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Thomas G. Burns, a member of PIRINC's newly created Board of Visitors, prepared the enclosed report, *Beyond Kyoto—What the World Needs Now*. The Board of Visitors allows PIRINC to draw on leading energy experts to help assess research priorities and, on occasion, to contribute their own analyses of key energy issues.

Although fraught with scientific uncertainty, there is a growing consensus that our planet, probably because of natural forces and climate cycles but very likely reinforced by human emissions of greenhouse gases, is still experiencing a period of gradual warming that has been in progress since the last Ice Age. This long-term trend can be addressed only by similarly long-term initiatives. The attached perspective attempts to outline current understanding of the problem, to update the political situation, and to provide some constructive suggestions that may help bridge the gap between rhetoric and reality. Only when the ramifications of both the problem and the proposed solutions are well understood—both by the general public and by policymakers—will we be able to identify new, more promising approaches to dealing with those climate-related changes that do eventually arise.

It has become a cliché that the world's economy is inextricably intertwined both with its energy supply and with the global environment. Energy drives the economy, which, in turn, provides the wherewithal to protect the environment. Continued success requires progress on all three parts of the equation. A healthy planet makes life worth living and provides valuable resources and services needed by the economy. The efficient use of all forms of available energy (all of which originally came from the sun) and other natural resources is necessary in order to continue to raise standards of living everywhere. And economic progress is the path to a peaceful world that has the knowledge, the interest, and the wherewithal to use, understand, and protect the environment in a never-ending cycle.

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May 2001

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Beyond Kyoto—What the World Needs Now

Executive Summary

For four years, working out the details of the Kyoto Protocol has dominated international efforts to mitigate possible human caused impacts on the changing global climate. Now that process seems to be coming to an end. Although it is still possible that the rest of the world could move to implement the Protocol, without US involvement, it would have relatively little effect on atmospheric greenhouse gas concentrations. If the US is not a full participant in the process, it might also prove more difficult to begin the next steps.

The science of understanding the global climate has made enormous strides in the past decade. However, it remains inherently uncertain. Each new discovery leads to new questions about the interrelationships among the extremely complex factors that influence Earth's life-supporting climate.

In the face of such uncertainty, it is important for society to make choices that will both continue to raise standards of living and hedge against possible future problems. Continued research and economic development are the best ways to create the knowledge and the wealth that will enable future generations to deal with the new (and unknowable to us today) problems that will inevitably arise. Rather than trying to solve these problems now, we need to establish options that will make future actions possible.

Two points are central to any effective long-term climate policy. First, we have to make maximum use of market mechanisms that provide consumers and decision-makers with the information required to make rational choices among the many alternatives available. And, second, we have to find ways to begin immediately to reward behaviors that start to reduce greenhouse gas emissions now and into the future.

All available tools at our disposal must be considered and used appropriately, including:

- Reduce, offset, or eliminate the easiest greenhouse gas emissions sources first.
- Use existing energy and other natural resources more efficiently.
- Develop affordable and secure energy supplies.
- Research and develop promising alternative energy technologies.
- Transfer both existing and new technologies to the developing world.
- Study all approaches to mitigate and adapt to inevitable changes in climate.

One thing is certain. There are no easy answers to the questions as to whether and to what extent civilization impacts the global climate. All we can do is to move carefully between the extreme views on either side of the issue in ways that keep open our ability to make sound choices as more information becomes available.

BACKGROUND

In 1992, the US Senate ratified and President George H. W. Bush signed the United Nations Framework Convention on Climate Change (UNFCCC). This international treaty governs the process of dealing with any potential human contributions to on-going, long-term changes in the earth's climate. It also established the Intergovernmental Panel on Climate Change (IPCC), a group of government, academic, and industry scientists and administrators charged with evaluating the overall state of climate science.

A series of international negotiating sessions led up to the Conference of the Parties held in December 1997 in Kyoto, Japan, where the Kyoto Protocol was agreed in an all-night session just prior to adjournment. The administration of President Bill Clinton largely supported the overall goal of trying to reduce greenhouse gas emissions, but were appropriately concerned about the potential impact of radical reductions on the economy. They attempted to negotiate an arrangement that would have permitted economic efficiency to play a major role in the emissions reduction process by making use of market mechanisms and greenhouse gas sinks to hold the projected cost of mandated reductions to a level that the economy could afford.

The Kyoto Protocol established greenhouse gas emissions reduction targets for the developed countries, varying by country, that would have resulted in a reduction in their average annual greenhouse gas emissions (largely carbon dioxide) to 5% below 1990 levels by 2008-2012. The Protocol excluded the developing countries from participation in the mandated reductions in order to permit continued fossil-energy based economic growth in those areas. The Protocol included two market-based flexibility mechanisms—Joint Implementation and the Clean Development Mechanism—that, when coupled with an Emissions Trading System, were intended to substantially reduce the overall cost of implementation.

In many respects, Kyoto was more a trade agreement than a climate agreement. It was immediately attacked for leaving out the developing world, which is responsible for a rapidly growing share of total greenhouse gas emissions. Although they now have relatively low per capita emissions, it was evident that future emissions growth in these areas would more than offset any reductions in the developed world, leading to continuing increases in greenhouse gas concentrations in the earth's atmosphere. The developing countries were adamant in their opposition to any talk of greenhouse gas restrictions for them, either now or at any time in the future.

The European Union generally pushed for and supported the stringent targets and timetables in the Protocol, based on the belief that they had at least a fighting chance of meeting their targets without significant detriment to their economies. In 1997, this appeared possible because: 1) Europe's economy was at a high point in the cycle in 1990, setting base year emissions at a correspondingly high level; 2) in the 1990s, the United Kingdom converted much of its electricity production from coal to gas, reducing carbon dioxide emissions significantly; and 3) the incorporation, followed by the shutdown of energy inefficient, coal-based former East German industries, meant that Germany was already significantly below its extremely high base year emissions level. The EU also was granted the right to allocate their target among their member states as they saw fit, thus allowing their less-developed regions to continue on a path of

rapid economic development and energy consumption growth, much like the developing countries.

The US based its initial agreement to the terms of the Protocol on the presumed ability to use the flexibility mechanisms to reduce the overall costs of meeting its considerably more restrictive target. It was estimated at the time that, in the absence of significant efforts to reduce greenhouse gas emissions, the natural course of economic development and related energy consumption growth would put the US over 30% above, not 7% below 1990 levels (its target) by about 2010.

The countries of the former Soviet Union were led to believe that they would be able to sell excess credits accruing to them as a result of the conversion of their economically and energy inefficient centrally planned economies in the years after 1990. This expected transfer of wealth from the OECD countries to Russia and Eastern Europe helped gain their support for the Kyoto Protocol.

As host to the Kyoto conference, Japan had a strong interest in seeing that an agreement was reached. Australia and Canada supported the Protocol, but as energy producers and exporters, recognized the need for effective market mechanisms and the use of carbon sinks to be able to meet their goals.

The developing countries were content to be left out of the targets, believing that, since rising atmospheric greenhouse gas concentrations were basically the result of past economic development in the developed countries, it was proper for them to lead the way toward a solution. Some developing countries also recognized that sustainable development might be encouraged and supported financially through processes like the Clean Development Mechanism.

HOW DID WE GET WHERE WE ARE?

As time passed, it became increasingly clear that almost no one liked the Kyoto Protocol. Its few remaining supporters continued to do so simply because they had invested much in the process and because they felt that it still represented “a good first step” toward reducing the perceived long term impact of human beings on the climate.

Even the environmental NGOs that largely supported the Protocol had their misgivings. They fought to restrict the flexibility mechanisms to the maximum extent possible in order to reduce credit given for what they saw as non-achievements. Since the reductions in Russian and Eastern European greenhouse gas emissions had already taken place, they argued against allowing credits arising from this so-called “hot air” to be sold to meet other countries’ future obligations. They also argued against widespread use of emissions trading systems because they viewed them as allowing companies and countries to “buy the right to pollute.” Sinks were also skeptically viewed as ways that developed countries could evade their commitments to reduce current emissions of greenhouse gases.

Even the European Union began to recognize that they would probably be unable to meet their overall target. However, they maintained the political pressure because they recognized that they would probably come closer than the US, and it would be to their political advantage at home if

they were not seen as opposing the agreement, even though it was increasingly unlikely to enter into force.

The reality is that, although over 100 parties including the US have signed the Protocol, no industrialized country, no major developing country, and none of the important Former Soviet Union or Eastern European countries has yet ratified it. In the US, the Senate is on record by an overwhelming majority as opposing the Protocol unless its major flaws are remedied.

The weaknesses of the Protocol were exposed in the final discussions held last November in The Hague. At that point, the parties were within sight of an agreement. In fact, an agreement was reached at the negotiating table among the negotiators. When this was reviewed, however, by the EU principals, they rejected it, bringing the negotiations to a close.

CURRENT PROBLEMS…AND OPPORTUNITIES

First of all, it is important to remember that everyone in the developed world is an environmentalist. And those in the developing world wish that they were rich enough to be able to afford to be environmentalists, too. After the basics—food, shelter, clothing, education, and mobility—are satisfied, people immediately begin to focus on quality of life issues. They don't only want more; they want better. New technologies and productivity increases provide the means to achieve these improvements.

Today's discussion on energy and the environment is rarely about ends. Almost everyone thinks we can and should do better on both fronts. The discussion is almost always about means. How do we achieve our shared goals—a cleaner environment and a more secure energy supply—most effectively?

It is essential to understand that there is a close connection between energy policy and environmental protection. Without secure sources of clean energy, we will soon lose the wherewithal to address environmental issues effectively. Most people still do not make the connection between the energy production and delivery system that they use and whose benefits they enjoy every day and the performance of our economy and its ability to deliver the environmental improvements we all desire.

The link between energy, economy, and environment lies most directly in what people tend to think of as "conservation," but which economists describe as "efficient use of resources." We need energy and other resources, but, faced with limited supplies, we need to make sure that we use those that we have most effectively. In this regard, mountains of economic research clearly prove that the use of market systems results in more efficient use of energy and other resources than any regulatory system yet devised.

Rather than trying to protect consumers from knowing what things actually cost, as is the case with most utility regulatory systems, for example, consumers should be given the best information available. Market pricing is an exquisitely rich source of information to help consumers when they need to make choices among alternatives for spending their dollars. It is not helpful when the system disguises real costs and hides subsidies. This is not consumer protection—it is consumer deception.

At the same time, it is essential to make sure that people truly understand the relationships between technical feasibility and cost to produce. The mismatch of actions and perceptions is best shown by the fact that consumer surveys consistently suggest that 60 to 70% of consumers are willing to pay extra for environmentally friendly products. However, when buying decisions are actually made, only about 10% of those who say they are willing are ever converted to real consumers who actually do pay extra to purchase "green" products. Environmentalists use the higher numbers to show that there is an unfulfilled demand for green products. Businesses that make and sell these products regularly confront the reality of the lower market share numbers.

One item that is high on every environmentalist's wish list is an electric car. It turns out that almost everyone would like an electric vehicle that would free them from the necessity to buy gasoline. But when they learn what they would have to give up in terms of cost, mobility, power, range, carrying capacity, and comfort as compared with a conventional vehicle, their interest wanes.

Climate change is fundamentally an energy/economy/environment issue, with potentially profound implications for the growth and direction of our society. Environmentalists are fond of pointing out that, with 5% of the world's people, the US emits 25% of the world's greenhouse gases. What they neglect to say, however, is that the US also produces about 25% of the world's goods and services, and the rest of the world is striving mightily to reach our standard of living.

In spite of the seemingly definitive pronouncements made in the Summary for Policy Makers of the IPCC climate science assessment reports, the science of the global climate, as described in the underlying working group documents, remains considerably more uncertain. As climate knowledge grows, new questions and uncertainties continue to be uncovered. We need to focus our attention on reducing these uncertainties before committing to costly programs that may have irreversible implications for our economy and society.

WHAT'S WRONG WITH KYOTO?

Kyoto was stillborn in 1997. Even the Europeans gradually began to realize that they would be unable to achieve their own commitment to reduce greenhouse gas emissions by 2010. That may have been why, after what seemed to be a successful all night negotiating session last November in The Hague, the EU reneged on the agreement that had been reached. But, by failing to communicate clearly on this issue, the US has given the European Union an opportunity to deflect the blame for failure and to portray the US as the one blocking progress on climate issues.

Kyoto was doomed primarily because it tried to set aggressive short-term goals to solve a long-term problem. There is nothing intrinsically wrong with the differentiated responsibilities called for in the UN Framework Convention on Climate Change. However, when these differentiated responsibilities are translated into specific goals, in order to be fair they must impose similar hardships on all of the participants. From the beginning, it was evident that the US would have the most difficulty in meeting its target, and that the target would impose by far the highest costs on the US economy.

Another major failure of Kyoto was that it focused primarily on penalizing failure rather than rewarding progress. It would have created a new bureaucracy to police compliance with the

treaty obligations. Experience with such command and control regulatory approaches made those who would ultimately be responsible—largely businesses—justifiably skeptical about the whole process. The Kyoto approach also made it logical for investors to defer projects designed to reduce emissions at least until the regulatory regime became clearer. Kyoto, with its percentage reduction approach would have penalized progressive companies that acted right away, while benefiting companies that delayed making reductions until later when they would be counted.

Some companies have nonetheless announced voluntary greenhouse gas reduction programs in spite of these risks. Careful analysis, however, shows that by far the largest amounts of greenhouse gas reductions will take place in the later years of the program, when the final rules of the game are likely to be better defined.

Although Kyoto contained some good ideas, namely the so-called flexible mechanisms, the environmentalists and the Europeans worked ceaselessly to restrict their use by making the implementation regulations as complicated as possible. Rather than encouraging behavior that reduces emissions, they were trying to penalize it. At times, it seemed as if inflicting economic pain was a larger goal than reducing greenhouse gas emissions.

The concept behind the flexible mechanisms recognizes that, in a global issue like greenhouse gas emissions, the climate does not care where or how the reductions are made. From the perspective of the planet, all emissions reductions are created equal. Joint Implementation and the Clean Development Mechanism were designed to encourage international cooperation in order to make the most effective and least costly reductions first, regardless of their location. Emissions Trading was then going to make it possible to move excess earned credits to other countries in order to meet the commitments of nations having few or only high cost greenhouse gas reduction opportunities.

Countries that could economically generate emissions reduction credits in excess of their commitments would be able to sell them, at a fair market price, to countries with needs in excess of their ability to make cost-effective reductions. Of course, no country would be forced to sell its excess credits if it didn't think the price was right. After all, a market transaction is one that makes both buyer and seller better off. If it doesn't, it doesn't take place.

WHERE DO WE GO FROM HERE?

The current administration has unnecessarily antagonized others by the way it announced its decision to terminate the Kyoto process. Everyone knew that Kyoto was dead, but, as at any funeral, it is necessary to be discreet in one's remarks about the deceased.

It is also important, when terminating one program, however ill conceived, to propose an alternative. Here are some thoughts to consider in the formulation of a post-Kyoto climate policy.

1. Encourage activities and investments that result in more efficient use of energy and lead to long-term reductions in greenhouse gas emissions.

2. Begin rewarding good behavior immediately by crediting all efforts to reduce greenhouse gas emissions, also giving credit for any reductions made since some base year. (Kyoto stipulated 1990, but that is now open for discussion.)
3. Focus on the most potent greenhouse gases like methane first, deferring major energy related efforts to reduce carbon dioxide emissions at least until new, cleaner energy sources are available commercially.
4. Use markets and market prices to improve energy efficiency, to achieve reductions in greenhouse gas emissions, and to develop consumer awareness of the real costs of the program.
5. Make sure that end-users have the information needed to make good energy use decisions. Do not hide the costs and benefits of greenhouse gas reduction efforts in the cost structure of the companies providing energy services.
6. Start right away to use the flexible mechanisms of Kyoto to the maximum extent and with as few restrictions as possible in order to begin making real reductions as quickly as possible.
7. Recognize that for much of the world, economic growth is the highest priority. Work with the developing countries to apply new, more energy efficient technologies that will help reduce the rate of growth of their emissions.
8. Continue to support development of improved energy production and consumption technologies in order to make certain that our energy supply and use system is as efficient as possible.
9. Enhance efforts to deepen our understanding of the earth's very complex climate system so that we can improve our ability to avoid, mitigate, or adapt to any changes in climate—for whatever reason—that will undoubtedly come in the future as they have so often in the past.

Based on the historical record, climate change is inevitable. Earth's climate is always changing and the evidence suggests that humans are now probably having some impact. We need to devise ways to minimize this impact as well as to be prepared to adapt to whatever changes do come, for whatever reason. At the same time, we have an obligation to future generations to provide them not only with the environment they deserve, but also with the technologies and wealth they will need to deal with problems that we can't even begin to foresee today.

What has been sorely lacking so far in the climate change debate has been a reasoned explanation of the entire story. It's a good one. Learning about the complexities of earth's climate is leading to a new and fascinating science. Understanding the real options available to influence these climate processes is still in its infancy.

It is essential to understand both the risks and the costs of actions taken now versus actions taken later. In the face of uncertainty, precipitate action may be very costly. Delaying action pending better understanding may be a far better solution. Furthermore, allowing time for existing equipment and factories to reach the end of their economic lives makes the transition to new facilities and processes much less expensive. Arbitrarily making everything we own today obsolete is not the prescription for economic success.

Unfortunately, the climate change debate has often had the air of a "'tis/taint" argument leading to little understanding of the participants' various views. The solutions proposed have often

been based on an underlying agenda that uses climate change mitigation as a convenient driving force to achieve some other goal.

Right now, the general public is generally unconcerned by and uninvolved in the climate change debate. They tend to be vaguely aware that something is going on, but have been immunized by past experience against some of the more hysterical cries of impending doom.

In communicating, it is important to make sure that the goals of any climate change mitigation program and the related implications for economic growth, standard of living, and changes in lifestyles are well understood. When the people understand this they will support and follow a long-term program designed to ensure continued economic growth at the same time it is reducing human impact on the climate. And the world will benefit.