MARKET-BASED STRATEGIES FOR ENVIRONMENTAL PROTECTION

A TRIBUTE TO SENATOR JOHN HEINZ OF PENNSYLVANIA

OUR MARKET ENVIRONMENT

by
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HARNESSING MARKET FORCES FOR ENVIRONMENTAL PROTECTION

by
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This forum event was one part of Project 88/Round II, co-chaired by Senator Timothy Wirth and Senator John Heinz, directed by Professor Robert Stavins, and dedicated to the memory of John Heinz and his vision of improving environmental policy through the application of economics. The project focuses on the design and implementation of incentive-based environmental policies in three areas: global climate change; hazardous and solid waste problems; and resource management issues. In addition to this forum event, the project includes a seminar series, a set of policy workshops, public policy reports, and student internships. Project 88/Round II is sponsored by the Center for Science and International Affairs' Environment and Natural Resources Program, Henry Lee, Executive Director. Financial support is provided by the W. Alton Jones Foundation, the Pew Charitable Trusts, the Surdna Foundation, and the U.S. Environmental Protection Agency. The Project 88/Round II report, *Incentives for Action: Designing Market-Based Environmental Strategies*, was funded by a grant from the Carnegie Corporation of New York. For a copy of the full report of Project 88 or Project 88/Round II, contact Professor Stavins at the John F. Kennedy School of Government, Harvard University, 79 John F. Kennedy Street, Cambridge, MA 02138 (617-495-1820).

FOREWORD

by
Robert D. Putnam
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This very special forum is dedicated to a man who was deeply and productively committed to solving society's toughest problems, and making a difference: United States Senator John Heinz. As the nation mourns his tragic and untimely death, we honor the life and the environmental legacy of the senator from Pennsylvania. We are extremely pleased that Teresa, the Senator's wife and a long-time and very articulate environmentalist herself, has joined us for this special event. "Market Based Strategies for Environmental Protection," the title of this evening's Forum, gets at the heart of Senator Heinz' environmental legacy. In collaboration with his lifelong friend and colleague in the Senate, Tim Wirth of Colorado, John Heinz initiated Project 88, a series of creative policy proposals that reconcile what many people had once thought to be irreconcilable: market forces and environmental protection.

Project 88, which is housed here at the Kennedy School under the leadership of Professor Robert Stavins, has been described as putting a green thumb on the invisible hand of Adam Smith. Project 88's powerful and practical ideas have been acted on not only by Bill Reilly's EPA, by the U.S. Congress, and by President Bush, but also increasingly by governments elsewhere in the world, in Eastern and Western Europe, for example. Project 88 is literally transforming the character of the discussion, the dialogue, and the debate over environmental protection.

Thanks to the support that has been generated by Senator Heinz and Senator Wirth, the Kennedy School has had an opportunity to stay intimately involved with this very special project. And over the next year and a half, with Rob Stavins' quarterbacking, we will host a series of seminars and policy workshops on incentive-based approaches to environmental protection. And beginning next summer, we will organize student internships in Washington and in state capitals across the country to enable Harvard students to help implement the policy recommendations of Project 88.

When the Project's Round II report was released last week, *The New York Times* headlined it, "More Green for Less Gold." This report, like its predecessor a little over two years ago, incorporates counsel from leaders in business and government, from academia, and from the environmental community. This inclusive approach to problem solving goes to the core of our mission here at the Kennedy School. If we can bring together disparate groups to solve our common problems, we can make a lot of progress on solving the long list of problems that are facing our country today. Project 88 is, a model of the kind of creative blend of far-sighted ideas and practical political realism that represents the Kennedy School at its best.

THE ENVIRONMENTAL LEGACY OF JOHN HEINZ

by
Robert N. Stavins
Assistant Professor of Public Policy
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As *The Washington Post* has noted, something which made Senator John Heinz stand out in the Senate was the tenacity with which he worked on behalf of those who lack an effective voice: the elderly, the chronically ill, children, those caught in the grip of poverty, and, we must add -- the natural environment. His commitment to innovative approaches to environmental protection was full and it was unconditional. He co-chaired Project 88 with his close friend and colleague, Senator Timothy Wirth, and thereby brought credibility to the idea of harnessing market forces to protect the environment, an idea which was *not* politically popular just three years ago.

Both Senators demonstrated great political courage by embracing the first Project 88 report, *Harnessing Market Forces to Protect Our Environment*, with its recommendations of the then controversial idea of a tradeable-permit program for acid-rain control; an idea which was later adopted by the Administration in its Clean Air proposals, and subsequently enacted by the Congress and signed into law by the President -- a chain of events in which EPA administrator William Reilly, of course, played an absolutely pivotal role.

Round II of Project 88 was again initiated and sponsored jointly by Senator Wirth and Senator Heinz. This second phase of the Project, like the first, was a collaborative effort involving over 100 environmental-policy experts from across the country, representing private industry, environmental organizations, government, and academia. The Senators' second report, *Designing Market Based Environmental Strategies*, was released by Senator Wirth just last week in Washington; and, in the words of one prominent environmentalist, "Project 88 may turn out to have a greater positive impact on our planet's future than all of the scare stories that have dominated the news." As Senator Wirth says in his foreword to the Round II report, "It is now part of the legacy of John Heinz."

Market-based strategies for environmental protection encompass a set of innovative approaches which recognize market forces not only as being the source of environmental problems, but also as being potentially part of the solution. Included are mechanisms such as pollution charges, tradeable permits, deposit-refund systems, and eliminating market barriers and government subsidies. These incentive-based policies force consumers and producers to experience the full costs and consequences of their decisions; not afterwards when it is too late to affect their decisions, but beforehand, when it still makes a difference. In this way, they provide powerful incentives for environmental protection, and can enable us to achieve our environmental goals at lower overall cost of compliance than with conventional approaches. Furthermore, incentive-based policy mechanisms provide ongoing incentives for the development and adoption of cheaper and better pollution-control technologies.

Over the past three years, we have witnessed dramatic changes in the reception given by members of the policy community to these market-based environmental strategies. Through Project 88, a set of diverse constituencies -- which often have been adversaries of one another -- have been brought together, working on behalf of the powerful notion of merging the interests of the environment with the mechanisms of the market. Contributors to the Project 88/Round II report include leaders from all segments of the environmental community -- outstanding authorities like Dan Dudek of the Environmental Defense Fund, Harvey Alter of the U.S. Chamber of Commerce, Hank Habicht of the U.S. Environmental Protection Agency, and Paul Portney of Resources for the Future. It is testimony to the vision and leadership of Senator Heinz that such diverse interests saw common ground for their efforts.

Interest in economic-incentive approaches to environmental protection continues to increase -- in Washington, both within the Administration and in the Congress, in state capitals, and in local communities, and, for that matter, in numerous countries around the world. Indeed, the changes from just three years ago are remarkable. Ideas which had been confined to academic circles for some thirty years are now being discussed, debated, and acted upon by policy-makers. For problems as diverse as global climate change and municipal solid waste management, consideration is being given to practical incentive-based policies. These dramatic changes in interest and activity are yet another part of the legacy of John Heinz, a legacy of great commitment to the development of innovative and effective policies for environmental protection; a legacy which will survive beyond all our days.

OUR MARKET ENVIRONMENT

by

William K. Reilly
Administrator
U.S. Environmental Protection Agency

We begin tonight's program in the presence of Teresa Heinz, whom I have just heard speak a few minutes ago, and I share now with her husband the strong sense of pleasure that I do not have to follow her, which apparently was a rule of his. Eloquent, succinct, and moving; we are all privileged, those of us who had dinner with you tonight, to hear your brief remarks. Dean Putnam, we will miss you when you leave your position. You have been a strong supporter for Project 88. I know that Al Carnesale is going to continue that support. And I want to recognize the evening's moderator, Rob Stavins, who has done an outstanding job as director of Project 88, just as he did also on the Environmental Protection Agency's Science Advisory Board, an independent body of scientists and engineers to which we look increasingly for objective, authoritative, scientific advice on which we hope to base all of our regulatory decisions.

I spent some time in Cambridge some years ago, and I particularly like to come back in the spring. Bob Hope, whose son was a law school classmate of mine, once said that "for over 300 years Harvard has been producing more politicians than any other university in the world, but they have made up for it in other ways." One of those politicians was John Heinz, a Senator for whom no excuses were ever necessary. I spent the day with him in Pittsburgh the Friday before he died, and he introduced me to a group of prominent Pittsburgh business leaders, and then to a dinner audience. And he spoke very proudly of his own, and of our shared environmental record in the last couple of years. And I said that evening, and will repeat tonight, that when the environmental history of this era is written, John Heinz will be recognized for a seminal contribution.

I had a new secretary back in 1988, and I was in the conference room of the Conservation Foundation one day when I was told that Senator Heinz was calling. By the time I had gotten back to my office, I was advised that on the other line was Senator Wirth. I shrugged and tried to imply to my secretary that this kind of thing happened every day. I was not sure which call to take first, but it did not matter because they were both calling on behalf of the same request. It was that I become engaged with a project, Project 88, and meet its director, Rob Stavins, and advise on its conceptualization. The work of Project 88, both the conceptual contribution and the legitimacy that the project won by having distinguished, environmentally progressive Senators from both parties, and also from having the key support of the Environmental Defense Fund, transformed the concept of market incentives from academic theory into national environmental policy. The ideas of Project 88, *Harnessing Market Forces to Protect Our Environment*, moved with remarkable speed to the stage of enactment, thanks in great part to the authority and credibility of its Senatorial sponsors.

Project 88 -- Round II, *Incentives for Action: Designing Market Based Environmental Strategies*, released just last week, has, I think, as much promise, and in many respects confronts fewer obstacles of unfamiliarity and ideological resistance than did the original Project 88 report. The standard line on market incentives to achieve environmental objectives used to be as follows: figures in industry would express theoretical adherence and acceptance but say that the political process was not sufficiently attuned and would, in fact, if ever any market incentive found its way into law, so layer it with command-and-control regulations that the one would cancel out the other, and that the regulated industry would end up with having to accommodate two highly demanding and divergent sets of demands. Environmentalists tended to take the view that market incentives to achieve environmental objectives were a kind of exaggerated oxymoron, that markets, after all, were the problem. They did not pay any attention to externalities, and they severely discounted the future. Moreover, the moral sensibilities of environmentalists were offended by the idea of acquiescing to a modicum of pollution, in legitimizing pollution as market incentives, emissions trading, offsets, and the rest in a sense do.

Let me say at the outset, that we in the Bush Administration are committed to both the concept and the process of market incentives. Both Dick Darman and I agree on that. More fundamentally, President Bush is profoundly committed to expressing in our market economy the full possibilities of applying our wealth to get this country green growth. So we now promote the potential for using the market on behalf of the environment. Inspired very much by Project 88, I initiated an EPA Task Force to study incentive-based proposals generated throughout the Environmental Protection Agency. And last month, the Task Force released an important new report, *Economic Incentives: Options for Environmental Protection*.

As you know, we have made an unprecedented commitment to market incentives in our Clean Air Act of 1990, signed last fall by President Bush. The acid rain title in that law provides for a reduction of about half of the sulfur dioxides that we presently release into the environment of the United States. But it says that those companies which are capable of achieving more than their allotted maximum of emissions are free to trade the increment of over-control to companies which may find it more profitable to purchase such credits than to invest to reduce an equivalent amount themselves.

We might speculate on why it was that that proposal proceeded so fast from the point of announcement to enactment, in some 18 months. One reason surely was the source of the idea which I described. Another surely was the very substantial commitment it represented: 10 million tons of sulfur dioxide reductions is a very ambitious goal. Some were disposed to give us credit, believed that we had won some bona fides in making a commitment of this sort, and perhaps deserved to be given the opportunity to experiment in this way. But, of course, one of the very significant advantages of this approach is that according to numbers derived by the Council of Economic Advisors, it promised to reduce by almost a quarter the total cost of our acid rain controls in the United States, by some $800 million per year. And so instead of seeing this as a proposed permit-to-pollute program, people came to see it the way the sponsors of Project 88 had conceived of this

concept, as a way to make scarce resources go farther, to get us more reductions for a constant amount of money.

I believe that the acid rain title in the Clean Air Act of 1990 will stand as a memorial to Jack Heinz. And I will here dedicate myself, with some trepidation tonight, to doing all I can not to mess it up in implementation. That is no idle commitment. It is an extraordinarily complex, unprecedented, demanding job that the Environmental Protection Agency has to realize the potential of this title. We have thus far succeeded in getting our strategy for implementation of the Clean Air Act developed and the initial decisions made on time. We will need the help of a great many people -- of industry, of environmentalists, of all interested supporters of a better environment -- to make this title work.

It was Lord Eric Ashby who once characterized the challenge to our century and our generation in terms of three crucial reconciliations: the reconciliation of man with man necessary to avoid nuclear war; the reconciliation of humankind with the wealth and resources of this earth in order to triumph over the poverty that oppresses the soul and undermines civilization; and the reconciliation of humans with nature -- so necessary if natural systems are to continue to sustain life on earth. I think that John Heinz understood America's need for a fourth reconciliation, not just America's, but the world's: a reconciliation between the proponents of economic growth and the advocates of environmental protection.

I think it is important to say at the outset, as we consider new departures in environmental protection, that this field is perhaps the most clear example of a great success, I think maybe the greatest success of recent public policy history. Our achievements with respect to the environment are measurable and indisputable. We have reduced carbon monoxides in our cities by 30 percent, sulfur dioxides by a third, particulates by 64 percent, and lead by 97 percent. We have begun to bring the Great Lakes back.

This set of achievements is highly admired, and much coveted by other countries who desperately want to learn from our experience. But our experience, for all of its successes, has two limitations. Much of what we have achieved has been purchased at the cost of great contention, confrontation, and litigation that has added to expense and to the time necessary to clean up the country. The second limitation is the increasing cost of continued incremental environmental improvements. We released a report recently, "The Cost of a Clean Environment," that makes clear that in the United States we currently are spending just under 2 percent of our Gross National Product on air, water, and waste management. And by the end of the decade, we expect that figure will rise to about 3 percent. I mention this not because I think we can not afford it, but because I think it makes clear the obligation we all have to get it right.

We approach in the environment, in some areas, the point of diminishing returns. I testified last Friday before a committee of the House of Representatives on safe drinking water, and looked at a projected set of regulations that will have us regulating atrazine and alchalor in the coming years, with the possibility that the cost of controlling those toxics will be the equivalent of spending more than a billion dollars per cancer death avoided. We

confront problems in the environment today that are highly diffuse, that do not have the same characteristic of a visible, high-volume, and controllable polluter; problems that are diffuse, like nonpoint source runoff from farms, forests, streets, and highways. I remember being told a few months ago in Los Angeles that a good Los Angelino did not trust air that he could not see. And he may be right, because where pollution used to be conceived of as visible, now it is the stuff you can not see that will do you in.

Our response to this new set of problems that we face must be increasingly on preventing pollution -- on strategies for environmental protection that transcend traditional end-of-the-pipe cleanup, using new materials, fuels, processes, and products to eliminate a generation of waste before it is created. We are in the presence, I think, of a new ethic, both of our people and increasingly of our corporate leaders. It is an ethic that searches for practical ways to make serious progress in the near future. It is an ethic that responds more than anything else to the fact that the environment has entered the core values of the American people. Let those who still doubt the wisdom of pollution prevention, or who still believe that there remains some fundamental conflict between economic growth and environmental protection, let them first consult many of these companies which have saved money, or made money, by achieving pollution prevention. And let them also, it they are still in doubt, visit Eastern Europe and see the Vistula River in Poland, over 80 percent of whose length the waters do not permit of use for industrial cooling, they are so corrosive. Or let them experience sulfur dioxide levels in Cracow, which have in the period of just 40 years corroded some 500 year old monuments. And let them see the spiraling rates of infant mortality, and worker absenteeism, and emphysema, and premature deaths, and all of the rest in places like Poland, where the environment minister told me that 15 percent of the Gross National Product is now allocated to correcting for environmental problems, health related impairments of economic productivity.

The lessons of Eastern Europe, as of other places, are very clear. A clean and healthy environment and healthy natural systems are prerequisites for sustained economic prosperity. And conversely, the lesson here at home is equally clear. Economic prosperity is essential for future environmental progress. Sustainable economic growth can, and really must be, the engine of environmental improvement. As a nation, we must build upon these lessons. In looking back at American experience, it has been economic growth which has provided the engine for so much of our environmental progress, that paid for the catalytic converters, and the elimination of lead from our air, and for the scrubbers, and for the pollution control, and for so many of the other investments that have created the prospect for improved quality of health and environment.

Let me close by saying that we will see very soon in the Congress a vote on fast track legislation for Mexican free trade. And I think that free trade with Mexico offers an unprecedented opportunity to ratchet up environmental protection to improve health and begin to bring back impaired natural systems for some 85 million people. I myself heard President Salinas at a meeting with President Bush and the industrial leadership of both our countries last December in Monterey, Mexico, say to the assembled group, "We do not want dirty jobs in Mexico. We want a higher standard of living, and a vital component of a higher standard of living is a better quality of environment. Send us only your clean jobs.

It is all we will accept." Mexicans have learned the lessons of Eastern Europe. They now have the prospect, through free trade, to get the resources necessary to make the investments that will realize their dreams, and I very much hope that the Congress gives them that opportunity.

Finally, let me enter another point, perhaps a little more surprising to this audience, but I suspect not so coming from the Administrator of the Environmental Protection Agency. Let us remember the values and the merits of regulations. I found myself prepared to give a speech, a stem-winder, on the values of the market in Eastern Europe last September, and talked to enough environment ministers there, and others, to realize that they are committed to the market to the point of having forgotten that we have a system of regulation that has corrected for its excesses. It is on that that we build our market incentives today. Regulations have provided the foundation, and we look to a new sophisticated generation of market incentives to take us where they can not take us. But we are not de-regulators. We are, in the Bush Administration, I hope, cost-effective regulators, better regulators, less intrusive and more respectful of those regulated, and more attuned to helping them achieve their objectives in ways that further environmental objectives.

So let me conclude with a reminder that there is at bottom a moral dimension to environmental protection. The public knows that. Not everything has a price; some things can not be traded. Command-and-control has a place, in regulation as in the Persian Gulf. But we have scarcely begun to plumb the possibilities of market incentives. It is a field of uncountable flowers waiting to be plucked. It is one of the significant policy innovations of our time, and I look forward very much to helping fulfill its potential.

HARNESSING MARKET FORCES FOR ENVIRONMENTAL PROTECTION

by
Timothy E. Wirth
U.S. Senator, Colorado

First, I want to thank Dean Putnam, Rob Stavins, and the Kennedy School for hosting this wonderful forum. I also want to thank Bill Reilly for being here and for playing such a critical role in developing incentive-based environmental strategies -- Bill continues to carry the banner in this Administration and in doing so commands our respect and gratitude.

On the plane coming up I made a list of the issues John Heinz and I had worked on together, and could remember the following: trade; banking and securities; foreign bribery; law enforcement in the saving and loan industry; children's television and communications law; the rain forest; the Tongass National Forest; and the World Bank. We were founding members of the old Environmental Study Conference in 1975, and the Congressional Clearinghouse on the Future a year later.

This was really a unique relationship, especially when you mix up families, geography, partisanship and political base as crazily as we did. It was a relationship perhaps unique to the history of the Senate, and I miss him terribly. We communicated through a shorthand developed over many years -- and through a lot of body language. I could tell from his posture standing behind his desk when he was in a stubborn mood, and he had an uncanny knack to spot the mischief behind Wirth amendments before I even offered them on the floor. I like to think that from time to time we helped to save each other from ourselves, no mean trick as Teresa and Wren know so well.

I also like to think that my politics were like John's -- he did not run for office for the purpose of getting re-elected, but to get something done. That prodigious energy and intellect spent no time on the petty, largely symbolic debates that have ground policymaking to a virtual halt; but rather he was consumed by a passion to know *more* about the issues of change that so fascinated and absorbed him. None was more compelling than the environment, the preservation of the globe, the stewardship of God's creation. In this area, as with so many others, the superficial debate often is polarized:

- the essential need for economic growth versus the unrealistic concern for environmental protection;
- hard-nosed reality versus fuzzy-headed dreaming;
- scientific data versus romantic poetry; and
- blue-suited Republicans versus tree-hugging Democrats.

John knew that change would not come from one pole or another, but as a poet whose name was synonymous with industry, as a businessman with a dream, as a realistic public servant, and as a committed environmentalist, he worked to cut through the ideology and actually get something done.

Together, we tried to move beyond the false debates, and embarked on Project 88. As Rob Stavins has outlined, the idea of Project 88 was not to propose a free market in the environment. It was not to replace government with the market, or to sanction pollution, or to assign dollar values to human health or environmental quality. Instead, recognizing our fundamental agreement on the urgency of and need for environmental protection, market-based strategies presented us with an opportunity to reach our environmental goals at the least-cost, using the creative genius of market institutions along the way.

Project 88 was successful way beyond our expectations. After an initial, very skeptical reception, it became widely discussed and accepted. It was embraced conceptually by the Bush Administration. Soon after our report was released, when we were looking for applications, we talked with Bill Reilly and Boyden Gray. They led the Administration in joining with the Environmental Defense Fund, picking up on these ideas and developing a credit trading proposal for polluting power plants. This formulation provided the foundation for breaking a 10-year-old political stalemate over Clean Air, and the result was the monumental Clean Air Act which President Bush signed into law last fall.

After Project 88 was initially released, John and I joined with the Kennedy School to host a major conference, beginning at the Renwick Gallery, across the street from the White House, and concluding at the Rayburn Building. Over a day and a half, a sparkling array of Administration officials, members of Congress, and representatives of business, and environmental organizations discussed the implications of harnessing market forces to help solve environmental problems. From that conference, it became clear that three areas that were of great interest to the two of us were particularly well-suited to market-based solutions: global climate change, waste management problems, and natural resource issues. So we set out in pursuit of *Project 88 -- Round II*, again raising the money and persuading Rob Stavins and the Kennedy School to join us once more.

Substantively, our new report looks at the design and implementation issues associated with market-based solutions for these three problem areas. Again, we did not try to determine what the overall political or governmental goal should be; but given certain choices made by governments and their constituents, how might market forces become tools to implement the goal, and to suggest least-cost strategies for national, state, and local governments.

Global Climate Change

On the global climate change front, the report recommends the use of an international trading program to ensure that any global efforts to reduce greenhouse gas emissions are cost-effective and equitable. We recognize that responding to this issue is

difficult. The effects of the problem are global, the causes of the problem are global, and therefore the solutions must be global. An individual who reduces carbon dioxide emissions by halting deforestation or planting trees in Brazil should be able to generate credits to offset emissions elsewhere around the world. This introduces equity into the delicate negotiations among nations. And it helps to ensure that the cheapest control strategies can be found -- whether they occur in Bombay or Boston.

We also examined broad-based energy taxes, such as carbon charges. The carbon charge is controversial and insufficiently mature to implement at this time. Nonetheless, the report points out that broad-based energy taxes are effective and efficient means of reducing emissions by encouraging the use of less polluting fuels (natural gas emits about half the CO_2 of coal, and petroleum emits about 75% as much).

One of the most interesting proposals in this section is the idea of shifting taxes away from socially desirable activities such as labor and capital formation, and toward socially less desirable activities like pollution and the burning of fossil fuels. Because a broad-based energy tax can generate enormous revenue, it is possible to craft a carbon charge that can be used to reduce payroll taxes (which tax us for working), Social Security taxes, and corporate taxes. This kind of revenue-neutral approach has promise for offsetting some of the economic impact associated with a carbon charge. Politically, however, a carbon charge has major equity problems; it poses very real challenges for some regions of the country. The coal industry has every right to fear these proposals. Clearly, if we impose a carbon charge, simultaneously we should develop a retraining and compensation package for displaced workers, which could be funded in an equitable fashion from the revenues generated.

Another recommendation on global warming is to encourage states to develop comprehensive least-cost electric bidding programs, an idea ripe for implementation, and being pressed by New England Electric as we speak. Investments in energy supply additions and energy demand reductions are made in the same dollars, but the results can be very different; investments in energy efficiency have multiple benefits for the economy, for our national security, and for the environment. Unfortunately, too often our laws and regulations discourage energy efficiency investments. We are working on removing some of those disincentives in the deliberations on a National Energy Strategy in the Senate Energy Committee, as this Commonwealth, California, Colorado, and other states are also doing. This is certainly an idea that is fast becoming reality.

Solid and Hazardous Waste Management

Solid and hazardous waste management is the second area we examined in *Project 88 -- Round II*. Unfortunately, much of the activity at the state and national level on solid and hazardous waste management continues to focus on traditional command-and-control approaches. Often, these efforts do not get at the problem -- the demand side of the equation; we have to send different signals to the marketplace.

For example, when you or I put out our garbage each week, we usually have little idea of the disposal cost. It costs the same, whether we put out a half barrel or a full one, one barrel or four. To put it another way, we know what it costs to buy a disposable camera but not what it costs to throw it away. No market signal is being sent that would influence our behavior. To get at this problem we recommend the use of unit-pricing programs: households pay for disposal based on the volume of waste they generate. If you generate 30 gallons a week, you might pay $5 dollars -- 60 gallons costs $10 and so on. These programs have been used in the State of Washington and in Pennsylvania, and have reduced curbside collection by upwards of 60%. By using a simple price signal, we create an incentive to recycle and reduce waste.

Another approach for products that are not picked up curbside or that are particularly hazardous is the imposition of a disposal charge at the point of purchase. Further, virgin materials charges can be levied to send the right signal to the marketplace up-front. In this way, we can direct the marketplace to recycle materials by ensuring that product prices more accurately reflect their true costs.

The report also examined recycling credit programs. These are ideas picked up in bills Senator Heinz and I introduced earlier this year, with Congressman Esteban Torres on the House side. We set recycling goals for used oil, tires, lead-acid batteries, and newsprint, with industry incentivized to buy, sell and trade credits among themselves to reach those goals. We will be pursuing these ideas as Congress considers reauthorization of RCRA later this year.

On the issue of *hazardous* waste, it is clear that we must look less at recycling and reuse and examine instead safe disposal. The report recommends the use of deposit-refund systems which would ensure that the purchaser of a hazardous waste has an incentive to dispose of that product safely and legally, encouraging efficiency in the system by discouraging waste, and, we hope, speeding up the search for substitutes.

Natural Resource Management

In the broad and pressing area of the public lands, our report looks at two key issues in public resource management that are important to the future of the West. The first issue is the potential use of water trades to get more out of scarce water resources. Those of you who saw the movie "Chinatown" will be familiar with this issue -- there one city, Los Angeles, drains the Owens Valley; there is a winner and a loser.

The report points out that if Federal and state institutions can be persuaded to make some changes in how they deal with water transactions, we can create win-win situations; we can increase the amount of water available for productive use from existing projects, increase the efficiency of agricultural water use (which uses 75% of the water in the West) and even increase returns to the Treasury at the same time.

The classic trade would work as follows: cities willing and able to pay $600 or more for an acre-foot of water -- pay instead for improvements in agricultural water use that save water; the cities are given water in exchange. Farmers are thereby enabled to install improvements (lining canals to stop leakage; installing more efficient irrigation systems that use less water) which they probably could not accomplish on their own (both because they can not afford to pay that much for water, and because they risk losing title to any part of their water that they do not put on the ground). Cities get water for less than they would pay to build environmentally damaging new water projects; farmers farm more efficiently and earn money from the cities; and the farmland is better off because using less water helps slow salinization of soils.

Another public lands issue involves the use of our national forests. Through a practice called "below-cost timber sales," the U.S. Forest Service sells timber even when it costs them money, and it costs them plenty. The Forest Service actually lost a million dollars a day last year on timber sales, mostly because they sold so much timber in remote areas that required difficult, expensive access roads paid for by the taxpayer.

Project 88 -- Round II suggested a way to slow and maybe eventually stop this widespread abuse of taxpayers' money. The Forest Service has built 343,000 miles of roads -- a system 8 times larger than our Interstate Highway System, and more than a mile of road for every square mile of forest. Not all of these roads were part of below-cost sales, but enough were to signal significant depletion of the environment *and* the treasury. The study goes further and recommends ways of reversing the economic pressures that drive this crazy process, by focusing more attention on net revenues than on gross receipts, while also recommending ways to address the real economic impacts of a reduced timber program on rural communities in the West.

Project 88 was successful beyond our hopes. In a relatively short period of time, market-based environmental policy has moved from scholarly journals to policy dialogues. It has transcended the false debates that I mentioned at the outset. We are poised to enter a new era of environmental policy making, putting a green thumb on Adam Smith's invisible hand.

The legacy of John Heinz and his contribution to environmental protection grows each day. This was his vision. And he was brave enough to see that vision through. How many politicians from a steel and coal state would be strong advocates of acid-rain protection, or to be honest about a carbon tax, or fierce on the need to recycle hazardous materials? Only one that I have ever known. Tonight, we remember his leadership and his contribution. Tomorrow, we must dedicate ourselves to pursuing these strategies with the same vigor, the same tenacity, the same idealism which John always brought to his work. That is a responsibility we have to his memory, and a commitment to future generations.

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John F. Kennedy School of Government
Harvard University
79 JFK Street
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The Center for Science and International Affairs (CSIA) is dedicated to advancing the understanding and resolution of complex public policy problems of international scope through research at the intersection of the natural and social sciences. The number of such problems is growing, and the Center's research agenda currently encompasses international security affairs, environment and natural resources policy, and the role of science and technology in shaping the international economy and other global concerns. Each year a multinational group of predoctoral and postdoctoral scholars drawn from the social and natural sciences is in residence at the Center. More than 50 Harvard faculty members and about 70 non-resident affiliates are also involved in Center activities.

Research Staff The Center is directed by a permanent staff whose individual experience reflects its diversity of interests. Director Ashton Carter, a theoretical physicist who has worked in the Defense Department and the Congressional Office of Technology Assessment, specializes in national security affairs and science and technology policy. Lewis Branscomb, a research physicist and former chief scientist of IBM, directs the Center's Science, Technology and Public Policy program. Environmental scientist William Clark and international security expert Kurt Campbell serve as assistant directors. Henry Lee, an energy and environment expert with state government experience, serves as executive director of the Center's Environment and Natural Resources Program. Steven Miller, a political scientist, is director of studies and editor of the journal *International Security*, which is published at the Center.

Research Projects Collaborative research efforts focus on new issues of international security after the Cold War, proliferation of high-technology weapons, regional security including the Pacific Basin, avoiding nuclear war, technology policies for economic competitiveness and national security, international science and technology policy, social learning in the management of global environmental risks, market-based policies for environmental protection, and management of natural resources. In support of its research, the Center maintains a substantial specialized library in science, technology, international security, and environmental affairs.

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Publications *International Security*, the quarterly journal sponsored and edited by the Center and published by the MIT press, is a leading publication in security studies and international affairs, offering a distinctive blend of scholarly research with policy relevance. Assistant Director William Clark is editor of the journal *Environment*. In addition to books, articles, and edited volumes authored by CSIA research staff and fellows, CSIA's publications include: Discussion Papers, which are working-draft manuscripts by CSIA affiliates; Occasional Papers, which are monograph-length paperback books that have grown out of research conducted at the Center; reprints of journal articles; and a newsletter, *CSIA News*.

Inquiries should be directed to
(617) 495-1400

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Center for Science and International Affairs
John F. Kennedy School of Government
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The Environment and Natural Resources Program (ENRP) provides a locus at Harvard for interdisciplinary research on domestic and international environmental policy issues. ENRP's research agenda covers a broad spectrum of issues including: market-oriented approaches to environmental problems, natural resource and lands policy, global climate change, sustainable development and environmental risk analysis.

The Program involves faculty and senior researchers from the Kennedy School, as well as other professional schools at the university. Workshops, executive sessions, summer internships for students and the Discussion Paper series are also a part of the ENRP program.

Inquiries should be directed to:
Henry Lee
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