

Harvesting experience: A reappraisal of the U.S. Climate Change Action Plan

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Abstract. For mitigating climate change and adapting to whatever impacts we cannot avoid, there are no politically feasible alternatives to improvements in the U.S. Climate Change Action Plan at this time or for the foreseeable future. Yet improvements in the Action Plan have been obstructed by the diversion of attention and other resources to negotiating a binding international agreement, to developing a predictive understanding of global change, and to documenting the failure of the Action Plan to meet its short-term goal for the reduction of aggregate greenhouse gas emissions. Continuous improvements depend upon reallocating attention and other resources to the Action Plan, and more specifically, to the many small-scale policies that have already succeeded by climate change and 'no regrets' criteria under the Action Plan. Sustaining the effort over the long term depends on harvesting experience from these small-scale successes for diffusion and adaptation elsewhere on a voluntary basis.

In October 1993, President Clinton and Vice President Gore announced the Climate Change Action Plan, a policy to fulfill the voluntary commitment of the U.S. to reduce emissions of greenhouse gases to 1990 levels under Article 4(2) of the U.N. Framework Convention on Climate Change. The Framework Convention was opened for signature at the Earth Summit in Rio de Janeiro in June 1992, and went into effect following ratification by fifty countries in March 1994. The ultimate objective of the Framework Convention, as stated in Article 2, is 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'

The two goals of the Action Plan are to strengthen the U.S. economy and to reduce emissions of greenhouse gases. According to its Executive Summary, the Action Plan 'meets the twin challenges of responding to the threat of global warming and strengthening the economy. Returning U.S. greenhouse gas emissions to their 1990 levels by the year 2000 is an ambitious but achievable goal that can be attained while enhancing prospects for economic growth and job creation, and positioning our country to compete and win in the global market' (Clinton and Gore, 1993). The Action Plan gathered together over forty existing and new federal programs and offered voluntary, flexible, and cost-effective partnerships between the government and other organizations, primarily businesses, to realize the two goals. The Action Plan was projected to cost the federal government \$1.9 billion over six years, with most of the funds to be reallocated from existing budgets of federal agencies.

Since then the threat of global climate change has not disappeared and the Action Plan has become problematic on several levels. First, the Action Plan is not expected to achieve the goal of returning U.S. greenhouse gas emissions to 1990 levels by the year 2000, or even come close. It could turn out to be little more than a symbolic substitute for effective action. Second, improvements in the Action Plan have been obstructed by its relatively low priority. More resources, including attention, have been invested in projecting aggregate emissions reductions, developing a predictive understanding of global change under the U.S. Global Change Research Program (USGCRP), and negotiating a legally-binding international agreement under the Framework Convention. Third, without continuous improvements in the Action Plan, the U.S. will fall far short of its potential contribution to global emissions reductions. This projection is based on experience indicating that the leading action alternatives to the Action Plan are not politically feasible.

Consider briefly the most relevant experience. A BTU tax was defeated in 1993, the first year of the Clinton Administration, despite Democratic majorities in Congress and a justification (deficit reduction) more popular than mitigating climate change (Paarlberg, 1996; Muller, 1996). The Kyoto Protocol was declared 'dead on arrival' by leaders of the Republican majority in the Senate in December 1997, even though the Protocol defers compliance with formally binding emissions reductions until 2012 and fails to include enforcement mechanisms (Dewar and Sullivan, 1997; Brunner, 1998). Effectively, it is no more binding than Article 4(2) of the Framework Convention. President Clinton's (1998) modest package of research and tax incentives (\$6 billion over five years) to mobilize technology against global warming was largely rejected in Congressional action on the FY 1999 budget. In short, without a major change in political circumstances, experience indicates we must rely on the Action Plan. And even if taxes, treaties, technological incentives, and the like become politically feasible, we would still have to rely on the Action Plan or something very much like it for their effective implementation.

To assist in continuous improvements in the Climate Change Action Plan, this article takes a procedural rather than substantively rational standpoint (Simon, 1983). The two standpoints are complementary, not mutually exclusive. But given present political realities and the magnitude and duration of global climate change as a policy problem, the issue is not whether the Action Plan as a substantive policy will achieve an arbitrary short-term goal of emission reductions. The issue is how the Action Plan as a complex system of policy processes can exploit whatever opportunities exist, now and over the long term, to mitigate climate change as well as adapt to climate impacts. The challenge lies in continuously (1) identifying policies that have succeeded at the operational level where emissions are produced and vulnerabilities are maintained; (2) diffusing and adapting these policies to similar circumstances; and (3) opening up promising but neglected areas – and doing so successfully enough to build support for further action. The challenge, in short, is harvesting experience for mitigation and adaptation.

This standpoint converges with other procedural standpoints that have become more competitive in response to the substantive shortfalls of the Action Plan. For example, while the draft U.S. Climate Action Report acknowledges the Action Plan's substantive shortfalls, the authors of the Report nevertheless 'believe that many actions send valuable signals to the private sector and may be appropriate models to others. We also believe that the U.S. experience will ensure that future efforts are more effective in reversing the rising trend of emissions, and returning U.S. emissions to more environmentally sustainable levels' (USCAR, 1997: chapter 4, p. 1). Similarly, the Intergovernmental Panel on Climate Change (IPCC) affirms that 'The challenge is not to find the best policy today for the next 100 years, but to select a prudent strategy and to adjust it over time in the light of new information' (IPCC, 1995: section 8.2; see also Bodansky, 1996: p. 447). The procedural approach taken here applies models of procedural rationality (e.g., Simon, 1981; 1983; Landau, 1969; and Collingridge, 1992) and the decision process (e.g., Lasswell, 1956; 1963; 1971). Equivalent ideas are being developed in models of adaptive complex systems (e.g., Holland, 1992; Bailey, 1995; and Gore, 1996), which are similar in structure to the Action Plan.

Part I of this article reframes appraisal of the Action Plan, emphasizing the importance of procedural models and criteria. Part II provides a comprehensive working map of the Action Plan as a system of interconnected policy processes. Part III applies the procedural criterion to the map in order to identify priorities for improvement. After a brief summary, the Conclusion suggests what might be done to initiate continuous improvements in the Action Plan.

1. Reframing appraisal

Continuous improvements depend on reframing appraisal of the Action Plan – both to discourage acceptance of the failure to achieve short-term substantive goals, and to encourage consideration of procedural alternatives that can exploit existing and emergent opportunities over the long term. The following reviews and critiques the major substantive appraisal, and outlines procedural alternatives.

Substantive appraisal

The major substantive appraisal of the Action Plan is the U.S. Climate Action Report (USCAR, 1997) to the Framework Convention, which was available for comments in draft form in mid-1997.¹ Using the figures reported (USCAR, 1997: chapter 4, pp. 33–40), it is fair to conclude that the Action Plan will fall short of its goal to reduce U.S. greenhouse gas emissions to the 1990 level by the year 2000. The 1990 level is estimated to be about 1,458 MMTCE (million metric tons of carbon equivalent, the standard unit for measuring emissions of

all greenhouse gases). In the baseline projection for 2000 without the Action Plan, U.S. emissions are expected to increase to 1,722 MMTCE, or about 18% over the 1990 level. In the projection for 2000 with the Action Plan funded at the 1997 level, U.S. emissions are expected to increase to 1,647 MMTCE, or about 13% over the 1990 level. Thus by 2000, the Action Plan is expected to reduce emissions by about 5% (or 75 MMTCE) from the baseline projection, but still fall short of meeting the goal by about 13% (or 189 MMTCE). In contrast, in 1993 when the Action Plan was announced, it was expected to reduce emissions by about 7% (or 109 MMTCE) and thereby meet the goal.

The summary conclusion of the Climate Action Report is not likely to diminish the skepticism that has plagued the Action Plan from the start. *Time* magazine, for example, titled its initial report on the Action Plan, 'Stop Polluting, please' (Lemonick, 1993), suggesting that a collection of voluntary, not mandatory, programs would be ineffective. The summary conclusion is mixed at best: 'While neither the measures initiated in 1993, nor the additional actions developed since then and included in this report have proven adequate to meet the stabilization goal enunciated by the President, they have had a significant impact in reducing emissions below growth rates that otherwise would have occurred' (USCAR, 1997: chapter 1, p. 10). Independent appraisals tend to be more pessimistic than the official ones. For example, Daniel Lashof of the Natural Resources Defense Council concluded late in 1994 that 'it's absolutely clear that [Action Plan programs are] not adequate to achieve the near-term goal ... and certainly do not put us on a course consistent with the long-term objectives which will require ultimately dramatic reductions in emissions below 1990 levels' (Lashof, 1996: p. 50).

The draft appraisal attributes the 189 MMTCE shortfall in emissions reductions generally to 'the nearly forty percent reduction of [Action Plan] funding by Congress from the amount requested by the President, greater than expected economic growth, and lower than expected energy prices' (USCAR, 1997: chapter 1, pp. 9–10). More specifically, 102 MMTCE of the projected shortfall is attributed to changes in energy use assumptions in the 1993 projections, including assumptions about energy prices, the mix of economic activity, electrification, and energy technology (USCAR, 1997: chapter 4, p. 34). Another 30 to 40 MMTCE of the projected shortfall is attributed to the assumption that the Action Plan would be funded at the level requested by the President. Appropriations for the Action Plan have indeed been reduced from the levels requested – by 46% to \$184 million in FY 95, by 53% to \$158 million in FY 96, and by 47% to \$163 million in FY 97 (USCAR, 1997: chapter 4, p. 7). However, it is not clear from official publications *how* the budget reductions affected the shortfalls of the Action Plan. The remaining 56 MMTCE in shortfalls is attributed to a number of technical assumptions in the 1993 projections, including assumptions about carbon sequestration in forests and emissions of methane, nitrous oxide, and halogenated greenhouse gases (USCAR, 1997: chapter 4, pp. 34–36).²

A critique

Substantive appraisal of the Action Plan is not irrelevant, especially beyond the short term. But so far the conclusions have been premature at best and unfounded at worst, and their net effect has been to divert attention and other resources from needed improvements in the Action Plan.³ The following critique focuses on the mitigation goal, the projections of shortfalls with respect to the goal, and the explanations of the shortfalls in the 1997 Climate Action Report.

First, substantive appraisal has been misguided by emphasis on one of the Action Plan's short-term substantive goals, the reduction of U.S. greenhouse gas emissions to 1990 levels by 2000. This goal is arbitrary and insignificant given the magnitude of reductions necessary to mitigate climate change. The magnitude is unknown and perhaps unknowable, but according to the IPCC (1995: section 4.6), 'immediate stabilisation of the concentration of carbon dioxide and its present level could only be achieved through an immediate reduction in its emissions of 50–70% and further reductions thereafter.' Reductions of this magnitude clearly imply that mitigation is a long-term task. Short-term reductions are needed primarily to sustain the expectation that significant reductions are possible over the long term, and to motivate taking the next steps. The Action Plan itself recognized that 'Global climate change is a long-term problem that will require years of sustained effort' (Clinton and Gore, 1993: Preface). That effort is not likely to be sustained by drawing attention to failures to meet arbitrary and insignificant short-term goals.

Moreover, the short-term substantive goal pertains to mitigation of climate change, but adaptation may be the proper priority. We may be committed already to significant climate change, given current concentrations of greenhouse gases in the atmosphere and the thermal inertia of the Earth system, which delays climate change and impacts (Kauppi, 1995; Stevens, 1997). Furthermore, the IPCC (1996: p. 188) has concluded that "even with the most ambitious abatement policy, some climate change is likely to occur." Anthropogenic climate change cannot be distinguished from natural ones. If their combined costs to human and natural systems are expected to be significant, then the goals of the Action Plan should be expanded to include adaptation as well as mitigation. 'Adaptation refers to adjustments in individual, group, and institutional behavior in order to reduce society's vulnerabilities to climate' (Pielke, 1998: p. 159). Opportunities for adaptation, like opportunities for mitigation, can be exploited by harvesting experience from successes in the field.

Second, substantive appraisal has mistakenly emphasized aggregate, quantitative projections for the Action Plan as a whole and for its component programs. For example, we know that in 1993, the Green Lights program to upgrade lighting systems in buildings was projected to reduce emissions by 3.6 MMTCE by 2000; and that in 1997, the Green Lights program, together with a more comprehensive Energy Star Building program, is projected to reduce emissions by 3.3 MMTCE by 2000 (USCAR, 1997; chapter 4, p. 14). But we do not know from the 1997 U.S. Climate Action Report the actual emissions reduced by the Green Lights program since its inception in 1991, or the specific

policies that succeeded best in reducing those emissions.⁴ It seems obvious that the point is to reduce actual emissions, not projected emissions, and the difference is not trivial: The Balanced Budget and Emergency Deficit Control Act of 1985, popularly known as Gramm-Rudman-Hollings, demonstrated how it is possible to sustain shortfalls indefinitely first by focusing attention on projections that targets will be met on time, and then by diverting attention from unmet targets when the time arrives (Schick, 1995: p. 39). Furthermore, the most relevant projections are those used by the particular business, community, or other policymaker in the evaluation of specific policy alternatives that might reduce emissions or vulnerabilities.

Third, the official explanations for emission-reduction shortfalls have diverted attention and other resources from opportunities to improve the Action Plan. In the logic of a substantive appraisal, explanations of shortfalls should identify those factors that might be modified to decrease shortfalls in the future; otherwise, the appraisal is irrelevant to improvements in policy. By this logic, if shortfalls in projected emission reductions are the result of incorrect assumptions – about reduced funding, higher economic growth, and lower energy prices, for example – then the Action Plan should correct the assumptions. This can conceivably decrease shortfalls in *projected* emission reductions; it cannot decrease shortfalls in *actual* emissions reductions. Gramm-Rudman-Hollings also demonstrated how the ‘scoring’ of assumptions for projections can become a substitute for ‘doing’ something to achieve targets on time. Furthermore, looking beyond the assumptions, the factors identified in the explanations are irrelevant to improvements in the Action Plan to the extent that they are beyond the ability or will of the Administration to control. The Clinton Administration, as noted above, was unable to raise energy prices through the broad-based BTU tax included in its first budget in 1993. The Administration has been unwilling to reduce economic growth for any reason, including climate change. And the Administration has been unable or unwilling to fund the Action Plan at the level requested.

Finally, the official appraisal has overlooked an alternative explanation for the Action Plan’s shortfall with respect to the emissions-reductions goal. The *de facto* priority of U.S. climate change policy has not been action, or even policy research for action, but predictive research and international negotiations (Pielke, 1995; Brunner, 1996). One indicator of priorities is the distribution of expenditures. Annual appropriations for the Action Plan have been about one-tenth the annual appropriations for the USGCRP, which was established in 1989 to develop a predictive understanding of global change.⁵ Another indicator of priorities is the distribution of attention in major newspapers, as shown in Figure 1.⁶ The number of stories in the *New York Times* and *Washington Post* that refer to climate change (or global change or greenhouse effect or global warming) is approximately 20 per month over the period from January 1992 through June 1997, reflecting primarily a steady flow of research news. The number of these stories that also refer to the Climate Change Action Plan (or CCAP) totals 14 over the entire period. There is no peak when the Action Plan

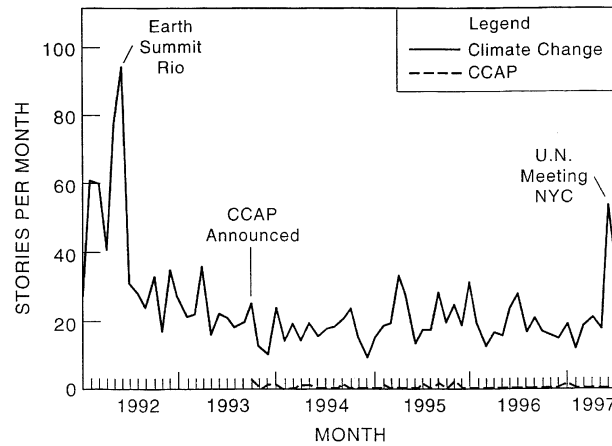


Fig. 1. Attention to the climate change and the Action Plan.

was announced in October 1993. The peaks in June 1992 and again in June 1997 coincide, respectively, with the Framework Convention in Rio and a meeting at U.N. headquarters in New York, a step toward a legally-binding international agreement to be negotiated in Kyoto in December 1997. Another indication is the White House effort in the fall of 1997 to enlist scientists in a campaign to build public support for Senate ratification of whatever treaty might emerge from Kyoto (Olson, 1997).

This critique suggests that the relevant question for appraisal of the Action Plan is not *how much* in emissions reductions it might or might not achieve by 2000 or a later timetable.⁷ The relevant question is *how to* exploit whatever opportunities exist, in the short and long term, for mitigating and adapting to climate change. For answers to this question, we need to focus attention and other resources on improvements within the Action Plan – not the factors beyond the ability or will of the administration to control, or the scientific and diplomatic substitutes for the Action Plan. We need to disaggregate experience within the Action Plan to distinguish those specific policies that have succeeded from those that have failed – not divert attention to aggregate projections. A selective emphasis on aggregate projected failures is not likely to sustain the expectation that significant reductions are possible over the long term, or to motivate taking the next steps. Finally, to make the most of qualitative and quantitative information on specific policies that have succeeded, we need to emphasize procedural criteria over substantive policy goals in appraisal in the short term, and to balance procedural criteria and substantive policy goals in the long run.

Process appraisal

For purposes of process appraisal, the Action Plan is best understood as a system of interconnected policy processes for clarifying and securing the common interest in mitigating (and potentially adapting to) climate change, without unduly compromising job creation, economic growth and competitiveness, and other values. Each substantive policy agreement within that system is a working statement of a common interest of the parties involved. The substantive policy agreements include, for example, partnership agreements like the one between the federal government and Johnson & Johnson (a manufacturer of medical supplies) under the Green Lights program; a program like Green Lights to upgrade lighting in buildings under the Action Plan; a national policy like the U.S. Climate Change Action Plan to reduce emissions under Article 4 (2) of the Framework Convention; and Article 4(2) itself. Each substantive policy agreement is only a working statement of the common interest because it is subject to change as experience unfolds unpredictably within and outside the system. Like other divisions of labor, this system of interconnected policy processes helps us find better solutions to complex policy problems, despite our human inability to find objectively rational solutions (Simon, 1957: pp. 196–206).

The future of the Action Plan depends upon experience that corroborates or contradicts the expectation that participation in the Action Plan pays off, on balance, according to participants' own criteria and compared to non-participation alternatives. For example, the Action Plan is more likely to fail as a means of clarifying and securing the common interest *if* elected and appointed officials expect support for it to be a liability in the next election or in Washington power games; *if* business people expect it to cost more than it returns, cutting into profits and perhaps leaving them at a competitive disadvantage; or *if* environmentalists expect it to be merely a symbolic substitute for mandatory regulations or binding agreements. On the other hand, the Action Plan is more likely to succeed if the experience of the relevant parties corroborates the expectation that it is a political asset, profitable, a workable policy for environmental protection, and so on. The relevant expectations are subject to change with experience, even if the preferences and loyalties of those involved remain relatively stable. Thus the future of the Action Plan as a means of clarifying and securing the common interest has not been determined by its voluntary status or any other factor, not can it be projected precisely or accurately with any confidence.

Nevertheless, the success of the Action Plan may be enhanced by better understanding of the processes through the policy sciences.⁸ To simplify the mapping of the Action Plan as a system of policy processes, Part II below uses a conceptual model of decision process (Lasswell, 1956; Lasswell, 1971: pp. 27–33) that directs attention to substantive agreements on policy. Each policy is a *prescription* insofar as it formulates rules (or norms of conduct) that the parties expect to be enforced by severe sanctions (penalties or rewards) against challengers in particular contingencies. Voluntary compliance typically means that

formal (or 'legally-binding') sanctions to enforce a policy are missing or mild. But voluntary compliance does not necessarily mean that a policy is ineffective according to its purposes: On the one hand, there may be no challenges if conformance to the rules is a matter of self-interest without severe sanctions. This may be the case with 'no regrets' policies that make sense on economic or other grounds, regardless of climate change considerations. On the other hand, the rules may be backed by informal sanctions that are effective against challengers. For example, in a competitive industry, foregone profits or insolvency is an informal sanction for failure to conform to *de facto* norms of best practice in the industry. In a competitive policy arena, foregone votes or defeat is an informal sanction for failure to conform to norms enforced by those colleagues or constituents who vote. The identification of sanctions, formal and informal, and their effectiveness is a matter of empirical inquiry.

But the effectiveness of a policy can also depend upon outcomes anywhere in the policy process. These outcomes include plans, proposals, or other alternatives relevant to choice or decision in the *intelligence* process (e.g., planning); selections among the alternatives in the *promotion* process (e.g., lobbying); stabilization of expectations about the rules in the *prescription* process (e.g., legislating, contracting); the initial *invocation* of the rules to determine compliance or non-compliance in particular cases covered by them (e.g., policing); the final *application* of the rules to determine compliance or non-compliance in particular cases covered by them (e.g., adjudicating); *appraisal* of the aggregate consequences of the policy and the policy process according to purposes; and *termination* of the policy, in whole or in part, if it does not serve worthwhile purposes. Because the success of a policy can depend upon the outcome of any part of the process, a myopic focus on the lack of formal sanctions in a statement of policy is potentially quite misleading. For example, the persistence of substantive policy shortfalls may be traced to malfunctions in the appraisal process, manifest in appraisal outcomes that are misguided by inappropriate goals, misfocused on aggregate projections, or misleading through irrelevant explanations, as in the case of the Action Plan.

To simplify evaluating and improving the processes, Part III below employs a working list of procedural criteria based on the conceptual model (Lasswell, 1971: pp. 85–97). The criteria state preferences for improving policy processes as means of clarifying and securing common interests; they also suggest how policy processes might malfunction from that standpoint. One set of criteria pertains to the distinguishable parts of the policy process. For example, criteria for the appraisal process include *independence*: 'Appraisers are insulated from immediate pressures of threat or inducement...' Criteria for the intelligence process include *creativity*: 'New and realistic objectives and strategies are compared with older or less realistic ones.' Criteria for the promotion process include *comprehensiveness*: 'All participants ... are activated with sufficient frequency to permit the formation of programs that reflect the full range of community interests.' A second set of criteria pertains to a policy process as a whole. They include, for example, *complementarity and effectiveness of impact*

and *differentiated structures*. The preference is that each part of the process contributes to immediate and continuing support for the process as a whole, and that the vigorous and independent performance of each part may require a separate structure (e.g., a separate office). For example, ‘if intelligence or appraisal structures do not exist separately, it is improbable that the function is adequately recognized and strongly supported.’

It may be worthwhile to distinguish a third set of criteria that pertains to interconnections among policy processes. This third set is implicit in the other two, and in the strategy of prototyping in the policy sciences (Lasswell, 1963; 1971: pp. 69–72). Heightened interest in this third set stems from the resemblance between the Action Plan as a system of interconnected processes and adaptive complex systems. The latter are comprised of large numbers of agents or processors that respond more or less independently to different and changing circumstances, and are capable of modifying those responses in the light of experience. Research on adaptive complex systems suggests that clarifying and securing the common interest may depend less upon the details of any one process (or processor) than on the connections among them. The third set of criteria expresses and elaborates a preference that experience dependably appraised in any one policy process be made available for diffusion and adaptation as intelligence in other policy processes that may be interconnected in series, in parallel, or hierarchically. Before applying specific criteria, it is necessary to map or describe the Action Plan as a system of interconnected policy processes.

2. Mapping the processes

Using the policy sciences and the limited information available to us, we begin with a description of the Action Plan as a working statement of the common interest and as a process, and then locate it within a more comprehensive map. A comprehensive map cannot be dismissed as obvious or straightforward in general or in the specific case. As dramatized in the well-known story of the drunkard’s search, a partial map inhibits the discovery of a solution.⁹ As argued below, a narrow description of the Action Plan as a substantive program for reducing greenhouse gas emissions to 1990 levels by 2000 obscures most of what is important for evaluating and improving the system of processes.

Action Plan

In what sense is the Action Plan a working statement of the common interest? In a negative sense, as argued above, there are no politically feasible alternatives to the Action Plan for mitigating and adapting to climate change in the U.S. at this time or for the foreseeable future. We must rely on the Action Plan, or something quite like it, unless or until there is a major change in political

circumstances. Furthermore, conducting predictive research and signing international agreements in themselves make no significant difference in mitigating and adapting to climate change. International agreements must be invoked and applied through many specific national and sub-national policies in order to make a difference. Research under the USGCRP explicitly avoids the evaluation of specific policies.¹⁰ In a positive sense, the Action Plan already represents a broad range of interests in American society and politics. Evidently, the Action Plan is consistent with the political and other interests of the Administration that initiated it and the Congress that has funded it, albeit at a lower level than the Administration requested. It is consistent with the economic and other interests of those many businesses, communities, and others who have accepted partnerships with various Action Plan programs. It is also consistent with the environmental and other interests of those organizations, like the Nature Conservancy and Environmental Defense Fund, that have participated in partnership agreements.

The Administration's initial commitment to the Action Plan stimulated expectations that competitiveness will be strengthened and emissions reduced by voluntary means. There are informal sanctions available if the Action Plan fails to meet those expectations, although the significance of the sanctions remains to be seen. A list of informal sanctions includes the threat of political retaliation if the Action Plan fails to reduce emissions. This may be taken seriously by those politicians who have cultivated environmental constituencies – especially if those constituencies take the Action Plan seriously. Another is the threat of political retaliation if the Action Plan fails to remain voluntary. This may be taken seriously by those who have sold the Action Plan to their constituencies as an alternative to mandatory regulations. The threat of mandatory regulations appears to be taken seriously by some businesses: According to the chief executive officer of a utility company, 'By being proactive on a broad front – voluntary greenhouse-gas reduction programs, joint partnerships with the government, cooperation in Congressional negotiations, educating the public, and more – we can lead the effort to reduce greenhouse gases while retaining our ability to achieve such reductions through marketplace flexibility, not command-and-control dictums' (Draper, 1994: p. 24). Similarly, the first reason for utilities to join the Climate Challenge program within the Action Plan, according to a U.S. Department of Energy Fact Sheet (n.d.) in circulation in 1997, is that 'national and international officials are watching this program closely. Therefore, an effective voluntary effort may negate the need for legislation or regulations.' Finally, if businesses that employ best practices for reducing emissions and cutting energy costs gain a competitive advantage, the competitors who lag behind may be disciplined by the market.

The Administration's commitment to the Climate Change Action Plan in October 1993 is also part of a policy process. Briefly, President Clinton formally initiated the policy process on Earth Day, April 1993, when he pledged to produce a cost-effective plan to reduce greenhouse gas emissions to the 1990 level by the year 2000. Before that pledge, existing programs for energy efficiency

and environmental protection were considered as sources of intelligence for the new plan. After that pledge, it appears that intelligence and promotion proceeded concurrently through a series of activities: A large White House Conference on Global Climate Change in June 1993, additional workshops, and quantification of the projected impacts of the proposals selected by a team of analysts. Judging from the Action Plan itself, scientific research under the USGCRP and assessments by the IPCC apparently served to justify and reinforce the demand to do *something* to mitigate global climate change (a promotional outcome), but failed to clarify specific policies (intelligence outcomes) – i.e., what goals are to be sought and what action alternatives might best achieve them.

After the Administration's commitment to the Action Plan in October 1993, the policy has been invoked through component programs such as Green Lights, Cool Communities, Climate Challenge, and Climate Wise, which are described below. The 1997 U.S. Climate Action Report, as we have seen, is only the most recent self-appraisal. Certain programs within the Action Plan have been terminated, at least in part because of lack of funding. These include the State Revolving Fund for Public Buildings, Adoption of Energy-Efficient Process Technologies, Reduction of Pesticide Use, and the R&D Program for Landfill Methane (USCAR 1997, chapter 4, pp. 13, 17, 28). The Action Plan is also one in a series of policy processes. A successor to the Action Plan is implied in programs added (USCAR 1997, chapter 4, pp. 9–10, 13) and in a continuing search for improvements – just as the Action Plan was initiated as an expansion of an earlier plan of the Bush Administration (Office of Global Change, 1992). This article may be considered part of the appraisal process insofar as it refers to the Action Plan's past, and part of the intelligence process insofar as it refers to the future.

A comprehensive map

Figure 2 is an attempt to locate the Action Plan, narrowly construed, in a more comprehensive map. The purpose of a comprehensive map is to open up the search for the most important problems and opportunities relevant to the task at hand. As suggested by the drunkard's search, a narrow search is a barrier to identifying the most important problems and opportunities. Figure 2 is also simplified for this purpose using the conceptual tools of the policy sciences. It identifies explicitly only the policy agreements already made that pertain to the U.S. It must be inferred that each of these policy agreements (like the Action Plan in the previous section) is a policy that applies in certain contingencies and is backed by informal sanctions and administrative assets that may or may not be sufficient to achieve its purposes. Each policy is part of a process that begins (conceptually at least) with intelligence and concludes with appraisal and termination. Finally, each process is connected with other policy processes in series, in parallel, and hierarchically.

These kinds of interconnections may be clarified by further example from

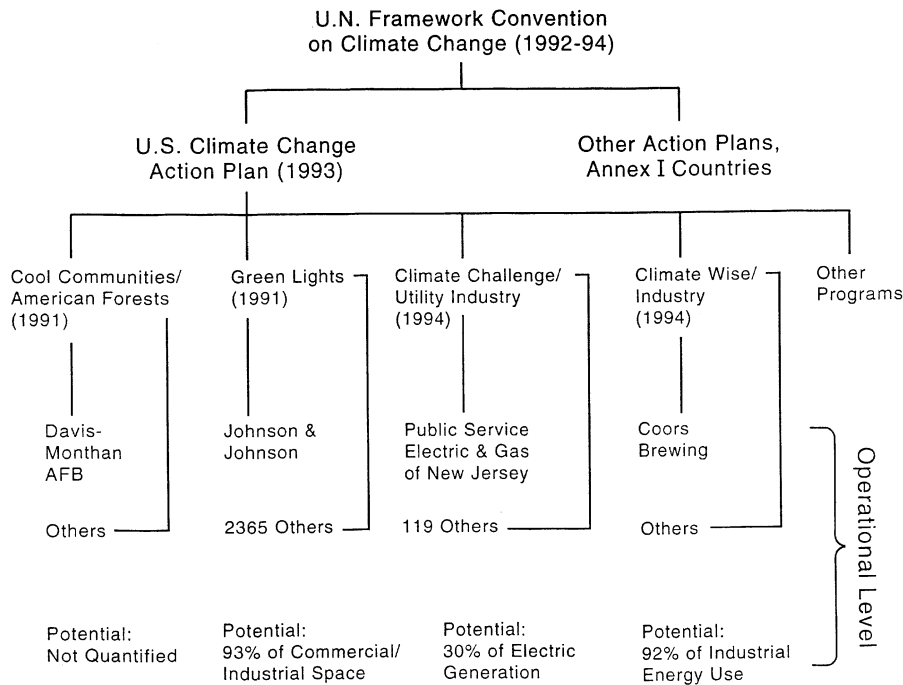


Fig. 2. A comprehensive map of interdependent policies and processes.

the operational level of Figure 2. The partnership agreement between Johnson & Johnson and the federal government under the Green Lights program is both a policy (a working statement of their common interest) and part of a policy process. As detailed below, that process is connected in *series* with a predecessor based on an energy conservation policy that Johnson & Johnson established in the 1970s, and with a successor based on a subsequent agreement under the Energy Star Building program. The original partnership process was connected in *parallel* with 2,365 partnership processes operating concurrently under Green Lights in July 1997, and potentially with partnership processes elsewhere in the Action Plan and in other countries. Finally, the original partnership process is connected *hierarchically* to the more comprehensive processes above it: It is only one case that invokes the policy of the Green Lights process. Green Lights, in turn, is only one case that invokes the policy of the Action Plan process. The Action Plan, in turn, is only one case that invokes the policy in Article 4(2) of the Framework Convention, which applies to the U.S. and the other developed countries listed in Annex I of the Framework Convention. The formal subordination of partnership agreements and processes from the top down need not obscure their potential for effective influence from the bottom up.

Figure 2 also indicates the potential for improvements. At the bottom or operational level are millions of private policies and policy processes that serve

the purposes of particular businesses and other organizations, but are not subsumed under the Action Plan or its equivalents in other countries. For example, 93% of commercial/industrial space in the U.S. is not covered by partnerships under the Green Lights program. (This and other estimates of potential were obtained from official program sources in the summer of 1997). At the right side Figure 2 allows for the addition of new programs that address significant policies and policy processes in relatively neglected areas, such as emissions reductions in automobile transportation and reduction of vulnerability to floods. For purposes of clarifying and securing the common interest, these policies and policy processes are significant as sources or sinks of greenhouse gas emissions for mitigating climate change, and as opportunities for cultivating the capacity to adapt to climate. One can envision improvements, in part, as the movement of these uninvolved parties up into partnership agreements like those that have already worked, such as the partnership between Johnson & Johnson and the government under Green Lights; and the expansion of the Action Plan out into relatively neglected areas. One can also envision improvements as the termination of failed agreements and programs, in order to free attention and other resources for more promising alternatives.

Notice the complexity of the structure mapped in Figure 2. The structure must be complex – a division of labor hierarchically, in parallel, and in series – in order to accommodate a vast number of different and changing circumstances within constraints on attention and other resources. To the extent that problems and opportunities in upgrading lighting in Johnson & Johnson buildings differ from those in the other 2,365 companies in partnerships under Green Lights, it would be irrational to impose a top-down, one-size-fits-all, policy upon them. But it would be procedurally rational to harvest experience anywhere in the structure for use in similar circumstances elsewhere, leaving potential users to determine what similar circumstances might be, and what experience is relevant to them. The complexity of the structure indicates opportunities to harvest a vast amount of experience across serial and parallel processes at any level in the hierarchy, and up and down levels in the hierarchy.

Other pieces

To underscore the complexity and for purposes of Part III below, it is worthwhile to describe additional programs and partnerships identified in Figure 2. The Cool Communities program offers public/private partnerships to reduce greenhouse gases in the atmosphere by strategically planting trees and lightening the surfaces of buildings and pavement. Cool Communities was a pilot program initiated in 1991 by the Environmental Protection Agency (EPA) and American Forests, a non-profit conservation organization. At the direction of the Action Plan, the program was transferred to the Department of Energy in 1994 and expanded to include 250 cities and 100 military bases and other federal facilities projected over a ten-year period. The program offers technical assistance,

promotional campaigns, and fund-raising assistance from American Forests. In return, Cool Communities partners agree to form a committee to identify opportunities for tree-planting, lightening surface colors, and energy conservation. For example, Davis-Monthan Air Force Base in Tucson, Arizona agreed to a tree-planting program. In November 1993, 275 trees were planted around 174 housing units; in April 1995, another 154 trees were planted around 64 units.

The Climate Challenge program was initiated by the Action Plan to reduce greenhouse gas emissions by the electric utility industry. On April 20, 1994 (Earth Day), the Department of Energy and the industry signed a memorandum of understanding. The guiding principles recognize *inter alia* that utility activities will be voluntary, flexible, and cost-effective; and that activities and results will vary according to the circumstances of each utility. Industry participants must agree to reduce, avoid, or sequester greenhouse gas emissions; to report annually under the guidelines in section 1605(b) of the Energy Policy Act; and to confer periodically with DOE. DOE agreed to support the program *inter alia* by addressing incentives and barriers identified in the memorandum of understanding; developing workshops, training courses, manuals, and other technical support; and providing incentives for reducing emissions. By June 1997, electric utilities had signed about 120 individual agreements covering 70% of the industry's carbon emissions. Meanwhile, a collaborative task force of the industry and DOE had developed the *Climate Challenge Options Workbook*, which identifies a number of opportunities for greenhouse gas reduction, avoidance, or sequestration, along with a description of barriers that might inhibit progress toward these goals.

One Climate Challenge agreement can serve as an example. The Public Service Electric and Gas Co. of New Jersey (PSE&G) agreed to reduce its CO₂ emissions by 2.5 million tons below its baseline of 23.5 million tons using a variety of means: Repowering a number of older units with cleaner, more efficient units; switching from coal to natural gas at some units; developing and promoting demand side management activities; running 60% of its fleet of vehicles on alternative fuels by 2000; reducing vehicle miles travelled on the job by 15%; modifying 15% of vehicles to eliminate operation of engines while the vehicles are stationary; continuing participation in the Green Lights program; continuing its weatherization program for low-income customers; continuing to provide standardized payments for metered energy savings; continuing its lawn mower exchange program; replacing gas regulators with zero emissions regulators; continuing the beneficial utilization of fly ash; continuing and expanding its recycling program; installing natural gas vehicle refueling facilities; testing, demonstrating, and installing innovative technologies; demonstrating the world's first 'in-duct selective catalytic reduction system on a wet bottom coal-fired boiler'; and continuing to participate in emissions reduction trades. PSE&G is committed to verification of its emissions reductions by an independent third party. It has teamed up with the Environmental Defense Fund for this purpose.

The Climate Wise program was initiated by the Action Plan as a partnership

between DOE, EPA, and industry to reduce greenhouse gas emissions in the industrial sector through voluntary adoption of energy efficiency, renewable energy, and pollution prevention technologies. Climate Wise consists of three interrelated components. The pledge program asks industry leaders to commit to taking cost-effective, voluntary actions to reduce greenhouse gas emissions. The recognition program provides public recognition for actual reductions in emissions, regardless of whether the company has made a pledge. The tailored assistance program assists companies through a clearinghouse, workshops and seminars. For example, Coors Brewing Co. of Colorado became a Climate Wise partner in March 1995. The Climate Wise agreement serves as an umbrella for Coors' existing energy efficiency and pollution prevention programs, which include promotion of an ultraviolet-cured aluminum can ink and overcoat process it has been using for almost 20 years. It also pledged to participate in EPA's Waste-Wise program to reduce packaging wastes and weights, use alternative fueled vehicles, reduce emissions of toxics into the air from production facilities, and continue to identify and analyze strategies that will reduce energy consumption.

3. Improving the processes

Selectivity

The Action Plan, as a system of interconnected decision processes, is much too complex for anyone to understand as a whole *and* in operational detail sufficient to identify priorities for improvement on a rational basis. Consider, for example, the amount of operational detail relevant to the PSE&G agreement, and to many other actual and potential agreements like it. Hence the challenge is to focus attention and other resources *selectively* in order to improve the system as a means of mitigating and adapting to climate change. Here we take up the challenge, using the limited amount of information presently available from published sources and telephone interviews.

The most significant policies and policy processes are conventionally assumed to be located at the top of the hierarchy, at the Framework Convention level. At least that is a fair inference from the distribution of attention in major newspapers (Figure 1), which peaks in June 1992 in connection with the Rio summit and in June 1997 in connection with the U.N. meeting in advance of the Kyoto conference. Moreover, there is some logic in this assumption, as suggested in Figure 2: The territorial range of activities subsumed under the Framework Convention is global and the functional range of activities is general – that is to say, almost anything done in global society can affect concentrations of greenhouse gases in the atmosphere. The apparent significance of this level is reinforced in the slogan, often repeated, that prevention or mitigation of climate change is ‘an irreducibly global problem’ because all emissions matter, regardless of their territorial or functional origins. Moreover, the preamble to the Frame-

work Convention declares that ‘change in the Earth’s climate and its adverse effects are a common concern of humankind...’ Concerns that are directly relevant to a small fraction of humankind, local or regional, and functionally specific – like Johnson & Johnson employees and stockholders, their facilities in New Jersey, and lighting – seem to pale in significance. Thus expansion of the demand (Lasswell and Kaplan, 1950: pp. 104–107) for the mitigation of climate change helps to justify climate change in competition with other problems that compete for resources including attention.

Contrary to the conventional assumption, however, the most significant level is the operational level at the bottom of Figure 2, where emissions are produced and vulnerabilities maintained in conformance with millions of private policies and policy processes.¹¹ The latter were for the most part established well before the Framework Convention and the Action Plan, and remain largely unaffected by considerations of climate change. If significant improvements in mitigating and adapting to climate change are to occur, they must occur at this operational level. The Framework Convention, the Action Plan, and its equivalents in other countries, are not in themselves significant sources or sinks of greenhouse gas emissions; and officials at these levels do not have the capacity for rational and effective intervention at the operational level. The private policies and policy processes are too numerous and diverse to be understood in the operational detail necessary for rational intervention from a comprehensive, top down perspective. Furthermore, the private policies and policy processes evidently work satisfactorily enough – according to diverse local circumstances and criteria – for the people directly involved to have withheld their political support for mandatory interventions from the top down. In free societies, mandatory interventions from the top down cannot be far ahead of voluntary support from the bottom up.

What are the implications? First, the negotiation, signing, and implementation of international agreements are means at best, not ends in themselves. They can support mitigation and adaptation to climate change at the operational level where significant greenhouse gas emissions occur, but they cannot by themselves effect mitigation or adaptation. Second, if enough people at the operational level were convinced that climate change is a major threat to their own interests, it is conceivable that private policies and policy processes could and would adapt with little direction from the top. However, enough people are not likely to become convinced in the absence of major disruptions in the climate system, even if scientific controversies over the causes, extent, and impacts of global warming eventually are resolved.¹² Third, unless or until such disruptions occur, improvements in mitigation and adaptation will depend upon private policies that make sense according to diverse criteria already established in myriad private decision processes. These are ‘no regrets’ policies, in that they make sense to the people involved whether or not they believe that global warming is occurring, or has anthropogenic causes or significant impacts.

Fortunately, such ‘no regrets’ policies already exist in the partnerships at the operational level (Figure 2). These are the appropriate selective foci for mitigat-

ing and adapting to climate change. It is not necessary (even if it were practical) to examine every policy as it passes through every part of the policy process – the policy as planned, the policy as promoted, the policy as prescribed, etc. It is sufficient to focus selectively on the policies provisionally appraised as successful. The harvesting of experience from such ‘no regrets’ policies can be broken down into three principal tasks:

- The first task is to identify and describe the policies provisionally appraised as successful, to verify that they have in fact succeeded according to the mitigation or adaptation criteria of national policymakers *and* the ‘no regrets’ criteria of policymakers in particular functional or territorial areas, and to explain formal and effective responsibility for each success.
- The second task is to disseminate the policies as intelligence for policymakers in other policy processes who might consider and adapt them to their own circumstances on a voluntary basis. The other policy processes include those at the operational level that are already involved in partnership agreements, and those that are presently uninvolved.
- The third task is to open up opportunities for more successes in neglected functional and territorial areas. Some of the necessary resources might be freed up by terminating once-promising activities that have not paid off well enough to warrant continuation. Termination is an important part of any strategy that depends upon bold, persistent experimentation in the field.

A selective focus on ‘no regrets’ policies appraised as successful is a constructive simplification. It eliminates myriad details that are unnecessary for purposes of mitigation and adaptation, unless and until those details become relevant to harvesting experience for use elsewhere in the system. For example, it is not necessary for those elsewhere in the system to be concerned about a policy as planned – including projections and the assumptions behind them – in any particular policy process. Action on a policy tends to surface important considerations of realism or worth that may have been overlooked in the policy as planned, promoted, and prescribed. A competent appraisal tends to make these overlooked considerations explicit, so that others can take them into account in adapting the policy. Policies appraised as successful clarify *de facto* in lieu of *de jure* standards of best practice (a prescription outcome), intensify demands to catch up to those standards (a promotional outcome), and serve as field-tested models on how to proceed for that purpose (an intelligence outcome). Thus, in contrast to a selective focus on aggregate failure to meet emissions reduction goals, a selective focus on ‘no regrets’ policies appraised as successful can motivate and inform further action on a sustainable basis. Policies appraised as failures tend to be ignored elsewhere in the system, although some information about them can serve to prevent unwitting replication without modification and to prevent premature rejection of policies that are still promising.

Opportunities

Harvesting experience occurs more or less spontaneously at the operational level, although the process is subject to malfunction at certain critical points. Here we review a successful example to illustrate the vast number of opportunities suggested in Figure 2. Johnson & Johnson, the manufacturer of medical supplies, learned about the Green Lights program early in this decade when the EPA contacted the company's environmental group. That group passed the information along to the corporate energy director, Harry Kauffman, who met with EPA officials and concluded that participation in the program would be an obvious benefit to the company. He was receptive because Green Lights was consistent with an energy conservation program that Johnson & Johnson had established in the 1970s, the decade of energy price shocks. Moreover, the company had successfully upgraded lighting at several of its plants and knew that all of the recommended technologies worked. Thus the Green Lights program became a catalyst for expanding the existing energy conservation program and linking it with environmental protection.

Johnson & Johnson became a charter partner with Green Lights, one of the first twenty-one companies to sign up in 1991. The company committed to a five-year program to upgrade lighting in 90% of its building space. In return, Green Lights assigned to Johnson & Johnson (as it does to other partners) a consultant from an environmental engineering firm under contract with and paid by EPA. Kauffman could call the consultant at any time. In addition, Green Lights sponsored workshops that provided Kauffman with training and technical information. Previously, Johnson & Johnson had received conflicting technical information on a variety of lighting products – in effect, it had too many choices and no adequate basis for making the best choice. Thus it was especially useful to have unbiased reports on lighting products from an independent testing facility. The workshops also put Kauffman in contact with his counterparts in other companies, who continue to keep in touch about problems and opportunities of mutual interest.

The company has completed its initial five-year program and exceeded the initial commitment by upgrading lighting in 95% of its building space. Over that period it avoided 33,500 tons of CO₂ emissions. According to an internal tracking system, Johnson & Johnson's lighting program currently saves the company \$3.55 million annually. Building on that success, it has moved into the Energy Star Buildings program initiated by EPA in 1995. This program helps building owners through a more comprehensive, five-stage strategy to maximize energy savings and minimize costs; the first stage is Green Lights lighting upgrades. In the first year and a half of its program, the company avoided 25,200 tons of CO₂ emissions. Moreover, Kauffman reports that the partnership with Green Lights exceeded his expectations; there were no significant shortcomings. He allows EPA to give his name to other companies to contact him, and he has made presentations to other companies. He believes other companies have signed up with Green Lights as a result. These are

qualitative indicators that the partnership succeeded according to Johnson & Johnson's own criteria, and that harvesting experience can occur more or less spontaneously.

Potential malfunctions

Officials at the program level and above can help by attending to potential malfunctions of various kinds in the process of harvesting experience. These potential malfunctions are suggested by the limited formation available to us on the Action Plan, the procedural criteria introduced in Part I above, and by comparative analyses of cases (e.g., Lasswell, 1963; Brunner, 1980).

The first task is to identify and describe the policies alleged to be successful, to verify that they have in fact succeeded according to emission reduction and adaptation criteria *and* 'no regrets' criteria, and to explain formal and effective responsibility for the success. One potential malfunction in the Action Plan process is a lack of third-party verification of allegedly successful partnerships. The partners individually and collectively have incentives to resolve uncertainties in ways that inflate the reported success in emissions reductions, and inflate the reported role of the partnership in that success, even if there is no intent to mislead (U.S. GAO, 1997). Reported success may help an industry forestall regulations that impose mandatory emission reductions, and may earn credits for individual companies if such regulations are later imposed (U.S. Department of Energy, n.d.). Similarly, reported success may help the Action Plan and its programs protect or expand appropriations. (Reported failure typically does not help with appropriations for programs that are not considered essential or for any program over the long term). Without third-party appraisal, there is a risk that the dependability of information available for diffusion will be compromised. That would lead systematically to the frustration of inflated expectations elsewhere, wherever the information is adapted and used. And that would not reinforce the motivation necessary to sustain action over the years.

The Climate Challenge program accepts the emission reduction claims of its partners at face value, on dubious grounds that there is little incentive for the partners to misrepresent their reductions because the partnerships are voluntary. A promising alternative is to engage environmental organizations for third-party appraisals. In principle at least, they have both the expertise and the incentive to ensure that the Action Plan is more than a symbolic substitute for mitigation and adaptation. Furthermore, there is some experience to build upon. The DOE helped establish a relationship between the Environmental Defense Fund and PSE&G of New Jersey to verify emission reductions. A similar relationship reportedly exists between The Nature Conservancy and certain utilities in Texas. The extent to which these relationships have lived up to their promise is an important topic for further inquiry. In any case, verifying the figures is not the only means of verifying success: Johnson & Johnson's decision

to expand its commitment and investment through the Energy Star Buildings program is an important qualitative indicator of its success with the Green Lights program.

Another potential malfunction in the first task is failure to harvest the right information for diffusion and adaptation of policies that are verified successes. In general, technical information alone is not sufficient, even though it was most valuable in the case of Johnson & Johnson. A description of the policy as prescribed, invoked, and applied is probably necessary to understand how the policy might be adapted to replicate its success. A description of the circumstances of the policy's success is probably necessary to understand whether or not to attempt to replicate the success in other circumstances. It may be, for example, that the success of Johnson & Johnson in the Green Lights partnership depended upon the leadership of Harry Kauffman and the skill and dedication of other people involved, an organization that permitted discretionary judgments, and a resource base that included not only technical information but financial and political support from above. In any case, no policy can succeed in all circumstances. Both qualitative and quantitative information are needed to tell the story, and to update the story as events warrant.

The Climate Wise program seems to have moved in that direction. Its initial bias was to let companies select technologies based on the technical information available, but it discovered that the companies wanted more guidance. Consequently, the program produced and distributes (among other information) a *Climate Wise Case Study Compendium* to show companies 'this is what's worked so far.' Going beyond case studies, a representative of Coors reports that the most valuable contribution of the Climate Wise program was to develop a set of benchmarks – apparently a reference to standards of best practice for relevant tasks. Such standards in general help set realistic goals. In any case, clarifying the content and style of case studies and other information that effectively harvest relevant experience for potential users is an important topic for further policy research. In this research, past and potential users can play an important role.

The second task is to facilitate diffusion of the information harvested as a source of intelligence for those who may be able to adapt it. Without diffusion, the information has little significance for mitigation or adaptation: A major producer of greenhouse gas emissions cannot use information it knows nothing about. Part of the task is simply to get out the word about the information and the Action Plan programs. Redundancy among a variety of channels is constructive (Landau 1969): If bottlenecks appear in one or a few channels, others are still available to get out the word. Information can flow horizontally between those who work in parallel processes. For example, Harry Kauffman's network of counterparts in other companies facilitates the flow of information horizontally on a person-to-person basis. Information can flow vertically from sources in industry and government up to trade publications, which disseminate the information back down to others in the industry.¹³ Finally, information can also flow vertically between potential partners and Action Plan programs.

For example, as we have seen, Johnson & Johnson learned about Green Lights from the EPA. PSE&G of New Jersey learned about Climate Challenge from a letter sent by the Secretary of the DOE, Hazel O'Leary, to the president of the company.

Another part of the diffusion task is to respond to requests from potential users of the information harvested. This is the clearinghouse function, which may be performed most efficiently by the Action Plan programs, as central sources of usable information harvested from partners and other sources. For example, the director of the Climate Challenge program received a request from a utility for information about biomass. He found the information on a biomass power program just down the hall from his office at the DOE, and passed it along to the utility. A precedent developed in the late 1970s, when organizations such as the National Association of Counties and the U.S. Conference of Mayors set up central clearinghouses to harvest information on decentralized energy policies from some members and distribute it to others. Most of the members were having difficulty coping with higher energy costs under budget constraints and could not obtain usable information from the DOE. These clearinghouses became the model for the President's Clearinghouse for Community Energy Efficiency, funded by DOE (Brunner and Sandenburgh, 1982).

Another part of the diffusion task is to stimulate the demand for usable information. For example, before budget cuts, the Climate Challenge program had the resources to contact and recontact companies that had signed letters of intent to join the program but had not followed through. In addition, the benchmarks provided by the Climate Wise program not only helped Coors and other partners clarify realistic goals for themselves. They can also help motivate others to catch up to *de facto* standards of best practice, and thereby stimulate the demand for usable information. Furthermore, the President is in a position to stimulate the demand and to help with the clearinghouse and outreach functions simply by drawing national attention to particular successes. President Clinton did this in education policy when he visited the Jackie Robinson Academy in Long Beach, CA in 1996 to publicize a school uniform policy that had helped decrease crime in the school by 36% (Mitchell, 1996; Lewin, 1997). The Department of Education distributed manuals advising the nation's 16,000 school districts on how to enforce a school uniform policy legally. If the Action Plan becomes a high priority for the Administration, it is not difficult to imagine the President visiting Johnson & Johnson to publicize its success in the partnership with Green Lights.

The third task is to open up promising new areas, and to close down areas that have not lived up to their promise. This would be unimportant if we could project with confidence which innovations will succeed and which will not, or if there were no limits on attention and other resources. As it is, we must rely on experience to determine which innovations have succeeded and which have not, and to terminate the latter in order to free up resources for continuous innovation, field-testing, and improvement.

Part of the task is harvesting experience at the operating level for adjustments at the program and higher levels. For example, as we have seen, the Climate Wise program developed case studies on what works in response to requests for more guidance from partners. The Climate Challenge program found information on biomass power production in response to a request from one partner. The Cool Communities program originally focused on tree planting, but adjusted the emphasis as experience showed that lightening surfaces (especially pavement) was more important than expected in reducing the energy needed for cooling. The adjustments may go beyond the program itself. For example, there has not been much progress in lightening roofs at Davis Monthan AFB. One report is that a sufficiently heavy, light-colored shingle was not available from industry; another is that a uniform Air Force policy mandates brown roofs without regard to local energy issues. In either case field experience identifies a barrier to innovation at the operating level that might be eliminated by changes in policy at a higher level. Cool Communities has helped to eliminate one barrier, by participating in the revision of certain building codes to allow less insulation if a more reflective roof is used. Cool Communities is also working on a standard measure of surface reflectivity in order to improve the consistency of manufacturers' claims of reflectivity.

Part of the third task is to invest additional resources, as they become available, in new areas that are important to climate change but relatively neglected. The early and procedurally-rational emphasis has been to exploit the easier areas, such as lighting upgrades through the Green Lights program, and to defer the more difficult areas. But the more difficult areas must eventually be opened up as opportunities arise and circumstances permit. These include automobile transportation, a major source of projected increases in greenhouse gas emissions in the U.S. These also include adaptations to reduce vulnerability to climate impacts. For example, measures to reduce vulnerability to flooding in inland and coastal regions include changes in regulations, disaster preparedness, insurance, education, floodproofing, elevation, and dikes. 'For any potential climate impact there are a wide range of such adaptive structural and non-structural measures that might be incorporated to reduce impacts' (Pielke, 1998, p. 161). For 'no regrets' adaptation, like 'no regrets' mitigation, there are already working solutions at the operational level on which to build.

The rational evaluation of new areas, as circumstances change, depends upon a comprehensive overview of specific policy innovations in alternative areas, evaluation of their success by climate change and 'no regrets' criteria, and their potential for diffusion and adaptation elsewhere. The Administration is not well organized for this purpose. There is no 'Office of the Climate Change Action Plan.' Higher level coordination of more than forty programs in the Action Plan is done through the Council on Environmental Quality, the State Department, and occasional meetings of the agencies involved. There is a need for some office to maintain a comprehensive map of the whole.

Conclusion

For mitigating climate change and adapting to whatever impacts we cannot avoid, there are no politically feasible action alternatives to the Climate Change Action Plan in the U.S. at this time or for the foreseeable future. Yet improvements in the Action Plan have been obstructed by the diversion of attention and other resources to negotiating a legally-binding international agreement, to developing a predictive understanding of global change, and to documenting the projected aggregate failure of the Action Plan to meet its short-term goal for emission reductions. Reporting of the projected aggregate failure is part of the U.S. obligation under the Framework Convention, but it is counterproductive to the extent that it diminishes motivation for sustaining action over the long term. Sustaining action depends upon reallocating attention and other resources to the Action Plan, and more specifically, to the many policies in partnership agreements that have already succeeded by climate change and 'no regrets' criteria at the operational level. The challenge is harvesting experience from these models of success for diffusion and adaptation elsewhere in the system on a voluntary basis. If this reappraisal has merit, what might be done to initiate continuous improvements in the Action Plan by those most directly involved?

First, leadership is necessary to raise the priority of the Action Plan. The President can take the lead by drawing attention to models of success under the Action Plan – including Johnson & Johnson – just as he drew attention to Long Beach as a model of success with school uniforms by making a personal appearance. To support the President, the Administration can develop a parallel, partially overlapping appraisal process to verify particular successes in the Action Plan, and to deemphasize its projected aggregate failure to meet emissions-reduction goals. In promoting verified models of success, a balanced emphasis on emission reductions and savings in energy costs can give most interest groups something to respect if not emulate. Under these circumstances, more businesses might reconsider the Action Plan as an opportunity to do better business, and not merely as a means to avoid environmental regulations. More environmental organizations might follow the lead of the Environmental Defense Fund and The Nature Conservancy and reconsider the Action Plan as an opportunity to do something constructive about climate change, and not merely as a symbolic substitute for legally-binding international agreements. There are additional opportunities for environmental leadership to relieve pressure on the Administration for a legally-binding international agreement (Berke, 1997a), lobby the Administration to make the Action Plan work, and promote the Action Plan directly to the public. Under these circumstances, and in the light of the 1996 elections, even the Congress might reconsider cuts in Action Plan budgets. In pre- and post-election assessments by the Republican majority, positions against environmental protection turned out to be a significant liability for Republicans (Kris, 1996; Berke, 1997b). In any case, without leadership to raise the priority of the Action Plan, the present expectation that the Action Plan is insignificant will become a self-fulfilling prophecy.

Second, it would be helpful to distinguish between predictive and policy research, and to support the latter as well. Research that seeks a predictive understanding of global climate change has been justified as a prerequisite for rational and cost-effective policy.¹⁴ Yet a predictive understanding of global climate change was not a prerequisite for the policy of Johnson & Johnson or other partners, for Green Lights or other programs, or for the Action Plan itself. A predictive understanding was essentially irrelevant to these policies, except to promote the demand to do *something* about global climate change. In contrast, policy research seeks to understand *how* to improve the integration of ends and means, of goals and alternatives, as experience unfolds in unpredictable ways. The priority for policy research is to identify and address malfunctions in the process of harvesting experience, and to stimulate new experience through policy innovations in neglected areas. The models of procedural rationality and the decision process mentioned in the Introduction and used in Parts I, II, and III have long been adequate for the task, even if there are too few researchers trained to use them.

Third, it would be helpful to reconsider the Action Plan on the model of an adaptive complex system and to manage it accordingly. In such systems, a large, complex problem like global climate change is factored into many smaller and simpler problems distinguished on a functional or territorial basis. The search for solutions to the simpler problems is distributed to many agents or policy makers or processors in a position to understand the requisite operational details of a smaller problem. Proceeding in parallel, some succeed in finding solutions and some do not. But if the system is capable of harvesting experience from its diverse parts, it can build upon successful solutions to simpler problems, move on to more complex problems, and continuously evolve better solutions that could not have been anticipated or predicted at the outset (cf. Simon, 1981, chapter 7; Collingridge, 1992; Gore, 1996). Wittingly or unwittingly, the Action Plan began with rather simple technological solutions to rather simple problems like upgrading the efficiency of lighting; these solutions were consolidated into programs like Green Lights; and programs like Green Lights were consolidated into the Action Plan. The evolution is worth continuing and extending internationally, not only because distributed processing facilitates the solving of complex problems, but also because it serves freedom and democracy. In mitigating climate change and adapting to climate impacts, we need not accept the technocratic hubris if not totalitarianism implicit in titles like ‘Managing Planet Earth’ and ‘Stabilizing the Climate System’ – a hubris which has been rejected by some scientists and policy makers alike (Tennekes, 1990; Havel, 1992).

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Notes

1. Other appraisals include an update on programs of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy released in December 1995, and the 1994 U.S. Climate Action Report. See also Lashof (1996), Montgomery (1996), and U.S. General Accounting Office (1996, 1997).
2. There are slight discrepancies in the figures. Using the 30 MMTCE attributed to funding cuts, the total adds up to 188 rather than 189 MMTCE.
3. It should be acknowledged that the primary purpose of the official appraisal of the Action Plan is to report to the Framework Convention, using methodologies and a format adopted by the Parties to the Framework Convention. As suggested in the Conclusion, a parallel, partially overlapping, system of appraisal is worth considering for purposes of improving the Action Plan.
4. USCAR (1997: chapter 4, p. 5) includes a graph of emissions reductions for the Green Lights program that is too smooth to be interpreted as data. It apparently assumes geometric growth. However, the U.S. General Accounting Office (1997: p. 18) reports emissions reductions of 0.6 MMTCE from Green Lights through FY 1996.
5. The Committee on Environment and Natural Resources (1997: p. 76) affirms that the current basic rationale for the USGCRP remains the same as it was in 1989: *'In the coming decades, global change may well represent the most significant societal, environmental, and economic challenges facing this nation and the world. The national goal of developing a predictive understanding of global change is, in its truest sense, science in the service of mankind.'* (Emphasis in the original.)
6. The number of climate change stories (upper curve) extends data first published in Pielke and Glantz (1995). A second-level search on the climate change stories counted stories that also mentioned the Action Plan (lower curve). Another second-level search (ungraphed) for references to voluntary (or Action Plan or Green Lights or Energy Star – the best-known programs in the Action Plan) turned up a total of 59 stories from January 1992 through June 1997, or less than one per month.
7. In this connection we agree with David Montgomery (1996: p. 77) of Charles River Associates, who contends that the Action Plan erred in mixing up the sensible idea of voluntary programs that reduce emissions and are good business with 'a set of arbitrary goals that distract attention from the key question: what is it that makes economic sense to do today?'
8. The most comprehensive summary of the policy sciences is Lasswell and McDougal (1992). For an introduction to that two-volume work, see Brunner (1996); for a preview, see Lasswell (1971). Normally the policy sciences are left in the background in order to focus attention on the results of application to the issue at hand. The Action Plan is an exception: As a system of interconnected processes it is extraordinarily complex and the long term is extraordinarily important for realizing its purposes. Hence a brief introduction to some tools of the policy

sciences might serve to simplify mapping, evaluating, and improving the present system, and to facilitate the systematic updating of understandings as they become obsolete.

9. In one influential source (Kaplan, 1964: p. 11), it is the 'story of a drunkard searching under a street lamp for his house key, which he had dropped some distance away. Asked why he didn't look where he had dropped it, he replied, "It's lighter here!"'
10. For example, according to the Committee on Earth and Environmental Sciences (1992: p. 3), the economics program within USGCRP enforces a sharp distinction between economic research and policy analysis. 'Policy analysis, the short-term evaluation of specific policy proposals, is excluded from consideration under the Research Program on the Economics of Global Change. The credibility of the Program rests on vigorous enforcement of this distinction and adherence to scientific standards of review.'
11. From this standpoint, mitigation and adaptation are irreducibly local or regional problems because climate impacts are expected to differ significantly from one such area to the next, and because local policies must be relied upon to reduce emissions and vulnerabilities in each area, regardless of policies elsewhere.
12. Compare Stephen Schneider on the summer of 1988, which included record-breaking heat, dangerous levels of urban pollution, and crop-destroying drought over large parts of North America: 'In 1988, nature did much more for the notoreity of global warming than any of us [scientists] or sympathetic journalists and politicians were able to do in the previous fifteen years' (quoted in Ungar, 1995: p. 446). Ungar adds that 'the issue achieved celebrity status not because of an increase in claims-making activities by entrepreneurial communities, but because these communities were able to piggyback their claims on the real-world events of that summer.' This is consistent with theory on the limits of propaganda (Lasswell and Kaplan (1950: pp. 113–114), including science perceived as propaganda. See also Bodansky (1995: pp. 447–449) and Brunner (1998).
13. Attention to the Action Plan in a sample of eighty trade publications peaked at 173 in 1994, but has dropped off since then. More specifically, attention to the Action Plan declined to 72 stories in 1995, 58 stories in 1996, and 11 stories in the first half of 1997.
14. For example, 'Recognizing that effective and rational response strategies to environmental issues can be built *only* on sound scientific information,' the Committee on Earth Sciences (1989: p. 8) wrote, 'the overarching goal of the U.S. Global Change Research program is: *To gain an adequate predictive understanding of the interactive physical, geological, chemical, biological and social processes that regulate the total Earth system and, hence establish the scientific basis for national and international policy formulation and decisions...*' (Latter emphasis is in the original.)

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