



A Framework for Climate Change Policy

by Michael A. Toman

Differing interpretations of the evidence—and differing interests—complicate efforts to negotiate goals and actions regarding climate change. While no easy cookbook-style recipe can indicate what should guide thinking about risks and policies, several maxims seem worth applying.

A great deal of controversy surrounds the issue of climate change. Some say that climate change is one of the greatest threats facing humankind, one that calls for immediate and strong controls on greenhouse gases from fossil fuel burning. Others say that the risks are weakly documented scientifically, that adaptation to a changing climate will substantially reduce human vulnerability, and that little action is warranted other than study and development of future technological options. The same kinds of divides arise in discussing policy options to reduce greenhouse gas emissions, with some predicting net benefits to the economy and others fearing the loss of several percentage points of national income.

These disagreements surface in the efforts of the international community to negotiate goals and actions under the 1992 Framework Convention on Climate Change. They reflect different interpretations of the evidence and different interests. To help sort through the tangle, I have summarized some ways to think about climate change risks and policies that may be useful in considering both international agreements and actions by the United States.

Decision Framework

While no easy recipe indicates what should go into a climate change decision framework, several maxims seem worth applying.

Think comprehensively about risks and costs. Efforts to gauge the benefits of reducing climate change risks should be as broad as possible. Elements to consider include the impacts on market goods like agriculture; effects on human health; effects on nonmarket resources like wilderness areas and wetlands that provide both recreational values and ecological functions; and the ancillary benefits of greenhouse gas reduction such as improved air quality. It is just as important to think broadly about control and adaptation costs, including indirect effects on the economy as well as direct compliance expenditures.

Given the current state of knowledge, it will be difficult to attach monetary values to a number of risk reductions and costs. This uncertainty is likely to persist for many risk categories (especially those related to ecological impacts) even if uncertainty about the physical manifestations of climate change declines. However, lack of information should not be confused with negligible risk. To be useful to decisionmakers, moreover, an assessment of climate change risks should go beyond a sequence of “best guess” or “worst case” estimates of atmospheric changes, biophysical impacts, and socioeconomic impacts to consider the variability of possible consequences.

Think long-term. The risks posed by climate change depend on the path of changes in the atmospheric concentration of greenhouse gases over many decades

RFF Climate Change Research

RFF launched its Climate Economics and Policy Program last fall to conduct basic and applied research and policy analysis related to global climate change. An initial set of research projects under way includes:

- Bringing Uncertainty into the Equation When Calculating Climate Change Risks
- Carbon Consequences of Tax System Reform
- Carbon Policy and Endogenous Technical Change
- Discounting in Intergenerational Decisionmaking
- Economic Analysis of Greenhouse Gas Emissions Trading
- Effective Environmental Policy in the Presence of a Distorted Tax System
- Electricity Restructuring and the Costs of Controlling CO₂
- Impacts of Climate Change Mitigation on Other Environmental Problems
- International Cooperation for Effective and Economic Greenhouse Gas Limitation
- Vulnerability of Low-Income Households to the Hydrologic Effects of Climate Change

To broaden understanding of climate change concerns, RFF is also organizing workshops and producing a series of Issue Briefs. The first of these, "Climate Change Risks and Policies: An Overview," is the source of Michael Toman's article.

For more information:

<http://www.rff.org/research/programs/climprog.htm>

and centuries, not just on the emissions of these gases over a relatively short period of time. We are dealing with the cumulative effect of many smaller influences on the biosphere—an effect with a great deal of natural inertia.

Having to confront the distant future greatly complicates risk assessment and the development of consensus for policy actions. To be effective, at least some actions must anticipate long-term impacts, before all of the scientific evidence is clear. Our political system

arguably is less effective at taking such actions than responding to a single large and immediate concern. On the other hand, the long-term nature of climate change risks means we can hone our scientific understanding and policy responses over time; we need not do everything right away.

Address adaptation. In areas such as agriculture, managed forestry, and human settlements, intuition and experience in other contexts suggest a medium-to-high degree of potential adaptability to natural changes, given enough lead time and investment. Adaptation possibilities include development of new plant varieties and crop patterns, changes in irrigation technology, relocation of coastal infrastructure, and expanded protection of wetlands to compensate for their potential future damage.

Adaptation may be difficult in some cases, for example, where damage occurs to natural ecosystems whose functions are not well understood. But even when adaptation capacity seems very limited, it should not automatically be treated as negligible. Improving the capacity to adapt where it is weak—as in many poor, developing countries—may be one of the most effective ways to respond to some climate change risks, at least until the cost of stabilizing atmospheric concentrations of greenhouse gases falls.

Think internationally. Rich and poor countries argue over how the burden of greenhouse gas emissions reductions should be allocated. The ongoing tension can only be resolved by negotiation among the parties themselves. However, long-term global climate change risks will not diminish to any significant degree until total *global* emissions are reduced, and this will require global cooperation, not just action by today's rich countries. This point deserves to be underscored in light of the likely future decline in the share of total emissions from advanced industrial countries (currently about 50 percent) as economic growth proceeds in other areas. The efficacy of any policies the United States pursues to reduce climate change risks thus will depend on the actions taken by others.

Keep distributional issues in mind. Climate change risks and response capacities vary with income level. There is also a fundamental asymmetry between the timing of response costs—which will largely be borne by the current generation—and the benefits of reduced climate change—which will largely accrue to future generations. This asymmetry means we cannot simply

compare the costs of reducing the risk with the value of enjoying the ultimate benefits. Instead, we must assess both the costs members of the current generation would bear and the strength of our concerns for those who would be vulnerable in the future. These are economically and ethically complex questions about which we know little, and they require mature political debate.

Estimate control costs realistically. Some people argue that market inefficiencies are so rife, and opportunities for innovation so plentiful, that emissions abatement is a low-cost proposition or one that might even benefit the economy. This point of view is in sharp contrast to the outputs of economic models indicating that stabilizing emissions may cost as much as several percent of a country's gross domestic product (implying that deeper cuts in emissions to reduce greenhouse gas concentrations in the atmosphere would be even more expensive).

Most people who have looked at the debate seem to agree that some low-cost improvements in energy efficiency exist, for example, by reducing subsidies and other market distortions. However, it is open to question whether these opportunities are substantial compared with, say, the amount of abatement needed to stabilize greenhouse gas emissions. Against the backdrop of future increases in global energy demand, the cost of longer-term reductions in greenhouse gas emissions cannot help but rise unless further progress occurs in the development of nonfossil energy alternatives. In assessing medium- to long-term costs, it is a mistake to assume technical progress as a panacea for reducing abatement costs, or no technical progress at all.

Another argument is that our tax system is so distorted that we can levy energy taxes to reduce greenhouse gas emissions and use the proceeds to lower other taxes that hamper economic growth. However, recent analysis calls into question this "double dividend." The basic conclusion of this analysis is that broader-based taxes like those on income generally create less overall economic distortion than narrower-based taxes like those on energy. Thus, adjusting other taxes might dull the economic pain of an added energy tax, but not to negligible levels. Moreover, any tinkering with the tax system is possible only if politicians take the difficult step of imposing higher energy taxes in the first place.

RFF Council Takes Up Climate Topic

The RFF Council took up the topic of "Climate Change: Policy Issues and Options" at its seventh annual meeting in April. Council members heard from scientists as well as experts in government, academia, and the business and environmental communities on this critical and controversial issue.

In a plenary session on how to think about climate change policy, RFF Senior Fellow Michael Toman was joined by American Petroleum Institute Executive Vice President William O'Keefe and Daniel Lashof, a senior scientist at the Natural Resources Defense Council. Toman and RFF Senior Fellow Raymond Kopp later led respective discussions on technical responses to climate change and implementation of policies.

Rafe Pomerance, the U.S. Department of State's deputy assistant secretary for environment and development, spoke of the challenges of negotiating international climate agreements. Everett Ehrlich, the U.S. Department of Commerce's under secretary of commerce for economic affairs, discussed the implications of climate change policies as they might affect the United States in particular.

Most studies of greenhouse gas abatement costs assume the application of idealized least-cost policy measures like a comprehensive "emissions trading" program or a comprehensive "carbon tax" based on the carbon content of different fossil fuels. Abatement costs will be higher (perhaps considerably so) if less than ideal policies are used in practice. The debate about which greenhouse gas reduction targets are appropriate cannot be conducted independent of discussions about what concrete measures can and should be used to actually restrict emissions.

Implications for Policymaking

The decision framework I have described has several implications for formulating policy.

Allow flexibility in the timing of cumulative emissions reductions to reduce overall costs. The potential cost savings from intertemporal flexibility in meeting a particular long-term emissions-reduction goal depend on the assumptions made, but it appears that savings of at least 20 percent or more are possible. Taking this approach

does not mean that all or even most policy actions are deferred to the future. It simply means that the emphasis is placed on sequential decisions—some of which are better taken sooner and others later. Unless we start with a longer-term perspective, it is impossible to consider such tradeoffs.

Incorporate economic incentives into emissions-reduction policy.

These incentives include carbon taxes on energy sources and various forms of tradable permit systems that would effectively establish quotas on emissions but allow their trade. Sources with higher control costs could (in effect) pay emitters with lower control costs to assume more of the reduction burden.

Provide opportunities for emissions reductions wherever possible.

One example of an abatement incentive program that takes place outside industrialized countries is the so-called “joint implementation” approach, whereby emitters in, say, the United States, can satisfy any emissions reductions requirements they face through actions that reduce emissions in other countries. Formal emissions trading programs among sources in countries with quantified emissions reduction targets also are possible. Significant practical questions need to be answered to structure flexible yet verifiable programs for international (and intertemporal) emissions trading. However, the magnitude of the potential cost savings underscores the value of seeking to overcome these challenges. Depending on the assumptions made, savings of 50 percent or more seem possible.

Build knowledge and improve technology. Even if we do all the best things possible to reduce emissions, given the current state of knowledge, economic growth—especially in developing countries—will continue to push up greenhouse gas emissions and atmospheric concentrations. Unlike limiting pollutant gases such as sulfur dioxide, for which a variety of technical control options is available, limiting carbon-dioxide emissions requires reduced energy use, greater energy efficiency, or substitution of energy sources with lower carbon content.

To avoid unacceptable climate change risks ultimately will require a fundamental change in our energy systems toward much greater reliance on other energy sources—solar, biomass, and possibly nuclear. To make the transition economically manageable will require continued or enhanced investments in basic and applied knowledge.

The government has an inescapable role to play not just in creating the incentives for private parties to seek better technologies but also in funding the development of basic knowledge about technology as well as climate change impacts. At the same time, we must recognize that our understanding of what policy can actually do to induce climate-friendly innovation is weak at best. We must also recognize that diverting resources from other areas to research on low-carbon energy systems may well reduce innovation elsewhere in the economy—technical progress is not a free good.

Increase emphasis on adaptation. Adaptation is part of an optimal response strategy in any event. Indeed, it is the means of transcending the narrower concern about our vulnerability to climate change to a broader concern with global-scale changes that place stress on natural systems and pose threats to human well-being. Furthering human capacity to adapt to climate change entails investment in improved understanding of the options and their international application. It also entails adjusting economic and other distortions that limit adaptation potential (such as assistance programs that subsidize coastal development or water use). In many cases, the best climate policy may have little to do with greenhouse gases or climate per se, and much more to do with developing better basic social infrastructures for natural resource conservation and use and for public health protection.

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