GLOBAL CLIMATE CHANGE AND REGULATORY UNCERTAINTY

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Environmental policymaking must confront two different kinds of uncertainty. I want to call attention to the role of a particular type of uncertainty, which I shall call "*regulatory uncertainty*" in the policy process.

The conventional paradigm for thinking about the role of uncertainty in environmental policymaking emphasizes *technical uncertainty*. Technical uncertainty usually means such things as debates among scientists about whether a particular environmental problem is real. In the conventional view, delay in taking regulatory action is justified only until a sufficient "scientific consensus" about the problem is reached. Once a sufficient scientific consensus exists, it is thought to be important to "do something" as quickly as possible to deal with the problem. The presupposition that we should always act promptly after a technical consensus has been reached,[1] which I take to be quite common in debates about global climate change in the popular press,[2] is what I wish to explore and ultimately to challenge.

The conventional view overlooks a crucial step in the policy process—namely, deciding *what* to do once we have decided to "do something." In the same way that we must judge when a sufficient technical consensus has emerged to warrant action, we must also judge when a sufficient consensus has emerged about what policy instruments to apply. Deciding what our policy response to a problem should be is also the source of a substantial degree of uncertainty. Hence, my term "regulatory uncertainty". I will argue that we need to engage in an on-going process of assessing the probable risks

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1. Because I want to illustrate the importance of regulatory uncertainty, *arguendo* I do not take issue with the apparent assumption in many of the other papers for the symposium that there is a technical consensus on relevant aspects of the problem of global climate change. In fact, however, I understand that there are significant technical disagreements, particularly over the issue of what assumptions to make in projecting data over the long-run and whether to assume positive or negative feedback from small changes in temperature. See, e.g. *New Global Warming Research Chief Flags Need to Settle Science Uncertainties*, Inside EPA, Mar. 20, 1992, at 17. See also Richard S. Lindzen, *A Skeptic Speaks Out*, EPA Journal, Mar. 1990, at 46.

2. *E.g.*, Tom Wicker, *In the Nation: Time for Action*, N.Y. Times, Oct. 24, 1991, at A25. In common with many other popular commentators, Mr. Wicker contributes to public confusion by mixing references to damage to the ozone layer (for which the scientific evidence is very strong) with references to theories of global warming. These two problems are quite separate, but regrettably they have become one in the same in the public mind.

and benefits of immediate action against the probable risks and benefits of waiting while we obtain more information.

John Gibbons's excellent paper[3] works an interesting change on the usual relationship between these two different kinds of uncertainty, which I am calling technical uncertainty and regulatory uncertainty. I read Gibbons as suggesting that we need not bother much with sorting out the disagreements among scientists regarding the nature, extent and timing of global climate change; according to Gibbons, most of the policies that we would implement in the short-run to deal with global climate change are "no regret" policies that should be implemented for other reasons anyway.

On one level, I agree in part with Gibbons. I would personally favor at least some of the general policy directions that he appears to support (although as usual "the devil is in the details."[4]) However, on another level, I believe that Gibbons' "no regret" argument dismisses too glibly objections to the policies that he favors. Although Gibbons characterizes the general mix of policies that Amory Lovins called the "soft energy path"[5] as desirable for other reasons, it is well to remember that the arguments for the "soft energy path" without global warming have not been strong enough for them to be adopted to date.

Possibly the combination of the other supposed advantages of a soft energy path plus concern about global warming may ultimately prove compelling. But it is not correct, in my view, to portray the measures that might be taken to combat global climate change as so uncontroversially desirable for other reasons that the nature and degree of technical uncertainty about global climate change is somehow irrelevant—a great deal depends on how certain we are that human activity will alter the biosphere in unacceptable ways and even more hangs on judgments about the time periods over which these changes may occur.

In my opinion, the proper basic framework for assessing both technical and regulatory uncertainty was laid down in 1973 in the *International Harvester v. Ruckelshaus*[6] decision. The issue in that case concerned whether EPA should give Detroit a one year extension to comply with certain air emission standards for new cars. The U.S. auto industry argued that it was not technically feasible for it to comply for the coming model year. EPA

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3. John H. Gibbons, *Decisionmaking In the Face of Uncertainty* (elsewhere in this issue—Eds.).

4. For example, Gibbons suggests that humanity needs to control the unrestrained growth of population. At that level of generality, few would disagree. However, when it comes to selecting the means to achieve that end—for example, forced abortions—controversies arise. Similarly, I have long felt that renewable energy sources, such as solar, are not too expensive; rather, nonrenewable sources such as fossil fuels are too cheap. But again, government interventions to raise the price of fossil fuels (such as a carbon tax) can be much more controversial than the general goal.

5. *See, e.g.*, Amory B. Lovins, Soft Energy Paths: Toward a Durable Peace (1977).

6. International Harvester Co. v. Ruckelshaus, 478 F.2d 615 (D.C. Cir. 1973).

thought that the U.S. industry could probably meet the deadline, in part because foreign manufacturers had already announced that their cars would comply. However, the D.C. Circuit in an opinion by Judge Leventhal held that EPA should grant the extension, even though the agency thought the U.S. industry could probably comply. The court reasoned that the risks of an error if EPA were incorrect—namely, a model year in which no American cars could be sold in the U.S.—were so grave that they outweighed the costs of an error in the other direction—namely, the harm from an additional one year delay in implementing increased pollution controls.

Judge Leventhal's approach in *International Harvester* essentially asks the policymaker to weigh the risks of what scientists call a Type I error against the risks of a Type II error—in other words, the risks of a false positive against the risks of a false negative.[7] In the language of economics, one must attempt to balance the costs and benefits of acting as opposed to waiting and obtaining more information.

One may think of the environmental policymaker as making decisions at points along a time-line. At any one point, she may act based on the information then available or alternatively, she may at some cost, opt to forego a decision and move on to the next point on the time-line (where somewhat more information will be available) before deciding to act. Waiting produces both costs and benefits. The price of obtaining additional information includes the costs of additional harm that occurs in the meantime. Likewise, acting immediately also has both costs and benefits. One obtains the benefits of earlier implementation, but at the cost of risking that today's policies will appear crude or misguided when viewed with tomorrow's "20-20 hindsight".

Balancing the probable costs and benefits of acting as opposed to waiting for more information is the essential framework we applied at EPA in the recent Dioxin review, which I chaired. Following the Banbury conference, where a diverse group of scientists reached a consensus on a new paradigm for assessing the risks of dioxin and other receptor-mediated hydrocarbons,[8] EPA Administrator Reilly[9] faced a difficult choice of what changes, if any, to make in EPA's regulatory actions. An emerging, new scientific understanding of dioxin suggested that EPA's assessment of the risks of dioxin might be too stringent by roughly an order of magnitude. To help him make the difficult decision of what change in policy to make, Administrator Reilly

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7. Judge Leventhal expands upon his approach in Leventhal, *Environmental Decisionmaking and the Role of the Courts*, 122 U. Pa. L. Rev. 509 (1974).

8. *Dioxin Risk Revisited*, 251 Science 624 (1991) (report of consensus of experts at Banbury conference on dioxin that receptor binding theory implies there is a 'safe' dose or practical 'threshold' below which no toxic effects occur).

9. William Kane Reilly was sworn in by President Bush as Administrator of the Environmental Protection Agency in March, 1989 and has served in that position to the present. He is the first professional environmentalist to have held the top job at EPA.

asked me to chair an agency-wide work group to make recommendations.[10] Major options available included: changing EPA's risk assessment for dioxin to conform to the new science; putting some or all of the Agency's dioxin-related regulatory actions on hold until more information became available; or continuing business as usual even though that might result in over-control. In deciding what to recommend, we had to assess not only the present state of the science, but also what would be the probable risks and benefits of waiting for more information before making a decision.

The benefits from waiting for more information were relatively high. Although a theoretical consensus now existed that there were thresholds below which dioxin would not be harmful to humans, none of the Agency's technical advisers was as yet prepared to say where those levels were, or how they compared to current exposure levels. However, EPA's Office of Research and Development ("ORD") had a project underway to develop a new dose-response curve for dioxin. It appeared that this important new information might be available relatively soon. Preliminary reports on the ORD effort were to be available in six months, a final report would be available for peer review in a year, and developing a scientific consensus on the report's conclusions might take an additional year or more. Even allowing for slippage and the uncertainties that would inevitably remain, it seemed likely that a future decisionmaker might have better information significant to policy than we did at the time.

Next, we tried to assess the costs of waiting. We conducted a comprehensive survey of the regulatory actions relating to dioxin that the Agency would be taking over the next year. Relatively few were contemplated that would both require irretrievable commitments and were sensitive to the likely range of the on-going scientific reassessment. (In other words, most of what we were planning to do, we could either undo later, or wouldn't be affected much regardless of how the new research came out.) In addition, as we noted in our report, regulatory actions taken in the meantime would have some risk-reduction benefits. Depending on how the scientific reassessment came out, the actual benefits might turn out to be less than was now anticipated (or more, though that seemed unlikely).

Under these circumstances, we recommended, and the Administrator adopted, a policy that the Agency should continue to go forward with its regulatory agenda while the scientific reassessment was underway, but revisit

10. The facts are summarized from the work-group's report, Memorandum to William K. Reilly Administrator from E. Donald Elliott, Assistant Administrator and General Counsel, Re: Potential Impacts of Dioxin Reassessment on EPA Programs, May 15, 1991 (copy on file with *Arizona Journal of International and Comparative Law*), which was made public as an attachment to the Administrator's decision in September, 1991, *see infra* note 11.

the issue every six months to determine whether a change was warranted.[11] The essential question in the dioxin review was balancing the likely costs and benefits of a change in policy now, as opposed to waiting for more information to become available. In the case of dioxin, (1) we thought that we would know significantly more within a year or two, (2) the costs of not changing policy in the meantime were relatively low, (3) few imminent decisions appeared to be sensitive to the scientific reassessment, and (4) the actions taken in the meantime would have risk-reduction benefits under any likely outcome of the scientific reassessment.

I submit that every decision we make in the environmental area, including those relating to global climate change, involves a similar calculus. Unavoidably, the question is always whether a decision in the future is likely to be better than a decision today by an amount sufficient to compensate for the delay. Whether we should act now or wait depends upon whether we can predict a change in the balance of information available that is likely to affect the decision significantly, and what costs (or benefits foregone) must be irretrievably incurred while we are waiting to obtain the additional information.

Either choice makes us uncomfortable. Acting may be burdensome, or threaten powerful interest groups, but waiting to act can also make us uncomfortable. Like many other environmental decisions, decisions to stay our hand to await more information force us to confront the existential terror of an unknown future.[12] We can never be certain whether the new information that will develop if we wait will outweigh the harm that occurs in the meantime. We must try to predict the future by learning from the past. If the new scientific information emerging about a problem today merely provides interstitial contributions to knowledge, while continuing to confirm the basic paradigms and trends that underlie our current understanding, then the best guess is that by waiting we will learn only more of the same. On the other hand, if in the recent past there have been many significant new pieces of information that fundamentally change or challenge prevailing theories, then perhaps we should anticipate that the benefits of waiting will be greater.[13] Recent reports suggest that the science of global climate is in the

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11. Memorandum from EPA Administrator William K. Reilly to Assistant Administrators *et al.* Re: Dioxin Regulatory Program, September 11, 1991 (on file with *Arizona Journal of International and Comparative Law*).

12. *See* E. Donald Elliott, *Against Ludditism: An Essay On the Perils of the (Mis)use of Historical Analogies in Technology Assessment*, 65 S. Cal. L. Rev. 279 (1991); E. Donald Elliott, *The Future of Toxic Torts: Of Chemophobia, Risk as a Compensable Injury and Hybrid Compensation Systems*, 25 Hous. L. Rev. 781 (1988).

13. *Cf.* T. Kuhn, The Structure of Scientific Revolutions (2d ed. 1970) (distinguishing between "normal" science, which merely supplies additional data under existing paradigms, and "revolutionary" science, which challenges the fundamental theoretical foundations of existing models).

latter category: it is still experiencing fundamental changes that would be significant for designing regulatory programs.[14]

Many of us working in the environmental field are used to thinking in these terms with regard to uncertainties in technical and scientific information. We are rarely as certain as we would like to be about the effects of substances on human health and the environment. However, where the costs of delay are large, we often wisely choose to act to prevent possible harm to health before all the information is in.[15] What we are not so used to seeing, however, is that a parallel calculus must be undertaken regarding "regulatory uncertainties". By regulating too soon we may not only regulate the wrong thing, but we may regulate in the wrong way. To be more precise, it may be that if we had waited a little while, we would have developed regulatory tools and techniques that are better by an amount that more than compensates for the harm that comes about in the meantime.

For example, in my opinion, the provisions for a trading system to deal with "acid rain" in Title IV of the Clean Air Act Amendments of 1990[16] are a good illustration that delay to properly resolve "regulatory uncertainties" can result in substantial net benefits. The state of the science with regard to "acid rain" changed relatively little during the 1980s.[17] However, if we had passed an "acid rain" statute in the early-1980s, when several bills were avidly proposed by Senator Mitchell and others,[18] we almost certainly would have adopted a crude regulatory approach such as mandating uniform reductions at a number of specified large sources in the Midwest. Not only would this approach have cost about twice as much as the trading system that was ultimately adopted,[19] but the "cap" on emissions in the 1990 Act has the effect of creating a market for savings from energy conservation, thereby creating a powerful incentive for efficiency. While some additional harm from acid rain may have occurred in the meantime, in my view, the delay in regulating

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14. Inside EPA, *supra* note 1. (describing recent discoveries that suggest that CFCs may not be a major global warming gas after all, despite previous scientific consensus).

15. *See, e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1 (D.C. Cir. 1976) (*en banc*), *cert. denied*, 426 U.S. 941 (1976). *See also* Alyson Flournoy, *Legislating Inaction: Asking the Wrong Questions in Protective Environmental Decisionmaking*, 15 Harv. Envtl. L. Rev. 327 (1991).

16. Title IV, Clean Air Act Amendments of 1990, 42 U.S.C. § 7651 (1990).

17. *See generally* Office of Technology Assessment, U.S. Congress, Acid Rain and Transported Air Pollutants: Implications for Public Policy (1984). Some maintain, however, that substantial reductions in SO_2 may not yield a comparable reduction in acid rain. Peter Huber, *The I-Ching of Acid Rain*, 8 Reg., AEI J. Gov't and Soc'y, Sept.-Dec. 1984, at 16.

18. *See, e.g.*, H.R. 3400, 98th Cong., 2d Sess. (1985) (mandating a 10 million ton reduction funded by a 48 state electricity tax). This and other early proposals for reducing acid deposition are criticized in Carl Bagge, *Behind the Acid Rain Facade*, 6 J. Energy L. & Pol'y 319 (1985).

19. *See* Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era From An Old Idea?*, 18 Ecology L.Q. 1 (1991).

acid rain was not a policymaking failure, but a success, because we used the time to develop a far better approach.[20]

We have a great deal of unfortunate experience in the environmental area of rushing in to regulate in a relatively crude way, only to discover later that our efforts, although well-meaning, were misguided—or at least, that there was a far better way, if only we had been able to find it. For example, according to press reports, a recent National Academy of Sciences study suggests that our multibillion dollar, quarter century-long battle against smog has been only modestly successful because we have focused our attention on the wrong pollutants, devoting too large a percentage of our attention to controlling volatile organic compounds ("VOCs") and not enough on the oxides of nitrogen ("NO_X").[21]

Gibbons is certainly correct that *in theory* policymaking should be an interactive, adaptive process.[22] But in practice, environmental policies, once established, have proved remarkably resistant to fundamental change. The failure of a statute to achieve its goals often becomes an argument for more of the same, rather than an occasion for fundamental reassessments of approaches to the problem. For this reason, it is particularly important that we make wise choices of regulatory approaches at the outset. When we can afford to, we should wait until we understand a problem well enough to develop a sensible, effective regulatory approach—rather than rushing off to "do something" as soon as the scientists tell us that there is a problem. We are used to the fact that resolving technical uncertainty requires a period of debate leading to a consensus. We should recognize that resolving regulatory uncertainties properly also requires an investment of time.

The stakes in the global climate change debate are enormous on all sides of the question. While Gibbons is certainly correct that uncertainty attends the economists' predictions as well as the scientists',[23] the forecasts of the magnitude of the possible changes to our economy are staggering—as high as $3 trillion, or 5% of annual national income by some estimates.[24] In addition, the regulatory approaches being proposed in some quarters (such as "goals and timetables" for CO_2 in isolation) could have significantly

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20. E. Donald Elliott, *A Cabin on the Mountain: Reflections on the Distributional Consequences of Environmental Protection Programs*, 1 Kansas J. L. & Pub. Pol'y 5, 11-12 (1991).

21. Matthew Wald, *U.S. Lag in Controlling Smog Tied to Misplaced Efforts*, N.Y. Times, Dec. 14, 1991, at A1.

22. Gibbons, *supra* note 3.

23. *Id.*

24. Peter Passell, *Economic Watch: Staggering Cost is Foreseen to Curb Warming of Earth*, N.Y. Times, Nov. 19, 1989, at A1, A18. (According to some private economists, proposed initiatives to address possible changes in global climate could add additional costs of $0.8 to $3.6 *trillion*, with direct costs in the United States on the same order of magnitude as we currently spend on armed forces and losses of annual output as high as $500 billion, or about 5 percent of national income).

greater effects on the U.S. economy than on our international competitors, because we in the United States are more dependent on fossil fuels such as coal.[25] For all of these reasons, I welcome discussion of innovative regulatory approaches such as Dick Stewart's Comprehensive Approach.[26] Already one sees in the literature (including Gibbons' paper) far more sophisticated and innovative thinking about possible regulatory approaches to the problem of global climate change than one saw only a year or two ago.

My fervent hope is that we will not be stampeded into "doing something" until we have the time to continue the process of thinking collectively about what, if anything, it really makes sense to do. Admittedly, there are potential costs to waiting before acting on global climate change issues, but because the changes predicted unfold slowly over many decades, we should scrutinize skeptically the rhetoric of prophets of doom who fervently tell us that we must act now or risk destroying the world. On the other side of the equation, there are enormous costs to rushing in to restructure the world economy to deal with global climate change before we really understand the problem.

25. *Id.*

26. Richard B. Stewart & Jonathan B. Wiener, *The Comprehensive Approach to Global Climate Policy: Issues of Design and Practicality* (elsewhere in this issue—Eds.).