some relatively narrow chokepoints like gas pipelines, oil refineries, and electricity generating stations. Most coal production can be monitored at the mine head or on the barges and railroads that transport it.

But this still leaves out a lot of greenhouse gas emissions. Since 1850, only about half of greenhouse gas emissions have come from burning fossil fuels. Other important culprits include burning tropical forests, the use of wood as fuel, livestock and rice cultivation, town dumps, and leakage from gas pipelines. Omitting these sources from a regime based on national targets thus would significantly limit coverage. But such gaps are probably necessary on practical grounds because most changes in emissions from these sources could not be easily monitored. Their omission, on balance, would probably favor the developing countries.

The demanding fossil fuel emissions targets for rich countries could be met by greater efficiency at converting fossil fuels to usable energy in existing plants; switching from coal to natural gas; building new plants and machinery that use less carbon per unit of usable energy, including nuclear power plants; and reducing demand for energy. Unfortunately, the scope for change at the easiest monitoring points is limited. Obsolete generating plants can be replaced with more efficient or less carbon-dependent ones, but demand for such plants in the OECD will be modest over the next 20 years. Replacing power plants faster than obsolescence requires is dauntingly expensive. In developing countries, the demand for electric power is rising rapidly—by an expected 300 percent between 1990 and 2010, as opposed to 20 percent in OECD countries. By 2010, most generating capacity in those countries could in principle use low-carbon-dependent technology.

The consequence is that most of the reduction in the rich countries must come at or near the points of final demand, where the number of consumers is greatest. The reductions must be achieved by some combination of taxation, exhortation, publicity, and environmental education. Many consumers are not aware of the ways they can conserve energy without radical changes in their lifestyles. The key to success is

not intergovernmental treaties but incentives that governments provide to their citizens. A treaty merely provides a vehicle for rough "burden-sharing" across countries and some international discipline in pursuit of the targets.

A WISER APPROACH

THERE IS an important alternative to setting national emission targets. That is to agree internationally on a set of *actions* calibrated to achieve the desired reductions in emissions. Since to accomplish their quantitative objectives governments must in any case create incentives for their citizens to alter their behavior, and since we have seen that setting a national allocation of global emission rights is likely to prove so contentious as to be impossible, it may be far easier to agree on a common use of instruments. For problems such as reducing emissions, the favorite instrument of economists is to tax the offending activity. All countries could agree to impose a common carbon emissions tax, which would increase the price of fossil fuels in proportion to their carbon content, with possible tax exemptions for uses that do not emit carbon dioxide, such as production of some plastics.

Such a tax would have at least two major advantages. First, it would encourage reduction of emissions to take place where it could be done at the least cost. All emitters would have the same incentive to reduce emissions, but only those who saved more in tax payments than it cost to reduce emissions would undertake reductions. Others would simply pay the tax. So the tax would encourage natural gas use everywhere (with benefits accruing to Russia and Iran, the countries with the largest known gas reserves). More important, the tax would boost general conservation of fossil fuels.

Second, the tax would generate revenue for governments whose usual sources of revenue hamper economic incentives to work, save, or undertake commercial risks. That should make it attractive to finance ministries everywhere. Where the revenues are large, as they eventually would be, the new tax should be phased in gradually. Growth can be encouraged by reducing other taxes, like those on foreign trade or on earnings. Taxes on fossil fuels would of course have some undesirable effects, such as delaying the

switch from firewood to fossil fuels in poor countries. But it would be impractical in most cases to tax firewood.

In principle, it would be possible to extend the idea of a common carbon tax to methane as well, covering wetland rice production, decomposable refuse, gas pipeline losses, and cattle raising. That more difficult step could be phased in later.

Monitoring the imposition of a common carbon tax would be easy. The tax's enforcement would be more difficult to monitor, but all important countries except Cuba and North Korea hold annual consultations with the International Monetary Fund on their macroeconomic policies, including the overall level and composition of their tax revenues. The IMF could provide reports to the monitoring agent of the treaty governing greenhouse gas emissions. Such reports could be supplemented by international inspection both of the major taxpayers, such as electric utilities, and the tax agencies of participating countries.

Instead of the Kyoto approach, impose a tax on fossil fuels.

Imposition of taxes by international agreement raises a major problem for democratic countries, however. Taxation goes to the heart of parliamentary prerogative, and most democracies will not relish taxation by international agreement, even with a requirement for parliamentary ratification. Moreover, as the Clinton administration's 1993 experiment with a BTU-based energy tax illustrates, even modest energy taxes remain politically unpopular. The European Council proposed a somewhat more ambitious tax on energy, but it has yet to be enacted. That proposal paradoxically but not surprisingly gave special preference to coal, which is the most carbon-intensive of the fossil fuels but is produced at high cost in several EU countries, and would also have levied a tax on nuclear power, the least carbon-intensive major source of electricity.

But this political calculus could change dramatically. If we are to act seriously to reduce greenhouse gas emissions, the cost and price of emitting activities is bound to rise. Indeed, a rise in price is necessary to encourage large-scale conservation. It is better that the revenues from the price increase go into the hands of governments that represent the entire public than into unnecessary economic inefficiency or into the hands of large corporations that are allocated emissions quotas.

Furthermore, the imposition of additional taxes does not necessarily imply additional revenues to governments. One possible disposition of revenues from emission taxes would be to reduce other taxes, such as the income tax or the payroll tax. Each country would be free to dispose of the emission tax revenues as it judged best. In the United States, passage of such a tax might be politically easier if coupled with the reduction of other taxes.

Two additional possible problems need to be mentioned, neither insuperable. The first concerns the fact that energy (especially oil) is taxed differentially among countries in the mid-1990s, and some countries continue to price both coal and oil well below world levels. Should a uniform tax be levied on an uneven initial condition? If existing pricing practices are taken to reflect existing national preferences on how best to allocate resources, a case can be made that the new carbon tax should be uniform, not the total tax burden on fuels. Of course, national policies would have to be monitored to ensure that the effect of the new tax was not undermined by other changes in tax or subsidy policy.

A carbon tax could raise $750 billion in annual revenue.

The second possible problem concerns the disposition of revenue. To have a significant impact on emissions, the tax would probably have to be substantial. A substantial tax on a major input to modern economies would generate much revenue. To whom should it accrue? Oil-producing countries will suggest that if oil is to be taxed, they should levy the tax and get the revenue—indeed, that is what OPEC's attempts to control oil prices amount to. Oil-consuming countries, however, would feel doubly aggrieved if they must charge more for oil to discourage its consumption yet do not receive the revenue; they will insist that the tax be levied on consumption and accrue to them, not least so that they may reduce other taxes to assure their continued prosperity and growth. In practice, that view is likely to prevail.

There is, however, a third possible claimant for at least some of the revenue: the international community. The international community has accepted a number of collective obligations that are cumulatively expensive. Caring for refugees and peacekeeping are only the most

apparent. Refugees and peacekeeping operations cost the United Nations about $2.6 billion a year, well over the regular annual U.N. budget of $1.2 billion. In addition, donor countries finance about $5 billion a year of U.N.-administered economic assistance to the poorest countries. The Rio convention conditions cooperation by developing countries in reducing emissions on new financial support from the rich countries. These activities could be financed in part by revenues from an internationally agreed tax levied by all countries. Obviously, the major emitters, currently the rich countries, would pay most of the tax. But as poor countries develop, their contribution would increase automatically—an attractive bonus. These collective needs, while substantial, are nonetheless modest in terms of the total revenue likely to be available from an effective carbon tax.

The revenue these taxes would raise is substantial. An OECD model suggests that a worldwide tax on 5.2 billion tons of global carbon emissions in 2020 would yield $750 billion in annual revenue, about 1.3 percent of gross world product in that year. The United States would gather about one-fifth of this amount.

Of course, we do not know how responsive publics may be to any given tax level. The cuts in emissions could be either greater or less than initially projected. Thus a regime based on mutually agreed emissions taxes must allow for subsequent adjustment in tax levels—up or down—as new scientific information on the significance of greenhouse gas emissions for prospective climate change becomes available and as we learn how effective a given level of taxation is in reducing emissions. These effects will become clear only over long periods of time, but that is not a decisive disadvantage when the objective concerns decades and perhaps centuries.

Taxes on greenhouse gas emissions will undoubtedly make energy-intensive products such as steel and cement more expensive. For countries that lack modern infrastructure, these higher prices will raise the costs of building modern housing and transportation systems. On the other hand, tax revenues from emissions would generate badly needed government revenue in such countries and help them avoid levying taxes on other commodities and on incomes, thus removing a frequent drag on development. The net effect is unclear, however, and no doubt will vary from country to country.

DEATH AND TAXES

DEVELOPING COUNTRIES are not likely to constrain their economic growth—and the concomitant demand for energy—for the sake of avoiding global warming. For one thing, adaptation to such climate change as may already be in train will be easier for those countries that are more developed, reinforcing the priority that poorer countries already give to development. Furthermore, developing countries will argue that, apart from local air and water pollution, global environmental degradation is overwhelmingly the fault of the rich countries. They have a point. The relative contributions to environmental degradation can change markedly with successful economic development, but that is a matter that the world's poorer nations are likely to be willing to take into consideration only after industrialization has actually occurred. The bottom line is that many developing countries will cooperate with developed countries in reducing greenhouse gas emissions into the atmosphere only so long as it does not entail great domestic political conflict and so long as the developed countries foot the bill.

For these reasons, the international negotiations for mitigating global warming will be painfully complex. One strategy is for the OECD countries to take on the assignment themselves in the hope that developing countries will join in later after their incomes and fossil fuel consumption have risen considerably. This strategy does not preclude action within developing countries—provided the OECD countries are willing to pay for it. The problem with this strategy is that there seems to be no right time for a country to graduate from "developing" to "developed" status, especially since such a graduation can cost a country its eligibility for development loans and preferential tariffs. Another hitch is that since not all countries will have joined the consensus, stiff OECD action to reduce emissions will lead to a costly relocation of energy-intensive industries to countries that have not yet committed to fight global warming—thus undermining the objective of reducing global greenhouse gas emissions.

An effective treaty cannot be based on the allocation of valuable emission rights since there will be no generally agreed principle for allocation. If the international community is to organize itself at all

for the significant mitigation of greenhouse warming, it should be on the basis of mutually agreed actions, such as the imposition of a more-or-less uniform carbon tax on the use of fossil fuels.

International cooperation in other fields has progressed most successfully when there was agreement not only on the objective but also on how best to achieve it. As the prolonged and sometimes acrimonious history leading to international cooperation in containment of contagious diseases suggests, the absence of scientific consensus on how greenhouse gas emissions translate into global warming and how these temperature changes in turn affect the human condition will make it difficult to agree on how to share costly actions or, indeed, on what actions should be taken. Large differences in assessments of the costs of mitigating action will simply magnify the difficulties. But taxes, like death, are inevitable as well as universal, and they can more profitably be imposed on harmful activities than on socially valuable ones. That fundamental truth offers some hope for international action to slow global warming.