WHERE DO WE GO FROM HERE?

FOUR RFF EXPERTS SHARE THEIR VIEWS ON LIFE POST-KYOTO

For over a decade, ratification and implementation of the Kyoto Protocol to the UN Framework Convention on Climate Change seemed like an elusive goal. Politicians and scientists from around the world clashed, negotiated, and eventually reached agreement on a plan for reducing greenhouse gas (GHG) emissions, which was ratified as a treaty on February 16 of this year.

Kyoto's lofty goals are turning out to be nearly impossible to achieve. Many European Union countries are struggling to meet their emissions targets; easy domestic solutions have turned out be very few. Japan had hoped to meet its Kyoto requirements by greatly increasing its nuclear power generation capacity but this now seems highly unlikely.

The long-term effects of the treaty's ratification are nearly impossible to gauge, as three of the largest sources of GHG emissions are not covered: the United States never ratified it and China and India, considered to be developing countries, are not affected.

To set these developments in perspective, four RFF experts explain the technical, economic, and political obstacles that lie ahead. To learn more about RFF's extensive work in the climate change area, visit www.rff.org/climatechangeafterkyoto.

The last issue of *Resources,* Winter 2005, provide a comprehensive framework for understanding key energy options—visit www.rff.org/rff/Publications/Navigating-Energy-Choices-in-the-21st-Century.cfm.

What Follows Kyoto?

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J.W. Anderson

When the Kyoto Protocol went into force in February 2005, it became a symbol of international cooperation to protect the climate. By imposing mandatory limits on the amounts of greenhouse gases emitted by 36 industrialized countries, it was the first serious effort to slow global warming.

But Kyoto is only a partial success. It does not include the world's biggest source of greenhouses gases—the United States—or any of the developing countries where emissions are rising rapidly.

The Kyoto commitments run only from 2008 through 2012. The treaty's authors assumed that by now negotiations would be under way to set subsequent, and presumably tighter, limits. Instead, the increasingly apparent shortcomings of the Kyoto system have started a much broader debate about the future of the treaty and climate policy. Of all the greenhouse gases generated by human activity, by far the most significant is carbon dioxide (CO_2). It is generated whenever fossil fuels—coal, oil, or natural gas—are burned, and those fuels provide more than 80 percent of the world's energy. The challenge is to cut emissions without slowing economic growth and reducing standards of living.

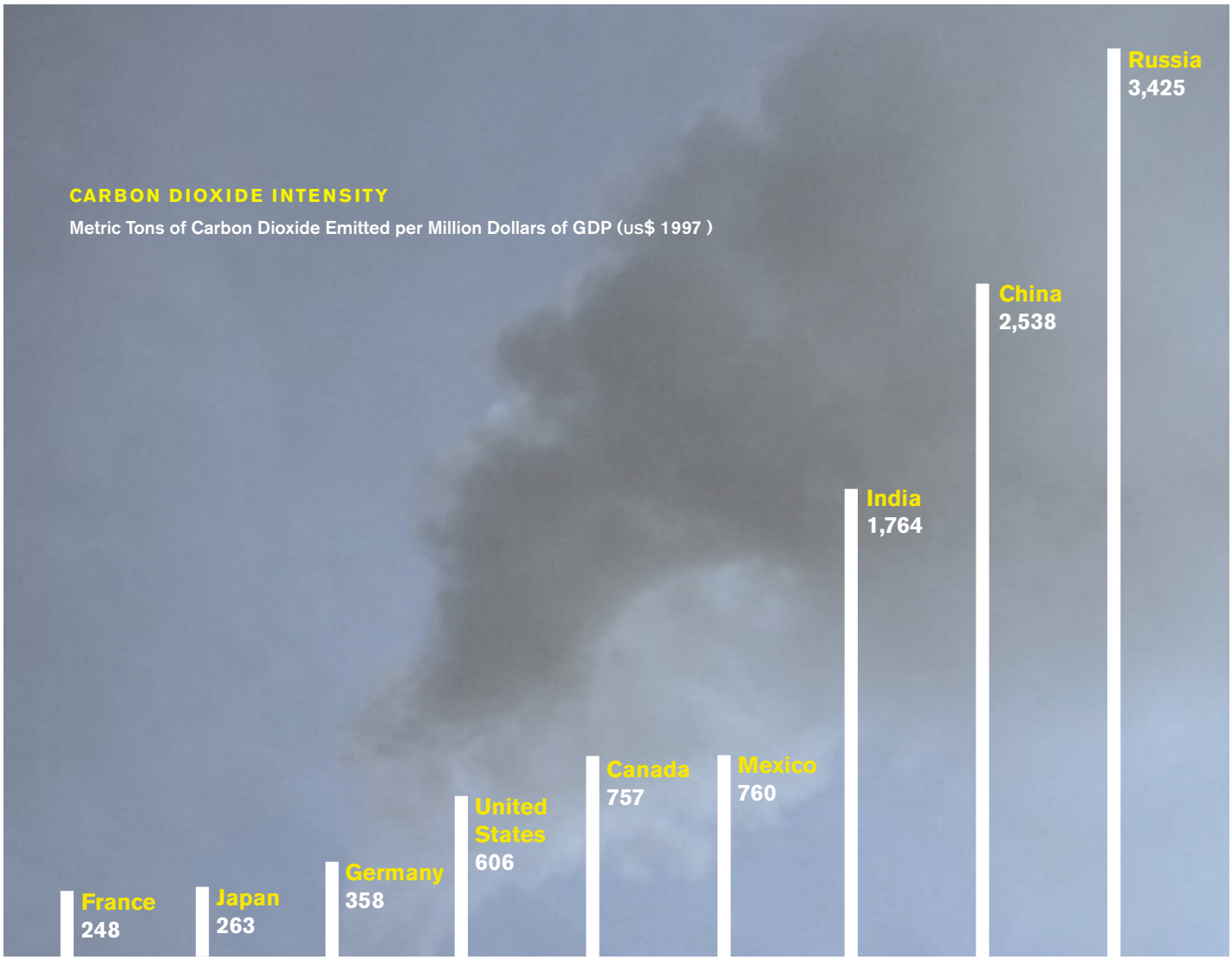
One basic choice is whether to rely on quantitative restrictions on emissions, as the Kyoto treaty does, or instead to look, as the Bush administration does, to rapid development and deployment of new technologies.

Since the world has had little experience with management of carbon emissions, it is altogether unclear how costly and disruptive the Kyoto limitations might be. It was because of these concerns that President Bush pulled the United States out of the treaty. If its limits prove unexpectedly difficult, some governments may choose simply to let them go unmet. The Kyoto treaty has no enforcement mechanism.

The Bush administration alternative, reliance on new technology, is under something of a cloud in the current debate because many other countries view it simply as a dodge by the United States to avoid taking any serious political action against a danger that others see as urgent. The administration has thus far refused to apply any mandatory standards and has set very loose national goals that are hardly different from the progress that business as usual would produce.

But the administration has introduced a concept, carbon intensity, that could be extremely useful if applied more vigorously. Carbon intensity is the relationship between an economy's total output, measured as its gross domestic product (GDP) and the amount of carbon dioxide generated to produce it. A fall in carbon intensity means a rise in energy efficiency—and raising efficiency is a much more appealing goal than cutting fuel use at any cost. While the large, fast-growing developing countries, led by China and India, are deeply suspicious of emissions limits as a threat to their expansion, the promise of higher efficiency is much more likely to draw them into a climate regime. And a climate regime that does not include those countries is hardly worth having.

The enormous variations in carbon intensity, from one country to another, suggest the magnitude of the potential reductions in emissions from the present trajectories (see opposite). The U.S. Energy Information Administration reports



Source: U.S. Energy Information Administration, 2001.

that, in 2001, the United States emitted 606 metric tons of CO_2 to produce each million dollars' worth of GDP. Germany emitted 358 tons of CO_2 to produce the same amount of GDP, and Japan emitted only 263 tons. At the other end of the scale, China emitted 2,538 tons per million dollars of GDP, and Russia emitted 3,425 tons.

While the worldwide debate over climate policy continues, warnings from scientists about global warming and the resulting risks are growing stronger. In November 2004, the Arctic Council—an intergovernmental research agency supported by eight countries including the United States—reported that the Arctic climate is now warming rapidly and larger changes are projected.

In February 2005, British Prime Minister Tony Blair convened a symposium at his government's meteorological center to tell him at what point the rise in CO_2 concentrations in the atmosphere will become dangerous.

The scientists replied that the danger point is a political judgment. But some said that even an increase of 2 degrees Celsius (nearly 36 degrees Fahrenheit) could result in large ecological changes. To limit the increase in temperature to no more than 2 degrees Celsius with high certainty would require keeping the concentrations of CO_2 in the atmosphere below 400 parts per million (ppm), the symposium concluded. Before the industrial revolution began around 1750, the concentration had been around 280 ppm for centuries. Currently it is slightly above 375 ppm, and the rise seems to be accelerating. That rise is produced by the basic structure of the world's expanding economy, and most analysts believe that holding the concentration of CO_2 below 400 ppm will prove almost impossible. ■

Business Planning in a Post-Kyoto World: For U.S. Firms, Which End Is Up?

Robert W. Fri

Now that the Kyoto Protocol has gone into effect, Japan, Canada, and much of Europe are struggling to figure out how to comply with its new requirements. But they are not the only ones who are confused: U.S. firms have to contend with their own murky set of circumstances.

While the United States refused to ratify the Protocol, U.S. firms—and not only those with multinational ties—are nonetheless directly affected by the increasingly likely prospect that U.S. greenhouse gas (GHG) emissions will sooner or later be controlled. The absence of a clear U.S. policy for curbing GHGs is making today's business decisions more costly and risky than they need to be.

For example, companies making long-term capital investments, like electric utilities, must consider what might happen to those investments if GHG controls come into effect over the next two or three decades. But different designs of a control strategy make a huge difference in future costs—by a factor of five or more. This uncertainty in the size of control costs greatly complicates strategic planning for long-term investors.

Another problem is that U.S. companies with GHG emissions in Kyoto countries still have to comply with GHG reduction requirements in each country. Because the United States is not a signatory to the treaty, however, reducing such emissions in the United States won't count toward their foreign targets, even if doing so is the least costly response. That could increase the compliance cost to U.S. companies and put them at a competitive disadvantage.

And even within the United States, the situation is unnecessarily confusing. U.S. companies are already subject to a variety of state and local requirements imposed because of climate change concerns. Over 20 states have implemented renewable portfolio standards, which mandate varying levels of renewable energy use, especially for electric utilities. California Gov. Arnold Schwarzenegger has proposed cutting his state's GHG emissions by 2050, a group of states in the Northeast has proposed its own regional GHG cap-and-trade scheme, and 131 mayors recently formed a bipartisan coalition to fight global warming. This diver-

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sity of regional and local GHG requirements almost certainly drives up the cost of compliance for companies operating in several states.

The time is therefore ripe to design and implement a GHG control strategy for the United States that is fair and efficient for U.S. companies. It's important to have a thorough discussion about this strategy because the design details make a huge difference to both the total cost and who pays it. All of the design options create winners and losers, so the trade-offs needed to find the fairest approach are properly the stuff of political debate. Once a system is agreed upon, both government and business will need operational experience with it to ensure it works in practice as well as in theory. For this reason, the control system must actually be implemented, not merely modeled by experts.

And the time to start this discussion is now. Doing so will reduce the uncertainty—and therefore the cost and risk—that the prospect of future GHG controls imposes on today's business decisions. Moreover, knowing what control system works best for our economy strengthens the U.S. position in the ongoing international debate about climate control strategies beyond Kyoto. Those deliberations will happen with or without us, but either way it's unlikely that anyone else will worry about our interests.

Some costs would be involved in implementing an initial GHG control system now, of course, but they can be minimized in several ways. For example, the initial system should require only modest GHG reductions at the start, and it could include a safety valve that would ensure that costs would be limited to an acceptable amount. Researchers, including several at RFF, have already begun investigating and designing such systems. As this work goes forward, the initial focus should be on getting the rules right, not on the size of the reductions they impose.

In sum, a key policy issue is how to balance the cost of doing nothing with the cost of doing something. The costs of doing nothing are real, and policymakers should address them sooner rather than later. ■

Is There a Role for the United States to Play in Future Climate Negotiations? Maybe.

Raymond J. Kopp

No one quite knows what's going to happen after 2012, the end of the first commitment period under the Kyoto Treaty. Negotiations are expected to begin shortly on the next round, but the United States won't be seated at the table. U.S. opposition to Kyoto is not based solely on partisan politics, however. While early on the Clinton administration played an active role in the negotiations, White House officials that realized the high economic cost of meeting the Kyoto targets was politically unacceptable and never presented the protocol to the Senate for ratification. The Bush administration has never wavered from its position that Kyoto poses too heavy a burden on the U.S. economy.

So where do we go from here? Can the United States take a leadership role in future global agreements on climate change? For this to come about, many hurdles will have to be overcome in the short run.

Frankly, the absence of domestic U.S. climate policy that is viewed as credible by our trading partners will make it difficult, if not impossible, for the United States to play any kind of serious role in the development of global policy in the near term. To say that the United States lacks standing in global discussions and negotiations of climate policy is an understatement.

That said, should the United States be judged credible in the future it could provide leadership on at least three important issues: developing-country participation, the process employed to reach global agreements, and the proper balance between establishing long-term goals and setting current policy.

Developing-Country Participation

It matters little what the European Union, the United States, and the rest of the developed world do if we cannot entice the developing world—countries like China, India, and Brazil—to reduce emissions as well.

We must recognize that these countries place a high priority on economic development and for good reason. Wide-scale international participation in efforts to mitigate climate change will be facilitated if global climate agreements are discussed and negotiated as a part of larger—perhaps much larger—international policy packages that cover trade, development, international finance, and technology transfer.

The larger the set of policies under discussion, the more degrees of freedom exist with which to craft compromises

and satisfy competing political and economic needs. This form of "policy linking" is not a new idea, but unfortunately it lies outside the current Kyoto framework.

Treaty Negotiation, UN Style

If the key to developing-country participation lies in broadening the negotiations to include things like development, technology, and global trade, then the current UN treaty process, involving some 190 member countries, is too cumbersome.

A more reasonable approach would involve a smaller number of nations, perhaps along the lines of the "Leaders 20 Summit" suggested by Canadian Prime Minister Paul Martin. This group would include the largest emitters (now and in the future) and the major economic and political powers. While not as inclusive as the UN process, the L20 would be a more manageable and perhaps more cohesive group and would still account for the majority of the world's greenhouse gas emissions now and into the future.

In this new negotiating realm of broadened policy packages, the emphasis will likely be on economic development, giving trade and finance ministers center stage while climate policy might have secondary importance and environment ministers would play supporting roles.

Long-Term Goals

Finally, there is the issue of the proper role of long-term targets, and here I am referring to concentration targets.

Undaunted by the difficulty of meeting their current Kyoto emissions targets, the European Union has gone on record setting a long-term greenhouse gas (GHG) concentration target of 550 parts per million (ppm) for all GHGs. This is equivalent to a carbon dioxide concentration of 470 ppm. These are extremely aggressive goals to say the least—many would argue that they can't be met. Presumably this long-term goal will be reflected in the European Union's negotiating stance as discussions of Kyoto second commitment period targets begin later this year.

I would argue that adopting such specific long-term goals as the basis for near-term policy development—without knowing the technical, economic, and political feasibility of the targets—is fruitless and, in fact, dangerous.

Ultimately, global GHG concentrations will not be determined by government proclamation. Rather, they will be determined by the perceived risks of climate change balanced against the technology available and the economic and political cost of GHG control. We will learn about all these costs and benefits over time and will adjust domestic policies and international agreements accordingly.

While it is important to know how the climate system will react to various long-run concentration levels, current policy should not be solely dictated by such uncertain information. Rather, it should be directed at two tangible goals: first, reducing the cost of GHG control worldwide, and, second, providing incentives for the advancement of alternatives to carbon-based technology. The task for decisionmakers is to foster the development and implementation of economically efficient and equitable policies to attain these twin goals. ■

It matters little what the European Union, the United States, and the rest of the developed world do if we cannot entice the developing world — countries like China, India, and Brazil — to reduce emissions as well.

What Is the United States Doing About Climate Change? Everyone Else Is Coping with Kyoto

William A. Pizer

While the rest of the world is struggling to figure out how to meet its Kyoto commitments, the United States is taking a different approach toward controlling greenhouse gases (GHGs). Against a backdrop of an existing voluntary, technology-driven response, proposals have arisen at the national and regional levels that either seek to strengthen the current technology approach or contemplate mandatory emissions programs.

The current energy bill, which passed in the House of Representatives and is now being debated in the Senate, falls into the first category: support for current technologies. While not directly addressing climate change, there are a number of provisions that have potential climate change consequences. Nuclear power, clean coal (with eventual capture and sequestration), renewable energy, and ethanol all have the potential to reduce emissions. Yet, none represents dramatic changes from the status quo, and the renewable energy and ethanol provisions, which were passed last fall as part of a bill to amend the tax code, would simply continue existing subsidy programs. Sizeable incentives exist to expand conventional fossil energy supplies—potentially increasing emissions. Still, there are elements that can and should be viewed as supporting climate-friendly technologies. (For a more detailed analysis, see www.rff.org/multipollutant.)

Senator Hagel's recent proposal also belongs in this group. While it might put more money on the table to encourage specifically climate-friendly technologies, the mechanisms are not significantly different—tax incentives for emissions-reducing technologies. Climate provisions from

earlier energy bills that would create various programs and offices for climate change, as well as some provisions that would have created emissions registries—lists of what companies release what emissions—similarly fall into this group. None of these would place a requirement, burden, or economic incentive directly on emissions or energy use itself.

The second category, involving mandatory programs, prominently includes the McCain-Lieberman bill as well as multipollutant bills targeting power plant emissions of carbon dioxide (CO_2) and bills aimed at tightening corporate average fuel economy (CAFE) requirements for light-duty vehicles. The McCain-Lieberman proposal would require power plants, industrial sources, and large commercial facilities, along with producers of transportation fuels, to obtain permits for each ton of gas they emit in 2010 and thereafter. A fixed number of permits—equal to a source's emissions in 2000—would be given out, or auctioned, and sources could freely trade those permits, such that those who really needed them could always buy more in a market. McCain-Lieberman would also allow sources to gain additional credits for emissions reduction projects in developing countries.

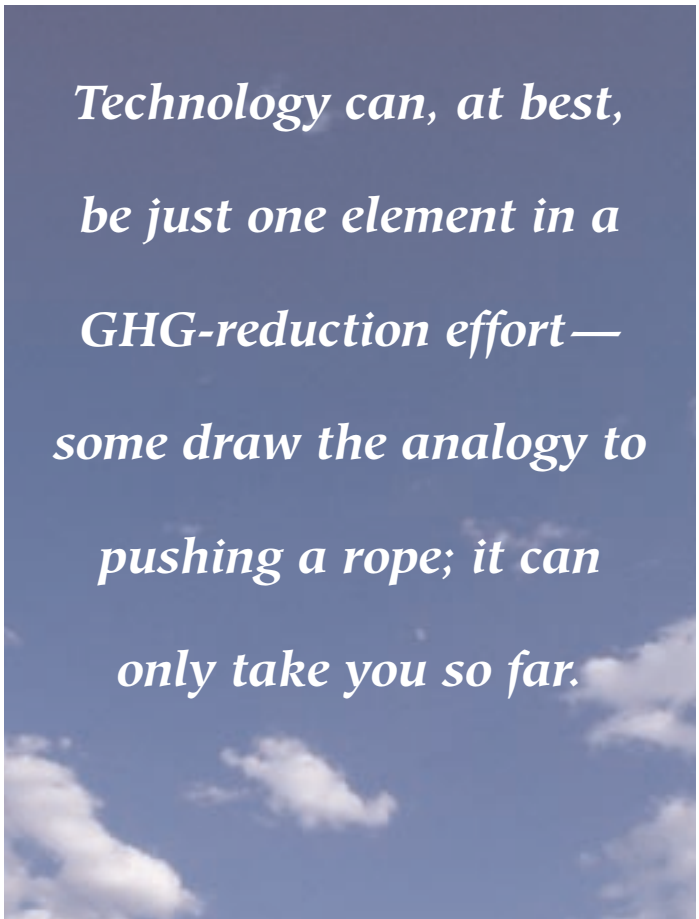
Economists generally like this kind of approach because it (a) applies the incentive directly to the thing we care about—emissions; and (b) is flexible, allowing the market, rather than a regulator, to find the cheapest emissions reductions.

Other mandatory proposals include those by Carper and Jeffords-Lieberman that would address GHGs from just the power sector in the context of a multipollutant program—simultaneously establishing trading programs for sulfur dioxide, nitrogen oxides, and mercury, as well as CO_2. (This is in contrast to President Bush's Clear Skies proposal, which does not include CO_2.) Proposals to tighten the CAFE standards, such as S794 in the last Congress, fit here because while they target oil use and are often motivated by security concerns, they would also have a substantial impact on emissions.

While it is not formally included in legislation right now, the National Commission on Energy Policy, a nongovernmental, bipartisan group that I was involved with, recently published a major report, *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*. The commission wants to encourage lawmakers to consider blending elements of both technology and emissions-focused policy. Specifically, the commission recommendations include not only a mandatory emissions trading program, but also incentives to develop and deploy carbon-friendly technologies. In fact, the policies are actually linked in that a small auction of allowances in the trading program finances the technology incentives. Another somewhat innovative element, compared to the McCain-Lieberman proposal, is that the allowance price—and indeed the overall cost—is capped.

Finally, the climate policy landscape in the United States is not exclusively federal. A number of actions are occurring at the state and local levels that bear mentioning. One is the effort in California to establish GHG emissions standards for cars and light trucks. Should they succeed, it would effectively establish tighter fuel economy standards. Another is an effort by nine northeastern states, initiated by New York Gov. George Pataki, to establish a CO_2 emissions trading program for power plants in those states. Such a program, if successful, could provide a blueprint for a national policy. Most recently, mayors from across the country have declared their commitment to see their cities abide by the Kyoto rules, but the impact of this effort remains to be seen.

Despite the variety of federal climate change policies on the table and their very uncertain future, and despite the apparent zest of states to fill the policy vacuum at the federal level, I think most people believe that climate change must and eventually will be dealt with by the federal government, in ways that are both comprehensive and mandatory. It is hard to see how state policies can succeed against a problem that is fundamentally global and requires international negotiation. Similarly, technology can be, at best, just one element in a GHG-reduction effort—some draw the analogy to pushing a rope; it can only take you so far. For these reasons, the relevant question for meaningful federal policy is probably how, what, and when, not so much if. ■



A Glossary of Key Climate Change Terms

Atmospheric Concentrations. Expressed in parts per million (ppm), the quantity of greenhouse gases relative to the global volume of the atmosphere. Atmospheric concentrations are often cited for carbon dioxide (CO_2) alone or for CO_2 equivalents, in which case they are adjusted to reflect all greenhouse gases. (See entry under CO_2 below.) Rising atmospheric concentrations can occur even with unchanged levels of annual greenhouse gas emissions.

Carbon Dioxide. The major greenhouse gas implicated in global warming, usually expressed in terms of carbon. One metric ton of carbon equals 3.667 metric tons of CO_2. Other greenhouse gases are often given as carbon or CO_2 equivalents, based on their respective global warming potentials.

Carbon Intensity. Shows the relationship between the amount of carbon dioxide emitted by a country and what its economy produces, measured by the gross domestic product. A lower number implies that the economy functions well without emitting many pollutants. Conversely, a higher number indicates that in order to run its economy, a country emits a great deal of pollutants.

Carbon Sequestration. A process by which carbon is sequestered or captured, usually in a natural formation such as the ocean, forests, or soil, to keep it out of the atmosphere.

Clean Coal. Refers to methods to reduce pollutants emitted when coal is burned, either by using coal with lower sulfur content or by using various methods to reduce the amount of sulfur emitted into the atmosphere.

Emissions Trading. A regulation that grants a certain number of permits to release a given pollutant. Companies may keep their permits and emit the pollutants or reduce their emissions and sell the permits, providing a financial incentive to decrease pollution.

First Commitment Period. Under the terms of the Kyoto Protocol, the time at which signatories are to reach their targeted emissions reductions. Generally understood to be between 2008 and 2012.

Greenhouse Gases. Gases, either natural or man-made, that trap heat in the Earth's atmosphere. Some, such as water vapor, are harmless. Others have the potential to raise average temperatures or affect the environment negatively in other ways.

Kyoto Protocol. A 1997 agreement in which 159 nations pledged to reduce emissions of six greenhouse gases, including carbon dioxide, methane, and nitrous oxide. Countries in transition to a market economy, such as Russia, were to reduce less and those in the process of becoming industrialized, such as China and India, were to be exempt. The protocol, without the signature of the United States, among other nations, was ratified in February 2005.

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