MEMORANDUM TO THE PRESIDENT

From: David G. Victor
Subject: Controlling Emissions of Greenhouse Gases

PROBLEM

America is in a bind. Public pressure to act on greenhouse warming is growing. Evidence that it makes economic sense to limit emissions of greenhouse gases is mounting.

Yet unilateral action makes no sense. Carbon dioxide, methane and the other gases that cause global warming have long lifetimes in the atmosphere; they waft worldwide, making greenhouse warming a truly global phenomenon. The United States is responsible for one-quarter of these emissions—our actions are significant, but acting alone would not have a dramatic effect on the total problem. Moreover, the United States must coordinate its actions with other nations because efforts to control emissions could be costly and will affect our economic competitiveness.

Yet today there is no viable framework for international action. The debate remains focused on the 1997 Kyoto Protocol, but it is nearly impossible for the United States to comply with that Protocol. This memo explains the origins of the Protocol and our predicament. It explains why we must not ratify the Protocol and outlines the major elements of a better alternative; it also explores the political strategy that will be needed to adopt this alternative since the United States was the leading architect of the Kyoto pact and will be tarred when it collapses.

Throughout, the memo focuses on an international framework for controlling (“mitigating”) emissions of greenhouse gases. No country can fully plan its
own policies to mitigate emissions until the central elements of an international framework are agreed. It focuses on mitigation because that is the most costly and contentious issue in the debate over how to respond to the dangers of global climate change. However, there are several other dimensions to an effective international global warming strategy in addition to mitigation. International action is needed to coordinate and fund research on the science of greenhouse warming—in that area, the U.S. is already a leader with its multibillion dollar annual investment in climate data and research programs. International action is also needed to help societies adapt to the effects of climate change, such as rising sea levels, possibly more intense storms, and (in some places) scarcity of fresh water. In general, adaptation has not been given enough attention considering that some climate changes are inevitable even if we undertake a vigorous mitigation effort. Finally, some international coordination is also needed for further research into “geoengineering”—for example, space mirrors that could reflect the sun and cool the planet. Geoengineering raises many severe concerns (what if the space mirrors cool the planet too much, or if they suddenly fail?), but a rational strategy would develop such exotic tools in case scientists discover an inevitable lurking climatic catastrophe. At present, U.S. and world investment in geoengineering research is inadequate.

BACKGROUND: The Road to Kyoto

In the late 1980s the major industrialized nations faced growing internal pressure to slow global warming. Environmental groups and a small group of concerned scientists were the prime movers. The hot summer of 1988 focused and multiplied the political pressure that these entrepreneurs had mobilized—first in the United States and then abroad.

The initial response in 1988 was to create a scientific body to review the evidence—the Intergovernmental Panel on Climate Change (IPCC). IPCC reported in 1990, noting that the effects of greenhouse warming were highly uncertain but could be adverse. IPCC has since become a permanent body, reporting every few years and also issuing special reports on various technical topics. Although the IPCC has become large and unwieldy, the United States government has wisely supported it because there is no realistic better alternative. The IPCC has probably helped to forge international consensus on the science of greenhouse warm-
ing; it has also engaged scientists from developing countries in an effort to encourage developing countries to take the climate issue seriously. Getting them involved is in our interest because within the next two decades developing countries will account for more than half of the world’s emissions of greenhouse gases.

With the first IPCC report in hand, negotiations on an international treaty to control global warming began in 1991. As only one year remained before the “Earth Summit” in Rio—at which nations were slated to adopt the treaty—diplomats deferred most of the substantive issues and instead negotiated a loose framework for future cooperation: the Framework Convention on Climate Change. The United States quickly ratified the Convention, as did nearly every other nation on Earth—the calculus was easy because the Convention required little action beyond what most nations were doing anyway. The Convention’s main obligations require all nations to submit periodic reports on greenhouse gas emissions and policies for controlling emissions. In addition, the Convention requires that industrialized nations contribute to an international fund that helps developing countries comply with the treaty’s obligations. Most nations, including the United States, had already committed to such funding because they knew how essential it was to engage developing countries.

Since the Framework Convention contained only vague obligations to control emissions, negotiations began in 1995 on a stronger treaty—a “protocol”—that would augment the Convention. Diplomats set a meeting for December 1997 in Kyoto as their deadline. Governments squandered most of the intervening two years with symbolic postures and debate on dozens of poorly fleshed-out proposals. Most proposals focused on mandating “targets and timetables” for controlling emissions of greenhouse gases. The European Union set the scene with a bold proposal for all industrialized nations to cut emissions of greenhouse gases 15% below 1990 levels by the year 2010. Although the EU had no plan for meeting its own target, horse trading around the European target dominated the public debate rather than sober assessment of what nations actually could implement.

In Kyoto, delegates finally agreed that the industrialized nations—known as “Annex I” countries—would, on average, cut emissions about 5% below 1990 levels during the period 2008-2012. The collective 5% goal was parsed into targets for each of 39 Annex I nations. For example, Japan committed to a 6% reduction, and the United States accepted a 7% cut. The European Union committed its 15
members to cut 8% collectively and has since doled out that target to each of its members, requiring Germany and the U.K. to cut deeply while Portugal and Spain actually increase their emissions. The Kyoto targets were averaged over five years, from 2008 to 2012, instead of aimed at a single year, to help soften the effects of the business cycle. Emissions rise and fall with the economy, so predicting emissions for a particular year is especially tricky. However, the 5-year period is somewhat arbitrary—real business cycles vary in length.

The Kyoto Protocol includes three mechanisms that can lower the cost of compliance by giving nations more flexibility in meeting their targets. First, the Kyoto targets apply to a “basket” of all six of the major greenhouse gases. Most global warming (70%) is caused by carbon dioxide, but methane (20%), nitrous oxide (6%) and other gases are also significant. An exchange rate known as the “global warming potential (GWP)” governs the tradeoff between the gases. For example, the current GWP for methane is about 21, which means that cutting a ton of methane would earn the same credit under the Kyoto Protocol as cutting 21 tons of carbon dioxide. In some countries and settings, the cost of controlling 21 tons of carbon is more than the cost of mitigating a ton of methane—in those situations, the extra flexibility of the “basket” approach saves money. In practice, however, making the multigas approach work requires overcoming some extremely difficult technical problems. Among them is the difficulty of measuring the emissions of nearly all the greenhouse gases. Of the major greenhouse gases, only emissions of carbon dioxide caused by burning fossil fuels can be measured with acceptable accuracy (within about 5% to 10%). In addition, scientists calculate GWP values by relying on arbitrary parameters that have no relationship to the real economic choices; some alternative schemes that don’t require GWPs have been proposed, but they are complex and still not adequately fleshed out.

Second, the Protocol allows “emission trading”—Annex I nations may trade credits and debits so long as the tally for the group complies with the emission targets. The program is modeled on the successful emission trading program for sulfur dioxide emissions here in the United States. In principle, trading makes economic sense because it is much cheaper to focus emission controls in Hungary, for example, than in the United States. The Hungarian economy is relatively wasteful of energy, whereas the United States economy already uses energy relatively efficiently. Buying some of the Hungarian quota would allow us to
save money while the Hungarians get better technology. Since the emissions mix worldwide, it doesn’t matter exactly where emission mitigation actually occurs.

Emission trading remains extremely contentious. In Kyoto, some environmental groups as well as many European and developing country delegates viewed trading as an American ruse to avoid serious action to control emissions. With this controversy swirling furiously, delegates in Kyoto agreed in principle to create an emission trading system, but deferred agreement on the rules that would govern the system. Diplomats still have not settled those rules because they are discovering that designing a workable emission trading system is no easier than inventing a new monetary system. Care is needed because much is at stake. If an emission trading system were created, the targets allocated in Kyoto would define the number of emission permits that each country could claim as its own. Reasonable calculations suggest these permits would be assets worth more than $700 billion, perhaps more than $1 trillion. (The asset value is the underlying worth of the asset—like the value of a house, rather than the cost of merely renting a house for a year.)

Third, the Protocol allows industrialized countries to purchase emission credits from developing countries. Developing countries often use energy extremely inefficiently and offer a cornucopia of low-cost ways to limit emissions. Yet developing countries have adamantly refused to set targets for controlling emissions because they fear that policies that would be needed to mitigate emissions would also undermine economic development, and without targets they can’t participate in emission trading. The solution is a scheme, known as the Clean Development Mechanism (CDM), which allows developing countries to earn tradable emission credits on a project-by-project basis. For example, a firm in the United States could invest in a project to build an efficient natural gas power plant in India. The American investor would earn credits for the difference between the actual emission level and the emissions that would have occurred without the project. The Indians would get the technology. Both sides win, and the climate is cooled while costs are controlled.

CDM, like emission trading, is highly contentious. The most important objection is technical: it is difficult to estimate the “baseline” of emissions that
would have occurred without any particular project, and thus it is difficult to determine the level of credit that should be awarded. There is no simple and transparent method for solving the “baseline” problem and thus no way to ensure that only worthy credits are distributed. Already without the lure of emission credits there is nearly $200 billion per year in private investment in developing countries, of which perhaps ten percent is in the energy sector. Companies such as Enron are already building efficient natural gas-fired power plants in India. With so much money already flowing there is great danger of rewarding projects that would have occurred anyway—issuing excessive credits will undermine the integrity of the credit system, just as printing money undervalues a currency through inflation. One solution is to empower an international regulatory body to review every CDM project individually. The problem, however, is that individual review would introduce large transaction costs and high uncertainty that would severely dampen the incentive for firms to invest. Indeed, the United States has a program under way known as the “United States Initiative on Joint Implementation” that operates with project-by-project review. The result is exactly as expected—the program is useful but cumbersome, and consequently the actual investment is far less than the potential.

RECOMMENDATIONS

Your immediate decision concerns whether to prepare for ratification of the Kyoto Protocol. The United States can’t ratify the Protocol unless you and the Senate are confident that the nation can comply with the Protocol’s obligations. Three strategies could bring the United States into compliance with the Protocol. However, none advances our interests, and thus none should be pursued; even if all were pursued simultaneously we would not be able to comply with the Kyoto emission targets at an acceptable cost.

First, the United States could attempt to control emissions within its borders and meet the Kyoto limits without having to resort to the controversial international emission trading or CDM. That scenario is impossible. U.S. emissions of carbon dioxide from fossil fuels, as shown in figure 1, are already 15% above 1990 levels and on track to rise perhaps another 10% by 2008. Yet Kyoto requires a 7% cut below 1990 levels. There is no way, even if the United States began in earnest, to cut 32% from our emissions in less than a decade. The lifetime of energy
equipment is long (2 decades or more); by the end of 2000, 80% of U.S. electric power generating capacity in 2010 will have been already built. We could comply only by shutting down a large part of the economy or by replacing existing energy equipment before the end of its economically useful lifetime.

The problem of compliance does not become much easier if the United States makes full use of the “basket” of gases to achieve compliance. Only 18% of U.S. emissions are from non-CO$_2$ gases, most of which is methane. The EPA already has several useful programs in place to help firms implement low-cost controls on methane, and we can achieve more before 2008-2012. However, it is unlikely that the United States can earn more than about 5% of the needed 32% reduction from non-CO$_2$ gases. Carbon dioxide matters most to solving the environmental problem.

Figure 1: Trends in CO$_2$ emissions from combustion of fossil fuels. Chart shows historical data from four semi-independent data sources and thus indicates the low uncertainty in the data. The large diamonds show the official data reported by countries for 1990, the base year for determining compliance with the Kyoto targets, which are shown as bars from 2008-2012. U.S. emissions have continued to rise steeply since the early 1990s, but emissions in Europe and Japan are more flat. Data exclude carbon sinks (e.g., forests and soils) as well as non-CO$_2$ greenhouse gases. Data sources: Oak Ridge National Laboratory (solid heavy lines), IIASA/WEC (dashed heavy lines), BPAmoco (solid light lines), EIA (dashed light lines).
The best chance for the United States to comply with the Kyoto targets is to play accounting tricks with carbon dioxide. The Kyoto Protocol includes not only emissions of CO₂ but also CO₂ sinks. When plants grow they accumulate carbon in their biomass—in the trunks, stems, roots and leaves as well as in surrounding soils. Two carbon sinks are especially important. One is trees. United States forests are growing rapidly as former farmland reverts to forest. More than two-thirds of Connecticut used to be pastures and crops; today, nearly all the state is woodland. All told, as much as 1 billion tons of carbon dioxide are sequestered every year in these growing forests; that offsets our emissions of greenhouse gases, which total about 6.6 billion tons of carbon dioxide equivalents today. (Carbon dioxide “equivalents” are the sum of all emissions of all greenhouse gases, weighted by the GWP exchange rate; of that total, 5.3 billion tons are in the form of carbon dioxide and the rest is other greenhouse gases.) The other sink is agricultural soils. Starting in about 1910—when tractors made it easier for farmers to plow deeper—intensive tilling has reduced the carbon content of America’s soils. Since the 1950s, to help slow soil erosion farmers have shifted to “no till” techniques that have also caused the carbon content of soils to rise. There are no good data on exactly how much carbon the soils are absorbing, but luck and clever accounting could deliver a large number.

The problem with using these sinks for a large fraction of our Kyoto commitment is that both trends long pre-date concern about carbon emissions and global warming. Rules that will govern credits for these sinks have not yet been adopted, but the Kyoto Protocol implies that credit should be awarded only for activities that are caused by humans and somehow relate to efforts to slow global warming. Should you instruct your diplomats to secure rules that let us take credit for these sinks and twist our books into compliance? This is unwise for several reasons:

- Most other industrialized countries are in a similar or better position to take advantage of lenient rules. Russia’s carbon sink from trees is perhaps twice the size of the U.S. sink, maybe larger; and in Europe, Japan and Australia the forests are also growing.

- We don’t know the trends in agricultural soil carbon, but countries with historically poor agriculture practices might be in even better position than the United States to claim credit for agricultural sinks as they improve soil management techniques.
• Fundamentally, no sound method yet exists for determining the credit that should be awarded for soils and forests. Good methods exist for verifying the carbon balance at particular well-monitored plots, but methods are not yet adequate for measuring the carbon balance of whole countries. (Under international legal agreements such as the Kyoto Protocol, ultimate responsibility lies with countries and thus good accounting is needed at the country level.) It is important to develop good methods for including forest and soil carbon, but pushing this agenda now, just for the sake for finding a way to comply with the Kyoto Protocol, would build a foundation of sand for future emission accounting systems.

In short, time has run out for America to comply with the Kyoto targets mainly through actions within our borders. We must look to other countries for credits.

A second strategy is to comply by purchasing credits through the emission trading system. The problem with this scenario is that Russia and Ukraine are by far the cheapest source of emission credits—not because the Russians and Ukrainians have had an epiphany about the risks of global warming but rather because their savvy negotiators got an emission target in Kyoto that far exceeds the likely level of emissions. Russia and Ukraine agreed in Kyoto to freeze emissions at 1990 levels, but the collapse of the Soviet economy in the early 1990s means that their emissions are already far below that target and unlikely to recover fully by 2008. Selling the windfall to nations in emissions deficit—notably the United States—could earn Russia and Ukraine $50 to $150 billion. (About four-fifths of that windfall would flow to Russia.) Since the windfall is free—completely an artifact of the luck and skill of the diplomats in Kyoto rather than the result of any effort to control emissions—these permits would squeeze out bona fide efforts to control emissions. That buys paper compliance but no reduction in global warming. Don’t expect Congress to be fooled by this ploy, not least because big financial transfers to Russia are not politically popular.

None of the proposed solutions to the problem of windfall permits—also known as “hot air”—is attractive. For example, the European Union has proposed a general rule that would cap the use of emission trading at 50% of each country’s effort towards the Kyoto targets, but that rule would not halt the flow of windfall permits from Russia; rather, it would cause more harm than good by ensuring that each country filled its cap with windfall permits and probably elim-
inate any bona fide permits from the international emission trading market. Moreover, the proposed cap would set a bad precedent for the future because an emission trading system would be most efficient if trading were unlimited. The real problem is not the trading rules but that the Kyoto allocation of quotas is severely biased in favor of Russia. Reallocating the permits would require renegotiating the targets adopted in Kyoto, which in effect would require renegotiating the entire protocol.

Finally, a third strategy envisions using the CDM to earn credits. However, it is unlikely that the United States could earn more than perhaps five percent of its Kyoto commitment through the CDM. Firms can’t sensibly parachute into developing countries with tens (or hundreds) of billions of dollars in additional investments in efficient power plants, afforestation projects and other activities that earn large quantities of CDM credits before 2008-2012. Even though the clock is ticking, governments still have not agreed on the rules that would govern the CDM system; nor have they built the institutions that would be needed to oversee and approve CDM projects. In principle, the CDM is extremely important because it is a concrete way to engage developing countries and to diffuse modern technology into developing economies. But there should be no illusion about the difficulty, time and expense of building a viable CDM system; time has run out for the CDM to play a major role before 2008-2012.

All the other industrialized countries also face difficult choices, but most are not nearly in as tough a bind. For them, the first strategy—meeting the Kyoto targets mainly through their own actions—is much easier because special factors and sluggish economic growth have kept emissions low. For example, in Britain the collapse of the coal industry and the shift to gas and nuclear power have reduced emissions of carbon dioxide. Compared with coal, natural gas emits only half the carbon dioxide per unit of energy; nuclear power causes essentially no emissions of carbon dioxide or other greenhouse gases. No wonder that Tony Blair has suddenly become one of Kyoto’s greatest advocates and the U.K. government is seriously considering cutting emissions beyond its Kyoto-related obligations. In Germany, the incorporation of the former communist East has also sharply cut emissions, mainly through economic recession and the replacement of inefficient equipment in the East. Together, Britain and Germany have propelled the European Union remarkably close to its Kyoto target. In Japan, persistent economic troubles have kept emissions low. The silver lining to a cloud of economic
trouble is that the European Union and Japan are both already close to compliance and can plausibly claim that the Kyoto targets are achievable, although in reality they, too, will find it difficult to comply with the Kyoto targets fully. In contrast, since the mid-1990s U.S. emissions have continued to increase strongly—and the gap between actual U.S. emissions and the Kyoto target has widened—thanks mainly to the unprecedented robust growth of the U.S. economy.

Since the United States can’t comply with Kyoto, we should make no effort to ratify it. However, you should not openly make that decision because doing so will incur the wrath of Kyoto’s supporters here and overseas. For many, supporting Kyoto is synonymous with the mission of slowing global warming—rejecting the former will call into question your commitment to the latter, not least because the United States was the main architect of the Kyoto pact. Formally rejecting Kyoto will put the U.S. government on the defensive and undermine any effort to build a sensible alternative. Instead, you should make no formal decision about Kyoto. Over the next few years it will become clear that the Clinton administration has put you in a bind because the United States can’t meet its Kyoto commitments—that fact is already clear to close observers of the scene. It is better that the bad news seep slowly and that fingers point to the previous administration than for you to paint a bull’s eye on your administration by announcing a formal decision to abandon Kyoto.

Moreover, formally rejecting Kyoto will destroy a framework that continues to be useful. The Kyoto process is leading to the development of generic rules and institutions—for example, carbon accounting systems for forests and agricultural soils—that will be needed in any international cooperative effort to slow global warming. Those precedents will form the starting point for the effort to build a successor to Kyoto. U.S. diplomats are deeply involved in these efforts; they should be instructed to pursue rules that make economic and scientific sense and not to adopt any rules whose main purpose is simply to make the Kyoto emission targets for 2008-2012 easier to honor.
After Kyoto

Given the resources already invested in Kyoto, there will be very strong political pressure—in the United States and abroad—to leave the basic framework intact. As it becomes obvious that the United States and some other nations will not ratify the agreement, Kyoto’s backers will merely want to stretch out the timetables and adjust the targets to make it easier to comply. However, the problems with the Kyoto Protocol are not merely the result of unrealistic targets and timetables that could be fixed through diplomatic tweaking. Rather, the problems are fundamental, and fixing them will require a different framework. The United States should take the lead in developing this alternative. Its exact form should emerge through consultation with your top advisors and key allies. A few elements to help start the rethinking process are outlined below. If you agree that an alternative is needed you should be prepared to back it with action and resources—the United States will be blamed for Kyoto’s collapse, and an alternative will not gain acceptance unless it generates tangible and prompt results.

First, a superior framework must emerge from consultations with about six of the largest emitters of greenhouse gases—the United States, the European Union, Japan, China, India and Brazil. Let us call this group the Climate 6 (C6); they account for most emissions of greenhouse gases today and include the main developing countries that will be the largest emitters of greenhouse gases in the future. A small group is needed because the current United Nations framework is too unwieldy for serious thinking about alternatives to the Kyoto architecture, and some of its members (e.g., oil-rich Saudi Arabia) actively work to undermine progress. The U.N. can remain as a global framework for cooperation, but a small group must lead with a foot outside the U.N.

Second, we should focus on controlling emissions of carbon dioxide caused by burning fossil fuels. This is the most important cause of global warming and, luckily, it is also the easiest flux to measure. Building a viable international framework for mitigating emissions of carbon dioxide will be hard enough without clouding the agenda with other gases that are much less important, harder to
measure, and require use of the dubious GWP concept. Rather, we should expand the system to include other fluxes only after we develop a sound framework for fossil fuel CO₂.

Third, we must take a long-term perspective and set long-term goals. Governments have little leverage over the short term because most of the technologies that cause emissions of greenhouse gases, such as electric power plants and automobiles, are long-lived. The problem, however, is that it is difficult to use binding international legal agreements as instruments for negotiating long-term goals. Goals are most effective if they are ambitious and unequivocal, but many governments (including the U.S.) have been wary of negotiating such goals in binding treaties because circumstances change and compliance may not be possible years down the road. Thus, with the C6 we should start with nonbinding objectives and focus our international cooperation on packages of actions that countries will implement to achieve those objectives, such as commitments to remove fossil fuel subsidies, promote energy efficiency, and raise the cost of emitting carbon dioxide. Such a nonbinding framework would send clear long-term signals that emissions will be controlled, and it would promote focused and quantitative debate on the objectives beyond the short 2012 time period of the Kyoto Protocol. Crucially, by focusing on actions and long-term goals, the C6-led system would shift governments’ energy away from the unrealistic short-term targets that have characterized global warming diplomacy to date and toward implementation and performance, which have been lacking.

Fourth, we must be sure that the long-term focus includes investment in new carbon-reducing technologies. Those investments should include not only efforts to improve existing technologies, such as making today’s gas-fired power plants even more efficient. We should also invest in more radical schemes—such as hydrogen energy carriers and the next generation of nuclear power—that the private sector won’t fund adequately on its own but which could eventually make feasible a carbon-free economy. The reports from the Clinton Administration’s Presidential Committee of Advisors on Science and Technology (PCAST) established good plans for beginning that effort—we should fund those plans more fully. We will need to work with other major centers of innovation—in particular, Europe and Japan—to ensure that they make comparable new investments in basic research and technology.
Fifth, starting within the C6 we should implement programs to invest in carbon-saving technologies in developing countries. The U.S. government already participates in modest programs to diffuse energy technologies to developing countries, and the potential for earning CDM credits has led the private sector to make small additional investments in projects that reduce emissions of greenhouse gases from developing countries. We should subsidize a much larger effort—perhaps a few hundred million dollars per year at peak. That investment would demonstrate the tangible benefits to developing countries of participating in efforts to control emissions of greenhouse gases, and it would help demonstrate that the United States is taking this problem seriously. Such a practical program would also help analysts refine methods for measuring “baselines” and solve other technical problems that have plagued efforts to implement the CDM. It would increase the chance that future CDM rules will be based on real experience that is consistent with U.S. interests and the interests of U.S.-based vendors of energy equipment for the developing world.

Sixth, as experience grows—perhaps over 5-10 years—it will be necessary for the C6 and other nations to codify basic obligations into binding treaties. A non-binding framework, advocated above, can set norms and provide direction, but it will not be adequate as the cost of action rises and the incentives to “free ride” mount. A ratified, binding treaty will be needed to assure countries that others are making comparable efforts.

Negotiating a new binding treaty must start with a clear understanding of why the Kyoto Protocol has not worked. In principle, the Kyoto approach—setting emission targets and allowing trading of emission credits—is an elegant market-based mechanism for controlling emissions of greenhouse gases. In practice, however, the approach impedes international cooperation because it requires creating and allocating new property rights (emission permits) that are worth hundreds of billions of dollars. Making that allocation is extremely difficult for two reasons. First, nations will be extremely wary of getting a raw deal because they are mindful that circumstances could change and they could be saddled with unexpectedly high compliance costs. Indeed, the surprising surge in U.S. emissions after Kyoto—and the decline in British and German emissions—reveals just how much can change in only a few years. Second, allocation of such large assets is especially difficult under international law because countries that are dissatisfied with the outcome can defect. If enough nations defect—as the United States
must from the Kyoto pact—then it will not be possible to “cold start” an interna-
tional emission trading program. Even if the program were started, the threat of
defection would loom like a cloud over the trading system. Securing property
rights so that markets can operate efficiently requires strong rule of law, which is
not available in the international system.

One widely discussed alternative to Kyoto-like emission targets and trading
is to coordinate emission taxes. The tax approach makes the most economic
sense, but it is impossible to monitor and enforce under international law and
must therefore be rejected. The best option is to combine the two mechanisms—
trading and taxation—into a hybrid system that regulates both the quantity of
emissions as well as the price. Countries would set emission targets and allow
trading, but if the price of controlling emissions ever exceeded a “trigger” level
then governments could raise the quota by selling more tradable permits at the
trigger price. By capping the price the hybrid mechanism would help assure that
the cost of controlling emissions would not be unexpectedly large, which would
make governments more willing to adopt meaningful binding commitments,
ease the process of allocating permits, and make an international agreement less
prone to defection if circumstances change.

If the initial cuts in emissions are modest—as surely they will be—then the
hybrid approach has another especially attractive feature: most of the economic
advantages of this hybrid approach could be achieved without international emis-
sion permit trading. Thus the United States could justify implementing this
approach at home even before a full international framework was in place. That
would send a clear signal to firms that they should begin to control emissions,
demonstrate that you are taking the global warming problem seriously, and make
it more likely that a similar system would be adopted at the international level.
Starting with a generous allocation of permits and a low trigger price could
achieve all of these benefits while minimizing the cost imposed on U.S. business.
To sweeten the economic and political advantages of this approach, the U.S. gov-
ernment could use the proceeds from auctioning and selling permits to offset cap-
ital gains and labor taxes—making it possible for you to build a winning coalition
that could also benefit the U.S. economy by promoting investment and work. As
you start work with the C6 you will be under pressure to make concrete efforts to
control emissions—implementing the hybrid approach here in the United States
and working with the others to do the same overseas would be a wise first step.
Global warming is the toughest international environmental problem that the community of nations has confronted. Solutions require a long-term perspective because the greatest risks of climate change lie many years ahead and there is little that we can do to leverage emissions over only a decade. That long-term perspective requires new legal instruments and institutions; we can play a constructive role in building those, but none of the sensible paths start with ratifying the Kyoto Protocol.