DEVELOPMENTS AT THE INTERFACE OF U.S. ENERGY AND ENVIRONMENTAL POLICY

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INTRODUCTION

The arrival of the Clinton Administration was perceived in many circles as a harbinger of significant change in U.S. environmental policy. While Bill Clinton's environmental record as Governor of Arkansas was perceived by environmentalists as mixed, Al Gore had developed a reputation as one of the strongest environmental advocates in the U.S. Senate. The Administration's election signaled the first time in history that the United States had elected a strong environmentalist to either the job of President or Vice President.

While environmentalists celebrated, many in industry, especially in the energy industries, looked upon the new administration with trepidation and concern. As the first year of the Clinton Administration ends, the evidence suggests that these concerns were not justified. While environmentalists have been appointed to many senior positions in the Administration and the rhetoric is much more pro-environmental, the programs and policies of the Clinton Administration have not departed radically from those of the Bush Administration. This is partly a result of the Administration's focus on economic issues, and partly a result of the fact that the Administration faced many of the same political and policy pressures that shaped environmental programs in the Bush era.

This paper examines the record of the first year of the Clinton Administration on key issues at the interface of environment and energy policy. While there are 10 or 15 policy issues that might affect both environmental and energy priorities, we have limited our assessment to four that were of major importance in 1993, either because the Administration developed new proposals, Congress enacted new laws, or because the U.S. Environmental Protection Agency (EPA) announced far-reaching implementation plans. Each of the four issues has components that are of interest for international energy and environmental policy. The four issues are: (1) global climate change; (2) energy taxes; (3) the implementation of the acid rain provisions of the Clean Air Act; and (4) alternative fuels and alternative fuel vehicles.

Similarities and Differences Between the Bush and Clinton Administrations

The transition from the Bush Administration to the Clinton Administration brought about some significant changes in U.S. environmental policy. But, as this paper illustrates, only some of these changes are substantive; others are associated with departures in "style." Furthermore, the common threads between these two administrations' environmental policies are much greater than generally recognized.

The Bush Administration began as fundamentally moderate-Republican on environmental issues. Its championing of the 1990 Clean Air Act Amendments is the prime example of its proactive yet moderate position during the initial two years of the four-year administration. Later, with the ascendancy of Vice President Quayle's Competitiveness Council, the Bush Administration moved to the right on environmental (and other regulatory) issues, became less activist, and — from the perspective of environmental advocates — more obstructionist. Much of the change over those four years had to do with the rhetoric, not the reality, that emanated from the White House. Indeed, the degree to which the Bush Administration "ran away from a positive environmental record" during the 1992 presidential campaign is striking.

The Clinton Administration has been characterized by some observers as "moderate (or new) Democratic," and many of the policy initiatives we review in this paper can be described by this label. At the same time, the Vice President in the new administration, Albert Gore, has played an exceptionally important role in the environmental area; and few would call the Vice President "moderate" on environmental issues. Some have suggested that the Vice President is as committed to pushing the U.S. toward more environmentally oriented policies as former Vice President Quayle was committed to pushing the country in the opposite direction. On the other hand, just as the Bush-Quayle Administration may have been more environmentally progressive than it later presented itself as being, so the new Clinton-Gore Administration may turn out to be somewhat less progressive on environment than its own rhetoric would suggest. Only time will tell.

Other Energy and Environmental Issues

There are several issues at the interface of energy and the environment of concern to U.S. policy-makers that are not discussed in detail in this report, primarily because they are not the focus of major new initiatives, or are not of direct relevance for international energy and environmental policy. It is worthwhile, however, to say a few words about each of these issues.

Nuclear Power. The Clinton Administration is certainly the most anti-nuclear of any U.S. administration in the past twenty years. While not quite as hostile as the previous Democratic presidential candidate, Michael Dukakis, President Clinton has made it clear that nuclear power will be pursued only as a last resort. Research into new reactor designs was almost entirely eliminated in the Department of Energy's (DOE's) proposed research budget, although the Congress restored some of these cuts. While both Bush and Reagan tried to provide assistance to the beleaguered U.S. nuclear industry, President Clinton and Energy Secretary Hazel O'Leary have made it clear they have no such intentions.

Instead, the focus of the Clinton Administration in this area is on cleaning up weapon production sites and identifying politically acceptable solutions for disposing of civilian nuclear waste. The political and financial obstacles to achieving these goals are enormous, and the United States' record in this area has been dismal; almost none of the official deadlines for cleanup have been or are likely to be met in the near future. Secretary O'Leary, however, has begun to make a number of changes, including: (1) declassifying previously secret information on the nature of the waste stored at many of the weapons production sites; (2) opening up the decision process for setting cleanup priorities to include state and local officials, in the form of federal/state/local partnerships; (3) attempting to develop links to the Department of Defense so that nuclear waste cleanup and nuclear non-proliferation initiatives will not work at cross-purposes; and (4) undertaking risk analyses of each of the sites with the objective of cleaning up those areas of greatest risk first.

Automobile Fuel Efficiency: CAFE Standards. In the early part of the presidential campaign, candidate Clinton endorsed a forty miles per gallon standard for automobile efficiency (CAFE or Corporate Average Fuel Efficiency), but by the end of the campaign, he stated only that he wanted to design options that would realize the same

energy efficiency benefits, without necessarily mandating more stringent standards. While the Administration has not shut the door on returning to stricter CAFE requirements, its initiatives in the first year were characterized by efforts to work with the auto manufacturers to develop more efficient cars and to implement statutory mandates for low emission or alternative fuel vehicles.[1]

Incorporating Environmental Externalities into the Pricing of Electricity. Many environmental advocacy groups have argued that demand side management programs should be favored by utility planners over building new power plants because they cause less environmental damage. In 1990 and 1991, several state public utility commissions ordered the utilities within their jurisdictions to add premiums to the costs of supply initiatives when comparing those costs with the costs of demand side management,[2] with the premiums set equal to environmental damages.

Support for this program seems to be waning. Several states have rejected the use of externality adders because of the difficulty of calculation. The debate over environmental externalities in the power planning process will continue, but this issue has taken a back seat to the concern over the move to a more competitive market for electricity.[3]

Environmental Technologies. Task forces have been created and meetings have been held at the highest levels of the U.S. government on the subject of providing incentives to spur the development of new environmental technologies.[4] The idea, one of President Clinton's and Vice-President Gore's primary themes, is that technology development enhances both the environment and the economy. To date, little has materialized from these meetings and efforts, but new initiatives may be announced in 1994. Given fiscal constraints, these will likely take the form of either providing better information to firms or facilitating new public-private partnerships.

One potentially important development in this area is the use of the capabilities of the National Laboratories to work with private industry to develop new technologies. These laboratories, originally established for defense-related purposes, have grown significantly over 40 years. The Administration wishes to refocus the efforts of these laboratories, and environmental initiatives are one of the primary targets of this effort.

The paper is divided into five remaining sections, as follows: on global climate change; on energy taxes, on acid rain; on alternative fuels and alternative fuel vehicles; and on future expectations.

GLOBAL CLIMATE CHANGE

Of the environmental problems that have arisen since the beginning of the industrial revolution, few have posed greater uncertainties or greater potential threats than the possibility of global climate change due to the greenhouse effect. Many scientists are concerned that if emissions of carbon dioxide (CO_2) and other greenhouse gases (for example, methane, nitrous oxides, and hydrofluorocarbons) continue to increase at current rates, global mean temperatures may increase from 2 to 5 degrees Celsius (3 to 9 degrees Fahrenheit) in the next century, causing widespread changes in precipitation patterns, storm frequencies and intensities, and ocean levels.[5] On the other hand, the anticipated costs of mitigating such climate change are enormous.[6]

The Framework Convention on Climate Change. In the face of uncertainties about the risks of climate change and the costs of greenhouse gas (GHG) reductions, the international community took steps to address global climate change as part of the United Nations Conference on Environment and Development, commonly called the Earth Summit, held in Rio de Janeiro, Brazil, in June, 1992.[7] By January, 1994, 161 nations had signed and some 50 countries had ratified the *Framework Convention on Climate Change,* a treaty requiring signatories to "achieve. . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[8] For industrialized countries, the specific challenge is to return GHG emissions "individually or jointly to their 1990 levels" by the year 2000.[9] Although the Bush Administration signed the Climate Change Convention at the Earth Summit and announced its intention to meet the stabilization goal, it never committed to specific reductions in U.S. emissions. The Administration wanted to maintain the United States' flexibility to adjust to actions taken by the European Community, and to adjust the magnitude of its response to changes in economic conditions.

Clinton Administration Position. In the waning days of the Bush Administration, a senior aide to Rep. John Dingell, chairman of the House Energy and Commerce Committee, told energy industry officials that the global warming issue was "ripening."[10] He noted that the political equation on climate change would change significantly with the arrival of the Clinton Administration, and warned that the

energy industry should take a "proactive, positive" approach to the issue. He said that if the issue of climate change is "treated as industry versus the environment, or the economy versus the environment, industry's going to lose. . . ." This seemed at the time to be a reasonable point of view, especially given the strong environmentalist leanings of Vice President Gore relative to those of former Vice President Quayle. In his book, *Earth in the Balance,* Gore stated that "Our ecological system is crumpling as it suffers a powerful collision with the hard surfaces of a civilization speeding toward it out of control."[11] He argued that the U.S. should make the environment the central organizing principle for civilization.[12] As described in the next section, the reality ended up being quite different.

On Earth Day, April 21, 1993, U.S. President Bill Clinton committed the United States to reducing its emissions of GHGs to 1990 levels by the year 2000.[13] Industry reactions were cautious, but stopped short of criticizing this apparent shift in U.S. environmental policy.[14] Environmentalists embraced the President's pledge as a fulfillment of a major campaign promise, and welcomed it as a sign that the Clinton Administration would take a much more active stance on global climate change compared with the Bush Administration.[15] Marking another shift from Bush Administration policy, Department of Energy (DOE) Secretary Hazel O'Leary pointed out that "the Administration has ceased to debate the science" and urged industry to get involved in the Administration's process for developing an implementation plan.[16]

Plan Development. As is typical for the Clinton Administration, it developed the Climate Change Action Plan through a process involving eight federal agencies, and including significant public input, such as through the White House Conference on Global Climate Change, a conference of 600 experts held in June.[17] Even as late as June, 1993, the energy sector was still being warned to "say something besides 'no' to climate change policy" and advised that it should get ready for mandatory climate change measures.[18]

At the same time, DOE Secretary Hazel O'Leary solicited letters from the utility industry backing a program centered on voluntary measures to cut GHG emissions. DOE was building support for a voluntary approach and was preparing for a requirement of the 1992 Energy Policy Act that DOE issue guidelines by spring 1994 for recording voluntary GHG reductions. Despite DOE warnings that if the Administration could not come up with a voluntary program the

White House would turn to a command-and-control program, utilities were reluctant to agree to early voluntary commitments to reduce emissions.

The President and Congress were preoccupied during late winter and spring with the budgetary process and potential deficit reduction measures, including the consideration of a tax on the energy content of fuels.[19] The energy sector thought it would be very difficult for the White House to win passage of mandatory GHG reduction legislation in Congress.[20] This fact, coupled with the high level of importance placed by the Administration on jobs and the economy, health care, and crime, influenced the final character of the Administration's climate change policy.

The Administration essentially had four choices: (1) it could seek a carbon tax; (2) it could ask Congress to approve mandatory emissions reductions; (3) it could contrive a multitude of voluntary initiatives; or (4) it could continue to emphasize research. With the failure of the BTU tax, the carbon tax was not politically tenable; nor, given President Clinton's stabilization pledge, was the "research only" path. The possibility that Congress would approve mandatory reduction targets was low — the public's concern over global climate change had waned since 1989 and Congress was focused on other issues. Therefore, voluntary initiatives were selected as the preferred option.

Overview of the *Climate Change Action Plan*

In October, 1993, six months after President Clinton's Earth Day announcement, the Administration revealed its GHG reduction strategy: *The Climate Change Action Plan*. The Action Plan embraces a comprehensive approach that emphasizes voluntary industry efforts, government-industry partnerships, and coordinated federal activity. The Plan is designed for "rapid and aggressive implementation" by minimizing the use of actions that require legislative or new regulatory authority, and which could thereby be delayed.[21] The nature of the initiatives in the plan are not unlike those that might have been expected from the Bush Administration, emphasizing volunteerism, government-industry cooperation, cost-effectiveness, the use of market incentives, and minimal mandatory government intervention.

If not altogether different in substance, the Clinton Administration's position is certainly different in tone from Bush Administration policy. The Action Plan states that it is part of the

"proverbial first step" to address climate change, that "ultimately we will have to do more," and that "the United States will help to lead that effort."[22] Paying at least rhetorical attention to the issue of reductions past the year 2000, the Action Plan lays out some near-term pieces of a "long term economic and technology development strategy. . . in order for progress to continue on greenhouse gas emission reductions into the next century."[23] Notably, the President directed a working group to develop measures within the next year to reduce emissions from personal motor vehicles, including cars and light trucks.

The Baseline Situation. The Action Plan estimates that, in its absence, U.S. GHG emissions would grow by about 7 percent between 1990 and 2000, from 1,462 million metric tons of carbon equivalent (MMTCE) to 1,568 MMTCE.[24] Breakdowns of 1990 emissions by type of emission and emitting sector are shown in Table 1. Fossil-fuel energy production and use contributes over 85 percent of GHG emissions, accounting for virtually all of CO_2 and a significant portion of methane emissions (for example, from coal mining and natural gas production).

TABLE 1

U.S. GREENHOUSE GAS EMISSIONS BY EMITTING SECTOR, 1990

Sector	Emissions (MMTCE)			
	Carbon Dioxide	Methane	Nitrogen Oxides	Hydrofluoro-carbons
Industrial	455	n.a.	n.a.	n.a.
Transportation	442	n.a.	n.a.	n.a.
Residential	260	n.a.	n.a.	n.a.
Commercial	210	n.a.	n.a.	n.a.
Forestry	–130	0	0	0
Total	1,237	166	39	20
% of Total	85%	11%	3%	1%

The task of stabilization was made more difficult by the White House decision not to include in their calculations compounds being

phased out under the Montreal Protocol, that is, chlorofluorocarbons (CFCs) and fully-halogenated CFCs. Making the stabilization task still harder, hydrofluorocarbons (HFCs), which are substitutes for CFCs, were included in the Action Plan as GHG emissions. In other words, chemicals being reduced under the Montreal Protocol are not counted as net reductions in the Action Plan, but substitutes for these chemicals are counted as additions in the Action Plan. The decision required the U.S. to find an additional 20 MMTCE of GHG emission reductions.

Components of the Climate Change Action Plan. Possibly the most interesting thing about the Action Plan is that, throughout its development, closely involved officials from both government and industry were convinced that both a broad-based energy tax and international offsets or "joint implementation" were critical to the United States' ability to fulfill President Clinton's commitment. Yet, neither of these actions were included in the final Action Plan. How, then, does the Action Plan reach its targets? The vast majority of reductions from the 42 actions announced or expanded through the Plan come from voluntary initiatives aimed at increasing the energy efficiency of the industrial, commercial, residential, and transportation sectors. Examples of program titles are: Climate Challenge, Green Carrots, Climate Wise, Motor Challenge, Green Lights, Energy Star Buildings, Rebuild America, Natural Gas Star, and Cool Communities. All said, about 61 percent of the total predicted reductions come from the energy sector, with the remaining reductions coming from, for example, methane recovery and reduction, reduced use of fertilizers and pesticides, forest management, and pollution prevention and recycling. Key industries targeted include: electric utilities, motor manufacturers and users, automobile manufacturers, and chemical and aluminum manufacturers.

The Climate Challenge program is a key ingredient of the Plan, comprising the set of voluntary agreements by utilities to reduce GHG emissions. But the viability of the Climate Challenge program is questionable, especially given the move toward more competition in the utility sector. Industrial customers, in search of lower-cost supplies of electricity, are arguing for the right to purchase electricity from the lowest-cost suppliers, who in many instances would *not* be their local electric utility company. Such transactions may be possible due to the enactment of the Federal Energy Policy Act, which opens up the electric transmission system to other utilities and non-utility generators.

In order to keep these industrial customers, utilities will have to

reduce the price of their power to levels that are competitive with other generators, most of whom are under no obligation to shoulder the financial burden of energy efficiency and other social programs established by the government. Invariably, utilities will find it difficult to pass through the costs of voluntary initiatives, such as those included in the Climate Change Action Plan. There is a diversity of opinion as to how rapidly this competitive scenario will unfold. Further, since regulation of the electric utility industry is in part a function of 50 different state public utility commissions, there will be a great deal of variation regarding how and when competition emerges in each state.

Impact of the Climate Change Action Plan. To meet the President's goal, the Action Plan estimates it would induce GHG reductions of 108 MMTCE from the year 2000 baseline, resulting in emissions almost equal to 1990 levels. Table 2 shows how the Action Plan would distribute the impacts of these reductions.

TABLE 2

ACTION PLAN GREENHOUSE GAS REDUCTIONS FROM 2000 BASELINE

	Reductions (MMTCE)	
Sector	Total	% of Total
Energy Demand		
Industrial	19.0	17%
Residential	16.3	15%
Commercial	10.6	10%
Transportation	8.1	7%
Energy Supply	10.8	10%
Methane Reduction/Recovery		
Other GHG Reductions	16.3	15%
Forestry Actions	10.0	9%
Total	108.6	100%

As for budgetary impact, the Administration estimates that the Action Plan will actually reduce the U.S. deficit because, while about

$1.9 billion will be spent between 1994 and 2000, the plan will also raise about $2.2 billion in revenue.[25] In addition, the Action Plan posits that individuals and firms will realize a net economic benefit due to energy cost savings from private investments of about $60 billion in energy efficient technology.

Plan Adjustment. According to the Action Plan, a "White House task force will actively monitor trends in greenhouse gas emissions. . . and if necessary will modify the program to keep emission reductions on track."[26] It is likely that the Action Plan will first be evaluated in 1994 if the Framework Convention on Climate Change enters into force upon ratification by at least 50 countries. The United States will submit a National Action Plan within six months of entry into force of the treaty, and the Climate Change Action Plan will form its basis, with any necessary modifications. After this point, the White House task force will reassess and update the Action Plan every two years, or sooner if requested by parties to the Convention.[27]

Although one might be skeptical about the importance of this evaluation process, it should be noted that Vice President Gore has retained jurisdiction over this issue. By not delegating this to a Cabinet-level department, the Administration is signalling that the White House commits its credibility to ensuring that the goal is met. Future adjustments could include a program with "more teeth in it," depending on the timing, the state of the economy, the federal budget, and other factors.

Key Issues Surrounding the Climate Change Action Plan

Some of the most controversial components of a potential GHG reduction strategy ultimately were not included in the Action Plan, including joint implementation, a broad-based energy tax, and mandatory reductions. Other issues that might have been more controversial, were it not for the dominance of these debates, include specific U.S. plans for the post-2000 period and aid to developing countries for GHG control. The Plan addresses the issue of international aid only tangentially in the ground rules for its pilot project on joint implementation.

Joint Implementation. A key question the White House had to answer in the Action Plan was whether to credit emissions offsets achieved by U.S. companies operating overseas against total U.S. emissions. The Climate Change Convention permits the use of so-

called "joint implementation," but treaty participants do not plan to establish guidelines until March, 1995.[28] Joint implementation is extremely important to the energy sector, which recognizes opportunities to offset GHG emissions by planting trees or boosting energy efficiency in developing and former Warsaw Pact countries at a fraction of the cost of similar actions taken domestically.[29]

Most environmental groups did not support the inclusion of joint implementation in the Action Plan, arguing that monitoring, enforcement and equity issues must first be resolved and that, in the meantime, the country should concentrate on reducing emissions within its borders. Both sides had support within the Administration, with DOE Secretary Hazel O'Leary strongly supporting joint implementation and the White House Office of Environmental Policy favoring the environmentalist position.[30] Those opposed to joint implementation could be further divided into two groups: (1) relatively moderate forces opposed only until international guidelines are established (EPA, for example); and (2) those opposed on "moral grounds," who are less likely to be swayed by institutional developments. There are many, especially within EPA, who favored the concept of joint implementation, but felt that instituting the program before international institutions were in place was a prescription for failure and would result in discrediting joint implementation as an approach. They favored proceeding with the pilot program, which could be expanded when and if the international community establishes procedures for monitoring and enforcing transboundary emission reductions.

The President chose this latter option as a middle ground between the proponents and opponents of joint implementation. The purpose of the pilot program, called the U.S. Initiative on Joint Implementation (USIJI), is to "gain experience in verifying net emission reductions from certain types of investments in other countries" and to "help advance thinking on the many issues that need resolution before an international joint implementation effort can be fully mounted."[31] The Department of State will oversee the development of USIJI, including publication of guidelines in the *Federal Register*, the groundrules for which appear in the Action Plan.[32] The groundrules include the following key features: (1) a mechanism for investments by U.S. firms and potential government assistance; (2) an interagency evaluation panel to certify emission reductions; (3) strict criteria to evaluate emission reductions; (4) measurement, tracking, and scoring of joint implementation projects and inclusion of net reductions in

the U.S. National Action Plan; and (5) assessment of USIJI within two years of its inception or six months of adoption of international guidelines, whichever comes first.

Broad-Based Energy Tax. If implemented as proposed, it has been estimated that the Clinton Administration's BTU tax would have reduced GHG emissions by about 25 MMTCE.[33] As this comprises about one-fourth of the total reductions necessary to meet the Administration's goal, it was a crucial component of any GHG reduction plan. In the next section of the paper we discuss the proposals for, the debate about, and the ultimate demise of a broad-based U.S. energy tax.

Reactions of the Energy and Environmental Sectors

Industry, in general, was relieved that their worst fears about a Climate Change Action Plan were not realized. As a result, it was generally supportive of the Plan. The reaction of most environmentalists was pragmatic. They realize that breaking with the Administration over this issue would be counterproductive. They appear to be hopeful that the Administration will support stronger action two years hence.

ENERGY TAXES

Economists in the United States have frequently argued in favor of greater reliance on energy taxes to raise revenues and to address a variety of social concerns, including pollution, urban congestion, and threats to national economic security.[34] Renewed concern about energy efficiency has resulted from increased attention to fossil fuel combustion, carbon dioxide emissions, and potential global climate change. This has combined with new interest in the economic efficiency attributes of energy taxes (compared with conventional, distortionary taxes such as those on investment) to produce an unprecedented level of interest in this area. This increased level of interest has not, however, evolved into increased policy action.

Brief History of the 1993 Energy Tax Proposals

During his campaign for President, candidate Clinton opposed increased gasoline taxes, but did not give strong signals about his posi-

tion on carbon taxes or other broad-based energy taxes. In early January of 1993, before the Clinton Administration took office, Vice President Elect Gore indicated that the Administration was discussing the possibility of some kind of a broad-based energy tax, such as a carbon tax, a BTU tax, or a gasoline tax.[35] Vice President Gore had previously gone on record as an advocate of carbon taxes to reduce emissions of greenhouse gases. In his book, *Earth in the Balance,* he wrote:

> I propose . . . that we create an Environmental Security Trust Fund, with payments into the Fund based on the amount of CO_2 put into the atmosphere. Production of gasoline, heating oil and other oil-based fuels, coal, natural gas, and electricity generated from fossil fuels would trigger incremental payments of the CO_2 tax according to the carbon content of the fuels produced. . . . I am convinced that a CO_2 tax which is completely offset by decreases in other taxes is rapidly becoming politically feasible.[36]

In early February, 1993, Treasury Secretary Lloyd Bentsen tested interest group and Congressional reactions to a broad-based energy tax, which he indicated could be used to help reduce the deficit.[37]

BTU Tax Proposal. As part of President Clinton's economic recovery plan, announced in his State of the Union address in February, 1993, he proposed a tax on the energy content of fossil fuels, nuclear power, and hydroelectric power. The proposal was for a tax of 27.5 cents per million BTUs for coal, natural gas, and nuclear power and 59.9 cents per million BTUs for petroleum. Hydroelectric power was to be taxed at the average rate for fossil fuels. The tax was to be phased in over a three-year period, beginning in 1994, and would have raised $22 billion annually by 1997-1998 with a total of $72 billion raised over the five-year period ending in 1998. The tax then constituted a little more than one-third of the $245 billion in new revenues that the Administration proposed in its budget plan.

The BTU tax proposal was promoted as much for its environmental benefits as its revenue-raising features, including its incentives for reducing greenhouse gas (GHG) emissions. If implemented as proposed, it was estimated that the BTU tax would reduce GHG emissions by about 25 MMTCE.[38]

Congressional and Interest Group Reactions. Throughout the debate that followed, energy sector interests argued that the energy tax should be replaced by a broad-based consumption tax that would hit all sectors of the economy and not penalize just one sector — the ener-

gy sector — as would a BTU tax. Indeed, the electric utility industry spoke out against the BTU tax even before President Clinton formally proposed it. Joined by the American Petroleum Institute, the National Association of Manufacturers, and other organizations, the Edison Electric Institute launched a massive campaign opposing a broad-based energy tax two weeks before the President's address.[39]

Congressmen from oil and coal producing states were particularly active against the tax. Other Congressmen supported it, extolling its benefits as a consumption tax that encouraged savings and investment, a pro-environment tax that reduced air pollution, and for deficit reduction. Republicans blasted the Administration for looking first at tax increases rather than spending cuts to decrease the deficit.

Environmentalists said they would support the energy tax as long as it included environmental as well as fiscal benefits. Ideally, environmentalists wanted a carbon tax, coupled with a surcharge on nuclear power and a large increase in the gasoline tax, because such taxes would encourage utilities to switch from coal to other fuels and motorists to decrease their driving.[40] A public opinion poll found that, as of February, 1993, half of U.S. registered voters supported taxing coal and other fossil fuels because of their environmental damages, with this support growing to 58 percent if such taxes were used to reduce the deficit.[41]

Unravelling of the BTU Tax. Even before the proposal was formally submitted to Congress, energy interests managed to get the Administration to make a dozen major changes in its proposal, thereby conveying the impression to remaining interests that the Administration's commitment was less than firm. Democratic leaders first pushed for an exemption for agriculture, telling the President that the BTU tax proposal would not pass without such an exemption.[42] This exemption led to pressure for an exemption for the aluminum industry, which is particularly energy-intensive. By the time the House of Representatives voted on and narrowly passed a modified version of the President's proposal in May, 1993, it included exemptions for fuels used to generate electricity, diesel fuel for agriculture, and non-hydroelectric renewable energy, and partial exemptions for aluminum and other energy-intensive industries.

Despite this "victory" in the House, the Administration's plan died in the Senate. The Senate Finance Committee replaced the BTU tax with a 4.3 cents per gallon gasoline tax and additional cuts in Medicare, Medicaid, and other social programs. The Senate passed

this alternative tax and spending cut combination as part of its deficit reduction package in late June, and the House agreed to it in a House-Senate Conference Committee. President Clinton's failure to get even one Republican vote gave Democratic Senators from energy producing states enormous leverage to block a major energy tax. Furthermore, the President and the Congress were leery of passing a program that placed any measurable burden on middle-income tax payers. These two concerns — protecting U.S. energy industries and the perception that energy taxes would hit hard on the middle class — were enough to defeat the measure.

Future Prospects for Energy Taxes

Under the budget plan passed and enacted, the deficit will shrink until 1996 and then begin to rise again in 1997 or 1998. While there is very little chance that Congress will be disposed to debating another tax program prior to the 1996 presidential elections, there will be growing pressure to do so once again in 1997 or 1998. The focus of the next tax debate will likely be three-fold: (1) reducing middle-income entitlements; (2) consumption taxes; and (3) energy or environmental fees. Each of these face strong opposition, but the available alternatives may be even less palatable.

ACID RAIN

Prior to 1977, little concern had been expressed about the phenomenon of acid rain, but subsequently evidence accumulated that emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and volatile organic compounds (VOCs) were involved in the formation of acid rain, often travelling hundreds of miles before being deposited.[43] Acid rain has been associated with damages to lakes, forests, and other ecosystems, materials (such as metals, wood paint, and masonry), and possibly public health and welfare.

After more than a decade of failed proposals, President Bush signed the Clean Air Act Amendments of 1990 (CAAA) into law on November 15, 1990. Title IV of the amendments established a new scheme for controlling the acid rain problem, focusing exclusively on electric power plants, which account for about 70 percent of SO_2 and 33 percent of NO_x emissions.[44] Under a two-phase plan, power plants will reduce SO_2 emissions by a total of 10 million tons annually and

NO_x emissions by 2 million tons annually by the year 2000. During Phase I of the plan, 110 of the largest and highest-emitting power plants must achieve specified SO_2 and NO_x reductions by the beginning of 1995. In Phase II, tougher requirements for virtually all power plants will be used to reach SO_2 and NO_x reduction goals by the beginning of the year 2000, at which time SO_2 emissions will be capped at about 9 million tons annually.

The acid rain control plan employs a market-based system, under which EPA will allocate "emission allowances" to power plants in an amount that reflects each plant's required emission reductions.[45] Each power plant will then have the option of: (1) reducing emissions to allowed levels; (2) reducing emissions to below allowed levels and selling remaining allowances to other power plants; or (3) acquiring allowances from other power plants to make up for emissions that are above a plant's allowed emissions level. In general, new sources must acquire allowances from existing allowance holders. EPA has the primary administrative role in implementing the acid rain program. In addition, state public utility commissions (PUCs) and the Federal Energy Regulatory Commission (FERC) have played and will continue to play central roles in developing specific policies to implement the program.

It is intended that this flexible system will result in more cost-effective reductions than possible using a conventional approach that emphasizes uniform standards, and which would not take advantage of (1) the varying costs of emission reduction faced by different utilities or (2) the varying cost faced by each utility of employing different control options. Estimates of the potential cost savings from the allowance trading system are approximately $1 to $3 billion annually, relative to a traditional command-and-control approach, representing a 50 to 75 percent savings.[46] While it is still too early to judge the cost-effectiveness of the acid rain program, initial developments indicate that the operation of the market is being impeded by uncertainty and by the decisions by state public utility commissions that oversee utility compliance plans.

By the end of 1993, there had been 17 allowance transactions, EPA had held the first allowance auction, and utilities had completed their Phase I compliance plans.[47] About 880,000 allowances were traded, with only two utilities accounting for the majority of this activity. However, the vast majority of utilities have settled on compliance plans which are self-sufficient, that is, they do not anticipate or neces-

sitate utilization of the allowance trading system. As a result, some utilities are incurring marginal control costs that are up to six times higher than necessary. To some extent, PUCs and FERC face a dilemma. If they do nothing to encourage the allowance market, utilities are likely to pursue self-sufficient strategies, thereby facing unnecessarily high control costs. Relying on the market may, on the other hand, expose ratepayers to some risk due to uncertainty over allowance prices and availability.

Utility reluctance to participate in a new compliance option, constraints imposed by state-level interest groups, and regulatory uncertainty are among the reasons put forward to explain these initial program developments. The rules faced by PUCs, for instance, generally do not provide them with adequate cost-minimizing incentives. To protect regional mining jobs, PUCs in high-sulfur coal states have been under intense pressure to require the installation of scrubbers, rather than allow switching to low-sulfur coal.

During 1993, the most significant aspects of the development of the acid rain program were: (1) continued uncertainty about EPA's final program rules; (2) the holding of the first-ever allowance auction; and (3) initial indications of how utilities would meet their reduction targets.

Uncertainty About Acid Rain Program Rules and Allowance Tracking

Uncertainty about property rights have plagued U.S. experiences with tradeable permits.[49] Indeed, uncertainty surrounding lawsuits and a delay of EPA's allowance tracking system have added to the sluggishness of the allowance market and difficulties for utility compliance planning.[50]

Lawsuits Over Program Rules. On January 11, 1993, EPA published its final acid rain program rules.[51] Among other things, the rules required Phase I units to submit compliance plans by February 15, 1993, and laid out EPA's procedure for permit issuance. Utilities, environmentalists, and New York State have sued for court review of EPA's acid rain program rules, but court action is not expected to be taken until some time in 1994.[52]

New York State's suit is based on its concern that the existence of emission trading will result in there being no reduction in acid rain over New York, especially its Adirondack Park, due to its geographic

location and the expected pattern of emission reductions. On the other hand, the Environmental Defense Fund has filed an amicus brief in support of EPA's program. In response to another lawsuit against EPA, the Agency is rewriting certain provisions of the acid rain program rules because they were originally and unintentionally written in a way that could allow from 1 million to 3 million tons more of SO_2 emissions than intended under Phase I of the program.[53] EPA has also recently canceled plans to issue rules that would allow trading between NO_x and SO_2 emissions, due to pressure from environmentalists.

Industry officials say these actions are impeding the development of the allowance market because utilities are not sure how many allowances they will have. The overall situation casts some doubt on the development of future environmental markets because it indicates to industry that the government may change the rules at any time.

Allowance Tracking System. Another source of uncertainty is EPA's computerized allowance tracking system (ATS), which it will use for compliance monitoring to ensure that utilities hold a number of permits that is equal to or greater than their emission level. The ATS is not expected to be operational until well into 1994, although it was supposed to have come on-line in March, 1993. Utility analysts agree that the lack of the ATS became an impediment to the allowance market because it cast doubt and uncertainty over transactions for many potential players. Utility representatives have been pressuring EPA to have at least a temporary ATS in place.[54] EPA had hoped that a private sector tracking system would be developed and that the ATS would be used only for internal EPA compliance purposes. As no central private clearinghouse has emerged, however, EPA's tracking system has become the default central depository of allowance trading information.

SO_2 Emission Allowance Auction

On March 31, 1993, the Chicago Board of Trade gave a boost to EPA's acid rain program when it conducted the first auction of SO_2 emission allowances. The event was held primarily to auction off allowances that were withheld by EPA from its initial allocation of allowances, although privately-held allowances were also offered for sale. Any interested party could bid for a permit; any current permit holder could offer permits for sale.

The auction won praise from utilities, EPA, the Chicago Board, and some environmental groups, as it represented the first-ever public auction of an environmental commodity. Other environmental groups were at best neutral about the auction, and one group, Greenpeace, protested outside the offices of the Chicago Board. Several utilities were big winners at the auction. For example, one utility will use the 85,103 allowances it bought to delay installing scrubbers on coal units until at least the year 2005, resulting in cost savings of about two-thirds over the next least-cost alternative.[55]

Virtually all of the allowances sold were the 50,000 Phase I and 100,000 Phase II allowances offered by EPA; only 10 privately offered Phase I allowances were sold. There was no floor price on the EPA allowances, and they sold for prices much less than predicted and less than those sold in private transactions over the previous two years. The average auction prices were $156 for Phase I allowances and $136 for Phase II allowances, as compared to previous sales in the range of $200-$400. The 95,010 Phase I and 30,500 Phase II allowances offered for sale at the auction by individual utilities did not sell, because they had minimum prices well above received bids.

The allowance market is still in its infancy, and so the results of the EPA auction and information from other transactions should be interpreted cautiously.[56] Several factors support this position. First, publicly announced Phase I transactions have involved a very small percentage of the 31 million allowances allocated for Phase I. In addition, the requirement that EPA sell its allowances without a minimum bid resulted in auction prices which are very likely to be below the market clearing price. And allowance sellers in recent private transactions have typically been utilities that can "produce" allowances at near zero marginal cost, thereby adding to the dubious impression that future allowance prices will be low.

Some experts believe that allowance price uncertainty is here to stay, but that this will not necessarily doom the allowance market.[57] Some of the reasons for continued price uncertainty include: PUC restrictions on allowance trading; limitations on technical compliance options; fuel-cost uncertainty; changes in the cost of scrubbing; and utility uncertainty over PUC approval of compliance plans.

Future Prospects for Auctions and Cash Markets. The Chicago Board of Trade had planned, but then postponed conducting periodic private auctions of allowances starting in July 1993. Cantor Fitzgerald, a New York based brokerage firm, has also developed an

on-line auction and spot sale system for which it says the vast majority of the allowance market has expressed interest. In addition, the same week as the auction, the Edison Electric Institute added an electronic bulletin board devoted to allowance buying, selling, and trading information to its on-line computer services.[59]

Utility Compliance Strategies

In its most recent estimates of compliance costs, the Edison Electric Institute anticipates that utilities will spend $2.10 billion in 1993, $2.16 in 1994, and $1.20 billion in 1995 as they comply with the Phase I requirements of the Clean Air Act Amendments.[60] According to preliminary estimates from the same study, utilities spent $1.04 billion for compliance in 1992, 10.4 percent more than expected.

According to another study, there will be about 1 million excess SO_2 emission allowances available each year under Phase I of the acid rain program, because many utilities will over comply.[61] Total reductions will be about 20 percent more than required in Phase I, according to the study, as a result of three main factors: (1) some states are requiring utilities to install scrubbers to protect mining jobs; (2) other utilities are installing scrubbers as a conservative compliance strategy; and (3) other emission reduction rules will result in additional SO_2 cuts. Additional allowances will also be available through EPA's auction pool, as described in the previous section.

While about 15 utilities have committed to complying with the acid rain program by retrofitting with scrubbers, according to the study, other plants are contracting to burn low sulfur coal, and 11 others are interested in using natural gas. Due to this reliance on scrubbing and natural gas, and because another 24 utilities have been testing the use of low sulfur coal for compliance for two years, a large increase in demand for low-sulfur coal is not anticipated.

On the public relations front, in March, Northeast Utilities of Hartford, Connecticut donated 10,000 Phase II SO_2 allowances to the American Lung Association, which will permanently retire the allowances from the market.[62] The value of the donation was estimated at about $3 million or $300 per allowance.

Conclusion

The debate over the allowance market has shifted from concern over whether the market would develop and what should be done if it does not, to an emerging focus on what the characteristics of the nascent market will be, including prices and the role of market facilitators.[63] The SO_2 allowance system is beginning to fall into place, but not without short term transaction costs and uneven responses from both utilities and regulators.[64] Due to overcompliance by utilities, especially those in coal producing states, there will be a surplus of SO_2 allowances available at least for the next 2-3 years. This excess supply will have the effect of keeping prices lower than anticipated. As the nation moves closer to the 2000 deadline for full implementation of the acid rain program, the permit surplus is expected to decline, resulting in a rise in permit prices.

ALTERNATIVE FUELS AND ALTERNATIVE FUEL VEHICLES

Efforts in the U.S. to reduce air pollution from mobile sources (for example, cars and trucks) have historically focused on reducing the rate of emissions from individual motor vehicles. While these efforts have led to a large reduction in emission rates over the past 20 years, motor vehicles continue to be the source of over 90 percent of carbon monoxide (CO) emissions and about half of emissions that lead to the creation of ozone or smog (i.e., volatile organic compounds (VOCs) and nitrogen oxides (NO_x)). The continued prominence of mobile source emissions in air pollution is due to an increase in the number of vehicle miles travelled, reflecting a number of trends, including an increase in the number of drivers and an increase in the number of automobiles per driver.[65]

As a result of continued high levels of mobile source emissions, as well as emissions from stationary sources, dozens of metropolitan areas in the U.S. still fail to meet national ambient air quality standards for ozone, CO, and/or particulate matter. These so-called "non-attainment areas" are populated by about half of the U.S. population and are scattered across the U.S., including most major metropolitan areas.[66]

To address this serious air pollution problem, the 1990 Clean Air

Act Amendments (CAAA) called for further reductions in mobile source emissions through a variety of measures, including the following: (1) fuel producers will have to produce and sell reformulated gasolines or oxygenated fuels in cities with the worst ozone and carbon monoxide problems; (2) fleet vehicles sold in areas with the most severe ozone problems will have to be capable of using alternative fuels; and (3) automobiles, trucks, and urban buses will face more stringent emission standards.

In addition, the Energy Policy Act of 1992 (EPACT) contained requirements that overlap with those of the CAAA, calling for the use of alternative fuel vehicles by centrally-fueled government fleets. The following sections review recent developments in the implementation of the provisions of CAAA and EPACT related to the encouragement of alternative fuels and alternative fuel vehicles.

Alternative Fuels

The use of alternative fuels in light-duty automobiles and trucks is widely viewed as an important step towards improving air quality in urban areas in the U.S. Under two separate CAAA programs, gasoline sold in the worst ozone nonattainment areas must be replaced by reformulated gasoline and gasoline sold in CO nonattainment areas must contain higher levels of oxygenates, such as MTBE, methanol, ethanol, and ethanol blends, such as ETBE.

Reformulated Gasoline. Air quality benefits from the use of reformulated fuels will be achieved by: (1) adjusting chemical composition to reduce photochemical reactivity and ozone formation; (2) reducing fuel volatility and thus VOC emissions; (3) reducing exhaust emissions of VOCs, CO, and possibly NO_x; and (4) reducing emissions of other toxic substances found in gasoline (for example, benzene).[67]

Beginning January 1, 1995, all gasoline sold for use in conventional gasoline-fueled vehicles in the nine worst ozone nonattainment areas must be reformulated. These areas are: Baltimore, Chicago, Hartford, Houston, Los Angeles, Milwaukee, New York City, Philadelphia, and San Diego. Other ozone nonattainment areas may opt-in, and so far thirteen states and the District of Columbia have chosen to exercise this option. These areas together account for about one-third of the gasoline sold in the U.S.; if all ozone nonattainment areas were to opt-into the program, about 55 percent of the gasoline sold in the U.S. would need to be reformulated.

The reformulated gasoline program will be implemented in two phases. Beginning in 1995, Phase I reformulated[68] gasoline will result in a 15-17 percent reduction in VOC and air toxics emissions from motor vehicles. Beginning in 2000, even stricter requirements under Phase II of the program will result in a 25-29 percent reduction in VOCs, a 20-22 percent reduction in air toxics, and a 5-7 percent reduction in NO_x emissions. EPA and industry studies estimate that the cost of gasoline will rise by 3 to 5 cents per gallon due to Phase I of the program, and another 1 to 1.5 cents per gallon as a result of Phase II requirements.

The role of *renewable* oxygenates in reformulated gasoline has been one of the most controversial aspects of the reformulated gasoline program.[69] The CAAA requires that reformulated gasoline contain oxygenates so that it will burn more cleanly. Nonrenewable oxygenates (for example, MTBE and methanol) are made from natural gas, while renewable oxygenates (for example, ethanol and ETBE) are made from corn, other grains, wood, or possibly garbage. According to farmers and other interest groups, there are some potential benefits to using ethanol as an oxygenate (for example, domestic energy independence and greenhouse gas reductions). On the other hand, environmentalists have been opposed to its use, because alcohols increase evaporative emissions, thereby contributing to summertime smog problems. Although a final EPA rule on the use of specific oxygenates in reformulated gasoline is not due until the summer of 1994, EPA's compromise proposal is that at least 30 percent of the oxygen in reformulated gasolines should come from renewables, but that only renewable ethers (i.e., ETBE) can be used during the summer.

Oxygenated Fuels. The oxygenated fuels program is aimed specifically at reducing CO emissions in about 39 CO non-attainment areas. Beginning in November, 1992, all gasoline sold in CO nonattainment areas was to have contained at least 2.7 percent oxygen during at least four months of the year, or 2 percent oxygen for areas also subject to the reformulated gasoline requirements. Any state can waive this requirement if: (1) it would interfere with attainment of an air quality standard other than for CO; (2) the area's primary CO source is not mobile source-related; or (3) an adequate supply or distribution capacity for oxygenated fuels does not exist.

While there was a consensus that there would not be enough oxygenate for all CO nonattainment areas when the program was first instituted during the winter of 1992-1993, an oxygenate shortfall did

not occur. This result was reportedly due to lower demand and higher supply of oxygenates than anticipated because some nonattainment areas did not participate in the program, California adopted a 2.0 percent rather than 2.7 percent oxygen content level, and there was an unexpectedly high buildup of oxygenate and ethanol inventories.[70]

Response by Petroleum Refining Industry. It is expected that, with appropriate capital expenditures, sufficient volumes of reformulated gasoline can be manufactured in existing and anticipated facilities using current technology and available engineering and construction resources. A 1993 report by the National Petroleum Council estimates that the U.S. refining industry will need to make capital expenditures of $14 billion in the 1991-2000 decade to manufacture clean fuels required by the 1990 Clean Air Act Amendments (i.e., reformulated/oxygenated gasoline and low-sulfur diesel fuel).[71] Another $23 billion in capital expenditures will be necessary over the same period to meet new stationary source emission controls and health and safety regulations.[72] As evidence of this capital investment, major reformulated-gasoline-related refinery work has been announced, including the following expansions and upgrades in California: a $1 billion expansion by Shell Oil Co., $950 million for upgrade by Chevron Corp. at its two California refineries, and $400 million each by Unocal Corp. and Tosco Refining Co. at their California facilities.[73]

Relative to 1989 conventional gasoline, reformulated gasoline is projected to cost about 8 and 12 cents more per gallon in 1995 and 2000, respectively (including stationary source requirements), with 60-70 percent of the incremental cost attributable specifically to the clean-fuel requirements. In addition, the consumer using reformulated gasoline will potentially see an additional 2 to 3 cents per gallon effective increase in gasoline costs, because reformulated gasolines have lower energy content and hence give poorer mileage performance.[75]

Alternative Fuel Vehicles

The CAAA also established two "clean fuel vehicle" programs: (1) a nationwide program for fleet vehicles in 22 urban regions; and (2) a California pilot program. "Clean fuel vehicles" (CFVs) are defined as vehicles designed to operate on clean alternative fuels, including methanol, ethanol, mixtures of these fuels with gasoline (i.e., gasohol), reformulated gasoline and diesel, natural gas, liquefied petroleum gas,

hydrogen, and electricity.

EPACT complemented the CAAA fleet program by establishing requirements for the purchase of "alternative fuel vehicles" (AFVs) in both private and public fleets. While the definitions of CFV and AFV overlap significantly, the EPACT definition of AFV places more emphasis on non-petroleum fuels (for example, AFV includes coal-derived fuels and fuels from biological material, but does not include reformulated gasoline or diesel). The emphasis by the Administration on natural gas powered vehicles is evidenced by a 233 percent increase (to $40 million) in its proposed 1993 budget for natural gas research and development.[76]

In another private-public initiative,[77] the federal government joined with the Big Three American automobile manufacturers to form the Clean Car Initiative, alternatively called the New Technology Initiative. The purpose of the initiative is to strengthen U.S. competitiveness through research and development of highly fuel-efficient cars. The goal of this cooperative effort between private automotive engineers and federal scientists is a three-fold increase in the fuel-efficiency of automobiles by the year 2000.

Fleet Vehicles. The CAAA fleet program, administered by EPA, requires fleets of ten or more vehicles in the 22 worst air quality nonattainment areas to begin operating CFVs by the end of the decade. Under this program, 30 percent of new vehicle purchases by covered fleets must be CFVs by 1998, increasing to 50 percent by 1999, and 70 percent by 2001.

The EPACT fleet program, administered by DOE, requires AFV purchases by centrally-fueled government fleets of 20 or more vehicles, beginning in 1993 for federal fleets and 1996 for state and fuel supplier fleets. If necessary, DOE may also require purchases by municipal fleets and certain private fleets of 50 vehicles or more after 1999. Under the Federal Fleet Conversion Program, already in effect, 25 percent of total federal government fleet vehicle purchases must be AFVs by 1996, increasing to 50 percent by 1998, and 75 percent after 1999. Goals for state fleet purchases are 10 percent by 1996, increasing to 25 percent by 1998, and 75 percent after 2000. The EPACT also provides economic and other incentives for original equipment manufacturers, fleet owners, and fuel suppliers.

California Program. The CAAA's California pilot program was designed to demonstrate the effectiveness of widespread CFV use in controlling air pollution. Under the California program, a portion of

all vehicles sold in California will have to be alternative-fuel vehicles. In model years 1996, 1997, and 1998, 150,000 of the vehicles sold must be clean-fuel vehicles, with this number rising to 300,000 in model years 1999 and thereafter. The standards for the pilot program will result in VOC emissions that are about 50 percent lower than the basic vehicle requirements in early years, and 70 percent lower beginning in 2003.

The California pilot program complements a program adopted by the California Air Resources Board (CARB) in 1990, which required auto manufacturers to produce an increasing number of clean-fuel vehicles beginning in 1994.[78] The state-level requirements include a combination of transitional low-emission vehicles (TLEV), low-emission vehicles (LEV), ultra-low emission vehicles (ULEV), and zero-emission vehicles (ZEV).[79] For instance, under the CARB program, 2 percent of vehicles sold in California must be ZEVs by 1998, rising to 10 percent by 2003. At this point, only electric-powered vehicles can meet the ZEV requirements. According to one study, these requirements could increase electric utility capacity requirements by up to 2,100 MW by 2010.[80] The automobile industry remains concerned that given the projected state of technology, consumers will not purchase such vehicles without substantial subsidies — offered either by the government or by the industry.

FUTURE EXPECTATIONS

This paper has examined the record of the Clinton Administration on major issues at the interface of environmental and energy policy. Some of the Administration's actions are extensions of the policies of the previous Bush Administration, rather than sharp breaks with the past. On the other hand, it is also true that President Clinton appointed many strong environmental advocates to senior policy-making positions throughout the government. Their ability to affect radical change may be muted, however, by three factors: (1) continuing concern about the state of the U.S. economy; (2) cutbacks in federal funding that will force program reductions in many areas, including the environment; and (3) increasing sensitivity to the costs of meeting ever more stringent environmental standards.

There are three important trends in environmental policy that are likely to continue. First, the use of market incentives to meet envi-

ronmental goals will grow at the federal, state, and even local levels. Despite its slow start, the tradeable permit scheme for reducing sulfur dioxide emissions as a precursor of acid rain is beginning to work. Similar schemes are being considered — and in some cases adopted — for other air pollutants, such as VOCs and NO_x, for reducing certain types of industrial and residential waste, and for controlling point and non-point source water pollution.

Second, the Administration will continue to emphasize investments in new, cleaner technologies. To some degree, the Administration is trying to replicate the pattern of environmental technology initiatives in Japan.[81] Third, the Administration will emphasize renewable energy options and investments to improve energy efficiency and will de-emphasize nuclear power.

Environmental considerations will continue to be important factors in the design of new energy policies, but actual changes from existing policy will most likely be moderate and incremental, rather than radical and rapid.

Endnotes

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25. *The Climate Change Action Plan,* 7. The new revenue comes from income

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26. *The Climate Change Action Plan,* 4.

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75. National Petroleum Council, *U.S. Petroleum Refining: Meeting Requirements for Cleaner Fuels and Refineries,* (Washington, DC: National Petroleum Council, 1993), 5.

76. U.S. Department of Transportation, *Technical Assistance Brief,* April 1992, 5.

77. United States Council for Automotive Research (USCAR), Media Information, 1993.

78. Systems Applications International, "The Clean Air Act Amendments of 1990: Mobile Sources," May 1991.

79. California Air Resources Board, "California's Plan to Reduce Motor Vehicle Pollution, 1993."

80. See: "EDF Study: Boost in Electric Vehicle Use Could Shift Emissions out of L.A. Basin," *Utility Environment Report,* 20 August 1993, 4.

81. For investigations of the effects of environmental and energy policies of various kinds on the diffusion of new technologies, see: Adam B. Jaffe and Robert N. Stavins, "The Energy Paradox and the Diffusion of Conservation Technology." *Resource and Energy Economics,* 16(1994):91-122 and Adam B. Jaffe and Robert N. Stavins, "Energy-Efficiency Investments and Public Policy." *The Energy Journal,* 15(1994):43-65.