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### How Much Will People Pay for Longevity?

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Cost-benefit analyses having to do with air pollution generally show huge benefits, primarily in terms of an individual's willingness to pay to reduce mortality risks, which far outweigh the costs incurred. New research at RFF indicates that individuals may place a much smaller dollar value on how much they would pay to live longer than has previously been assumed by the U.S. Environmental Protection Agency.



**Paul R. Portney**

## Energy Déjà Vu

Could it really be the case that another year has passed? It has, indeed, and with it—finally—another presidential election. 'Tis the season, then, in which various constituencies tee up the issues with which they hope the new administration will concern itself.

One issue quite likely to loom large in the new Bush administration is the nation's energy policy—or the lack thereof. With OPEC flexing its muscles once again, the price of oil stopped its nearly two-decade slide and climbed sharply in 2000. Natural gas prices have climbed every bit as much—quintupling at times in the spot market. In one very important state, California, electricity prices jumped so much that regulators imposed price caps. Not since Bush the Elder was president has there been a focused discussion of the sources and uses of energy in the United States.

This issue of *Resources* contains a number of pieces that touch on this subject. Ian Parry writes about the controversy that began in the United Kingdom and spread throughout other parts of Europe this past summer when authorities talked about raising gasoline taxes still more (gas taxes average \$3.40 per gallon in the United Kingdom). Can such high taxes be justified on the basis of the “negative externalities” that accompany gasoline consumption in motor vehicles—principally traffic congestion and air pollution? Not even close, Parry concludes, suggesting that the United Kingdom consider relying less on the gasoline tax and more on other levies.

Speaking of cars, Howard Gruenspecht takes a look at efforts in California to force automakers to sell more zero emission vehicles (electric cars, for now). The problem is, as Gruenspecht argues, the California plan would—if implemented—likely increase annual air pollution emissions from cars in that state by creating a strong incentive for owners to keep their older, more-polluting vehicles on the road longer.

J.W. Anderson reports on another energy-related matter, namely, the recent and unsuccessful effort in The Hague by international negotiators to work out critical details of the Kyoto Protocol on climate change. If Anderson has it right, those talks foundered for reasons going far beyond disagreements over the role that carbon “sinks” could play in helping countries meet their carbon emission reduction targets. One of the major benefits of reducing airborne concentrations of certain pollutants associated with fossil fuels is the reduction in premature mortality expected to result. Alan Krupnick describes a recent study he and other researchers have conducted to see how much individuals are willing to pay for these reductions in mortality risk, both as a function of their age and the timing of the risk.

Let me conclude my message by directing your attention to the closing pages of this issue wherein we recognize our benefactors. Without their generosity, our research and public education activities would not be possible. To each and every one of you, a heartfelt thanks for your support!

*Paul Portney*



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### **RFF Team to Help Chinese Province Develop Air Pollution Permit Trading System**

With support from the Asia Development Bank (ADB), a team of RFF researchers, led by Senior Fellow Dick Morgenstern, will soon start work on a project in Shanxi Province, in north-central China, to help officials there develop an air pollution permit trading scheme. Shanxi is a heavily industrialized inland province. A 1998 World Bank report listed the provincial capital, Taiyuan, as one of the most polluted cities in the world as well as the most polluted city in the People's Republic of China (PRC).

The goal of the project is to develop a system, based on emissions-trading models now in use in industrialized countries, that will work in concert with the current regulatory infrastructure in the PRC. The RFF team will study the existing legal, regulatory, and administrative bodies in Shanxi to assess their adequacy for carrying out various approaches to meeting this goal; determine specific options; and offer recommendations for carrying out a demonstration project. Examples of emissions-trading models under consideration include emissions offsets, open-market trading systems, and cap-and-trade systems.

Despite recent increases in the efficiency of its electricity-generating sector, China as a whole faces serious environmental challenges from its heavy reliance on relatively uncontrolled and inefficient coal combustion as a source of power. Sulfur dioxide (SO<sub>2</sub>) controls recently were incorporated into the national environmental strategy. In the PRC, environmental policies and strategies are first developed at the national level by various agencies and then further refined

at the provincial level, where environmental management efforts are coordinated.

The ADB was established in 1966 as a multilateral development finance institution, owned by 59 members, mostly from Asia and the Pacific. Promoting environmental protection is a key strategic-development objective of the Bank. Its principal tools are loans and technical assistance, which it provides to governments for specific projects and programs such as the one described here. RFF has provided training to ADB staff on emerging policy instruments for environmental management, but this marks the first time that RFF has won one of these highly competitive contracts for technical assistance.

ADB wants to enhance the use of economically sustainable, market-based instruments (MBIs), such as subsidies and tradable permits, in Shanxi Province. According to one recent study conducted in a nearby province, the use of MBIs could generate potential cost savings of 50% or more for SO<sub>2</sub> reductions, compared to traditional command-and-control regulations.

### **RFF Researchers to Examine Effect of Resource Quality on Poverty and Population Growth in India**

India, like many developing countries, has been plagued by problems associated with population growth, poverty, and resource degradation. Roughly a third of India's 1 billion people live below the poverty line. Access to clean water, animal fodder, and fuelwood is particularly important for them, because many of these people depend directly on natural resources. India's natural resources, however, have been deteriorating, with 53% of India's total land area degraded or prone to soil erosion, and with marked deforestation and wide-

spread water scarcity and pollution. Meanwhile, India's population continues to increase by 2.2% annually, one of the highest growth rates in the world.

The fact that rapid population growth, acute poverty, and severe resource degradation coexist in India is no coincidence. In fact, a considerable amount of research has already examined the effect of poverty and population growth on environmental degradation worldwide. However, few analysts have considered that a degraded environment may also cause poverty and rapid population growth.

In a two-year study funded in part by RFF and the World Bank, RFF Fellows Urvashi Narain and Heidi Albers, along with David Zilberman, from the University of California at Berkeley, and Shreekant Gupta, from the Delhi School of Economics at the Delhi University in India, will examine whether improvements in natural resource management could lead to sustained economic growth, decreased fertility rates, and other demographic changes.

In order to better define the intricate relationships between resource degradation, poverty, and population growth, the researchers will conduct a household survey, interviewing 300 households from 30 villages in the Shivaliks mountain range in northern India. This region struggles with severe shortages of drinking water, fodder, and fuelwood because of degraded and limited forest cover and soil erosion.

The survey will elicit data on resource quality, human fertility, income, household labor allocation, household schooling decisions, migration, and household size in an effort to examine trade-offs that have been previously overlooked. To examine changes in household behavior, demographics, resource quality, and economic wealth over time, the researchers hope to administer fol-



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lowup surveys to the same families in five years. Village leaders will also be interviewed regarding the past successes and failures of village projects to gauge whether cooperative behavior may be a successful route to improving and maintaining resource quality.

The researchers hope to gather a wealth of data that will shed light on how resource quality affects poverty. They speculate that if resource degradation forces households to spend time in the pursuit of fuelwood, villagers would have less labor for income-generating activities. Also, water scarcity can lower agricultural yields, and fodder scarcity can make animal husbandry less profitable.

As agriculture and animal husbandry become less productive, men may be forced to migrate to towns and cities in search of employment opportunities, which increases the work burden placed on women. In short, resource degradation may not only be the effect, but also a cause of poverty.

The researchers believe that improved management of natural resources could create income growth by expanding opportunities for both animal husbandry and the sustainable harvest of natural resources like trees and grasses. In addition, improved management could lessen resource scarcity and also enable villagers to better cope with natural disasters, such as hurricanes and floods.

Resource quality and population growth have a similar relationship. Population growth puts pressure on natural resources, and resource degradation may increase fertility rates. Because resource degradation forces households to spend more time in pursuit of fuelwood and fodder for grazing animals, families might choose to have more children to meet that labor requirement.

Child labor is particularly important in animal husbandry because children can contribute more effectively to the care of animals than to tilling and harvesting. Their workload could increase to the point where girls would be required to forgo school to help with household chores, a still-common division of labor in India. Female literacy would likely decline, leading to an increase in fertility rates. Consequently, if natural resource management is improved, population growth could be abated as well.

Using survey results, along with policy simulations and results from economic models of household behavior, the researchers hope to develop potential policy prescriptions that will reflect empirical evidence and input from villagers, non-governmental organizations, and government agencies.

### **RFF and Sweden's Beijer Institute to Explore Biodiversity as a Primary Land Use**

Declining biological diversity is a pressing concern for environmentalists worldwide. Many natural scientists believe the world is in the midst of a human-induced crisis in which species are being lost at rates not encountered since the extinction of the dinosaurs. Although a number of factors can be identified for the decline of biodiversity, the conversion of natural habitat to other uses like farmland is probably the single greatest cause. However, habitat conversions may not always benefit all the citizens of the nations that allow them. Farming, fishing, and forestry enterprises that benefit members of the upper class or arise from inadequate local market and legal institutions may fail to meet the basic needs of local citizens.

While most would agree that effective conservation policies are needed, there is less agreement on how biodiversity should be conserved. RFF and the Beijer International Institute of Ecological Economics in Stockholm, Sweden, have initiated a program to determine when, where, and for whom the best use of land will involve the maintenance of biodiversity.

Researchers from RFF and Beijer will explore the potential of actual and emerging markets for eco-friendly products and ecosystem services to provide conservation incentives. For example, ecotourism operations may provide incentives for the maintenance of biodiversity since tourist revenues depend upon maintaining attractive natural features. The researchers also will consider whether such incentives should be actively and specifically promoted, or if more general policies to promote institutional and economic development would prove more effective. Because economists generally agree that resources are allocated more efficiently when property rights are established and enforced, one aspect of the research program will be to see what effects the establishment of property rights has had in different geographical areas.

RFF and Beijer researchers will collaborate with experts from universities and other institutions around the world to conduct applied economic, institutional, and ecological research on the relationships among habitat attributes, ecosystem functions, and their economic value. A number of case studies will be conducted in developing countries to contrast the effects of different economic, social, institutional, and political circumstances on land use choices. The research will culminate in joint publications that will provide practical guidance to policymakers, resource managers, and other stakeholders.



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RFF and Beijer launched the research program by hosting a workshop at RFF in October. Leading ecologists, economists, and other experts made presentations and directed discussions on issues of biodiversity and land use. After the workshop, plans were made to pursue a number of directions for future research, focusing on developing the economic and ecological criteria through which the success of conservation policies can be judged and identifying the social and institutional contexts required for instituting successful conservation.

According to RFF researcher David Simpson, "This research is critically important because conservation advocates and funders need practical advice on what works, what doesn't work, and how to make their dollar go the furthest."

### **An Update on RFF's Pilot Project to Build Environmental Citizenship in Hungary and Slovenia**

RFF is working with New York University Law School (NYU) and the Hungarian-based Regional Environmental Center for Central and Eastern Europe (REC) on a pilot project to support efforts in Hungary and Slovenia to create environmental administrations that are more transparent and to strengthen public participation in environmental decisionmaking.

The first in-region meeting took place in early October in Szentendre, just outside of Budapest. The purpose of the project is to assist each country in implementing international legal obligations they have agreed to under the Aarhus Convention and various agreements to improve the quality of the Danube River. (The *Convention on Access to Information and Public Participation in Decision-Making and Access*

*to Justice in Environmental Matters* was signed in 1998 in Aarhus, Denmark, by environment ministers from throughout Europe.)

Discussions at the Szentendre meeting centered on the current status of laws, regulations, and practices governing public access to environmental information in each country. Hungarian and Slovenian participants outlined the considerable legislative and institutional progress that has taken place in both countries in the past 10 years and described the development of environmental nongovernmental organization initiatives. Both countries have laws in place that should make public access to environmental information possible, but parts of the laws fall short of the standards set out in the Aarhus Convention.

Ambiguities in these laws hamper public access to information. Officials who must interpret unclear laws regarding the confidentiality of official and commercial secrets often deny requests by the public for fear that they might get themselves into trouble by releasing sensitive information. The absence of enabling regulations and guidelines has resulted in other problems. Officials have wide discretion and often deny information requests on technicalities. In some instances, officials require the person making a request for information to provide justification or ask whether requesters have adequate rights or "legal interest" to receive the information in question, even if the law does not require the person requesting information to provide a reason.

Even when the law on information access is clear, problems with the institutional structures in Hungary and Slovenia can thwart efforts by the public to access environmental information. In most cases,

information is only truly available to those who know how to ask for it (namely, people who know and are known to the officials in charge of the information). Sometimes there are no appointed officials to deal with requests at all, or requests are handled by officials who are overwhelmed by other duties.

### **Next steps**

By the end of the meeting, each country delegation had selected case studies to use as vehicles for examining current practices, recommending reforms, and developing project outputs. The Slovenian delegation decided to evaluate a controversial pulp and paper mill located not far from the Croatian border. The Hungarian delegation chose to focus on discharges to the Tisza River, a tributary to the Danube recently made famous by a cyanide spill from an upstream Romanian mine.

Potential project outputs, or publications, may include a citizen's guide to accessing available information and legal and practical guidelines for national and local-level governments that have line responsibility for responding to public requests for environmental data and information. Whatever recommendations or outputs come out of this project must be consistent with the requirements of the European Union, because Hungary and Slovenia are among the leading candidates for membership.

Capacity-building meetings will be held in Hungary and Slovenia this winter, in the countries' native languages, to examine in detail the issues identified during the October meeting. An electronic discussion list has been established to allow the project team and participants to share ideas, information, and best practices. Hungarian and Slovenian participants will go on a study



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tour to the Netherlands, New York, and Washington, DC, in the early spring.

Funding for this project is from the Global Environment Facility, with funds administered by the United Nations Development Programme.

### **Despite Benefits, Gasoline Taxes in Britain Are Too High, RFF Scholar Concludes**

In September 2000, truck drivers and farmers in Britain protested high gasoline prices by blockading oil refineries and depots, causing most gasoline stations to run dry. These protests were mirrored in various countries across Europe, with truck drivers blockading Brussels and snarling traffic on motorways around Dutch cities.

The demonstrations followed a three-fold increase in world oil prices over the last two years to over \$30 per barrel as the world economy expanded rapidly following recovery from the Asian financial crisis. But gas prices are also high in Britain because it has the highest gasoline tax in the world. The current excise tax is 50 pence per litre (\$3.40 per gallon), which is 75% higher than the 1990 level in the United Kingdom, even allowing for inflation. Indeed the price of gasoline now stands at about 83 pence per litre (\$5.65), more than three times the U.S. price (currently \$1.56 per gallon). Britain's Labour government claims that high gasoline taxes are necessary to reduce pollution and traffic congestion and to provide revenue that will help pay for promised increases in public spending.

In a recent discussion paper, RFF scholar Ian Parry suggests that, despite the benefits of gas taxes—cleaner air, reduced traffic congestion, and increased government revenue—the current tax of 50 pence

per litre still seems excessive. In terms of the environment, Parry writes, a gasoline tax of around 5 to 10 pence per liter could be defended, based on studies that assess the damages from vehicle pollution. This does not seem to justify the 1990 level of tax in the United Kingdom, let alone the current tax rate.

The argument that gasoline taxes are effective at decreasing traffic congestion is also questionable, Parry says. To effectively reduce congestion, policies must be in place that encourage people to consider all alternatives to driving on busy roads at peak periods, including using public transport; altering work schedules to avoid the rush-hour peak; carpooling; and driving on alternative, less-congested routes. A gasoline tax may encourage people to use public transportation and to carpool, Parry explains, but it does not encourage people to modify their work hours or drive on less-congested routes. Furthermore, a gasoline tax raises the cost of driving on roads that are relatively free flowing, for example, in sparsely populated areas or urban areas on weekends.

A much more effective policy to tackle traffic congestion would be to charge drivers for using busy roads at peak periods. Nonetheless, in the absence of peak-period charges, Parry argues that it is still appropriate to include the congestion benefits in the overall assessment of gasoline taxes. Parry concludes that the environmental and congestion benefits together might justify a tax of about half of the current U.K. rate. This is still a hefty tax, however, about four times the current U.S. gas tax.

In terms of providing money for public spending, Parry argues, the issue is whether increasing gasoline taxes beyond levels justified by pollution and congestion benefits will generate government revenues

at lower economic costs than raising revenues from other sources, such as the personal income tax. Income taxes cause economic costs, for example, by discouraging employment. But gasoline taxes also produce economic costs by inducing people to drive less than they would otherwise. They also raise transportation costs for businesses, which can ultimately lead to higher prices for products purchased by households.

Summarizing recent research findings, Parry suggests that the costs of the recent gasoline tax hikes in the United Kingdom probably outweighed the additional environmental and congestion benefits. Indeed, the net costs appear to be significantly higher than the costs would have been if the additional revenues had been financed through higher income taxes. In other words, there appear to be substantial benefits from shifting some of the burden of taxation off gasoline and onto income taxes, thereby lowering the current rate of gasoline taxation below 50 pence per litre.

Parry's paper, titled "Are Gas Taxes in Britain Too High?", is available at: [www.rff.org/issue\\_briefs/PDF\\_files/parry\\_gas-tax.pdf](http://www.rff.org/issue_briefs/PDF_files/parry_gas-tax.pdf).



# Zero-Emission Vehicles: A Dirty Little Secret

*Howard Gruenspecht*

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California's decision to mandate the sale of zero-emissions vehicles (ZEVs) as a means of improving air quality in the state looked like a clear victory for the environment. However, technology breakthroughs have proven elusive, resulting in ZEVs with high costs and poor performance. If the costs of producing ZEVs and subsidizing their purchase are spread across California's new car market, consumers are likely to respond to the price increases by holding onto their older vehicles, which have much higher emissions rates. Even a small increase in their use will generate extra emissions that will more than offset emissions reductions from ZEVs.

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**E**ven though California no longer holds the undisputed title for the worst air pollution in the United States, many areas within the state still exceed federal and state air quality standards. As policymakers in California seek effective ways to improve air quality, good intentions have occasionally resulted in some deeply flawed programs. The state's mandate for the sale of zero-emissions vehicles (ZEVs), now scheduled to take effect in the 2003 model year, falls into this category. It represents a triumph of environmental symbolism over environmental substance that will increase rather than reduce emissions while imposing substantial costs on California consumers.

Noting that vehicles generated approximately half of all smog-forming pollutants in California, the California Air Resources Board (CARB) in 1990 adopted a requirement that car companies include ZEVs in their California sales mix beginning in 1998. The requirement mandated that ZEVs should comprise 2% of all vehicle sales start-

ing in 1998, rising to 10% of sales in 2003 and thereafter. At the time of CARB's decision, it was widely expected that ZEVs would run on battery power, although other possible zero-emissions systems were not explicitly ruled out.

Despite large-scale research and development (R&D) funded by government and private sources, the technological challenges to the deployment of batteries with sufficient performance to make electric vehicles reasonable substitutes for conventionally powered cars proved to be insurmountable. Recognizing that workable zero-emission propulsion systems would not be available in 1998, CARB in 1996 delayed implementation of its ZEV mandate until 2003. Major automakers agreed to continue R&D activities and to maintain limited distribution of prototype ZEV vehicles within California. In 1998, CARB reduced the mandate for "true" ZEVs to 4% by adopting provisions that allowed manufacturers to use extremely clean advanced-technology vehicles, referred

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to as “partial ZEVs,” to meet up to 6% of the overall 10% requirement.

Over the last several years, R&D efforts have made significant progress in reducing emissions from conventional vehicles through the design and initial production of fuel-efficient hybrid vehicles and the development of fuel-cell technologies. (These technologies could eventually provide viable ZEVs after cost reductions and the development of a hydrogen-refueling infrastructure.) However, although the car companies have followed through on their commitments to CARB, battery technology breakthroughs remained elusive. For example, at a recent environmental technology seminar, Toyota Senior Vice President Jim Wilson said that, despite years of research, an electric vehicle would still cost \$20,000 more to build than a comparable gasoline-powered car. CARB staff estimates a cost premium of between \$8,000 and \$20,000 for production of an electric ZEV with performance characteristics inferior to those of a conventional vehicle.

Notwithstanding the continuing shortcomings of ZEV technology, CARB voted unanimously in September 2000 to reaffirm the ZEV mandate. Unless current rules are revised, between 4%–10% of all cars, minivans, pickups, and sport-utility vehicles sold by the major car companies in California starting in model year 2003 must run on battery power. At first glance, CARB's decision would appear to represent a victory for the environment over the manufacturers and dealers of conventional cars and trucks. A closer look, however, reveals a dirty little secret—the mandate will make the air in California dirtier rather than cleaner for the foreseeable future.

### Why the ZEV Program Will Increase Emissions

The electric car requirement will slightly reduce emissions from the average new car sold in California. However, the program will also raise the prices of both electric and non-electric new cars sold in the state as companies seek to recover the costs of developing and producing electric vehicles and the subsidies needed to get consumers to buy them. It is the economic response of Californians to these higher prices that will turn CARB's good intentions into extra tons of emissions. Californi-

ans are likely to purchase fewer new cars and to continue driving their old cars longer.

If the cost of producing electric cars, as estimated by CARB, is spread across the entire new car sales base in California, previous experience with the consumer response to higher new car prices suggests that total new car purchases will fall by 2%–3%, with an offsetting increase in the retention of older cars in the fleet. While the consumer response is small in terms of numbers of vehicles, the emissions impacts will be substantial, because old cars have much higher emission rates than new ones. Yet a recent CARB staff analysis, which suggests that the ZEV program will very modestly reduce emissions from the vehicle fleet, simply ignores this consumer response and its emissions implications. Once this response is properly taken into account,

CARB's own emissions models suggest that the emissions increase resulting from more intensive use of older cars will overwhelm the expected emissions reductions from new ZEVs.

Let's look at the numbers. CARB's own emissions model projects that in 2010, cars and light trucks manufactured before model year 2003 will emit about 20 times as much reactive organic gases (ROG) and 10 times as much nitrogen oxides (NO<sub>x</sub>) as the fleet of 2003 and newer vehicles. According to CARB's most optimistic scenario, by 2010 the ZEV program could cut total emissions of ROG and NO<sub>x</sub> from cars manufactured after model year 2002 by roughly 10%. However, the new car fleet

is already very clean, so this is only a small reduction in tons of pollution. The emissions from older cars that would be driven more because of the program will swamp this environmental benefit. Indeed, I estimate that the extra emissions from older cars in 2010 will be 3 to 15 times CARB's estimated emissions reduction from the new-car fleet. If the program proceeds on its present course, Californians can look forward to paying \$500 million more each year for their new cars and getting dirtier air in the bargain.

### Broader Lessons

The first lesson that could be gleaned from analyzing California's counterproductive ZEV initiative is that new programs

The larger message—that the pursuit of environmentally ‘perfect’ technology can be environmentally counterproductive once the consumer response is considered—should be remembered as regulators consider future measures to clear the air.



sometimes fall into old traps. Published results from my 20-year-old doctoral dissertation examined the possibility of perverse effects from tighter emissions standards for new cars in an environment abounding with grandfathered (older) cars. Indeed, a series of recent inquiries regarding my research from participants in discussions surrounding the environmental impacts of ZEVs had alerted me to the California program, which appears to be a far more glaring example of perverse effects than I ever thought possible in the early 1980s.

Second, regulatory advocates and designers appear to show selective recognition of the importance of market responses. Environmentalists have frequently called attention to the problems inherent in grandfathered emissions standards for electric power plants and criticized their contribution to the life extension of old units with high emissions rates. They have vigorously pursued remedies under existing law, such as the proposed application of new source review requirements to old plants that undertake major maintenance, as well as new legislation to force emissions reductions from older plants.

However, although the same market responses clearly affect the environmental impact of the ZEV program, actions to reduce grandfathering are probably not politically attractive because their direct impact would fall on drivers of older vehicles rather than on corporate polluters perceived to have deep pockets. Indeed, an effort by CARB's predecessor agency to require retrofits of rudimentary emissions controls on existing vehicles in California during the 1960s was quickly reversed by the state legislature in the face of consumer protests. Political pragmatism, however, should not preclude environmental advocates and planners from taking account of the economic and environmental reality of a market response to regulations in the marketplace. Their unwillingness to do so has resulted in an electric car program that is a lose-lose proposition—more emissions and higher costs.

The larger message—that the pursuit of environmentally “perfect” technology can be environmentally counterproductive once the consumer response is considered—should also be remembered as regulators consider future measures to clear the air. California consumers want a cleaner environment and are willing to pay for it. However, policymakers have the responsibility to weed out feel-good policies that squander consumers' money and fail to deliver environmental improvement.

A third lesson relates to the scope of environmental analysis. The CARB staff analysis presents a misleading perspective on implications for total tailpipe emissions by focusing exclu-

sively on emissions from new vehicles and ignoring emissions due to the market response. While analyses completed with finite time and finite resources must have some boundaries, there is no justification for choosing boundaries that deliberately crop the overall picture to avoid results that make a particular policy look less attractive.

In addition to excluding the emissions effects of consumer responses in the vehicle markets, the CARB staff analysis did not even address the potential for increased emissions of lead and other toxic metals associated with the use of battery-powered ZEVs, an issue that has received considerable attention. While the CARB staff has previously disputed estimates that each vehicle powered by lead-acid batteries requires the processing and recycling of 80 times more lead than a conventional vehicle, there is simply no basis for completely ignoring the environmental implications of sharply increased lead use contained in the CARB staff analysis itself. Government agencies have a particularly strong obligation to provide neutral predecisional analyses rather than advocacy-type analyses designed to support a particular policy choice.

A final lesson is that it is increasingly important to accurately characterize market responses in evaluating policies that seek small emissions reductions at high cost. The analysis of ZEV impacts summarized here reflects the extensive literature on price responsiveness in vehicle markets, but additional refinements could be made. ZEV opponents would probably claim that my calculations understate the resulting rise in emissions as ZEVs come into use by failing to account for the poor performance of ZEV vehicles. They note that the driving range between charges is too short, the time required to change batteries is too long, and there is a shortage of recharging stations. Because of these shortcomings, subsidies will have to exceed the extra cost of production to make enough consumers choose these vehicles to meet the mandate, resulting in a larger increase in the use of old high-emitting vehicles as the market response.

On the other side of the coin, ZEV advocates would point to some extra benefits available to ZEV owners. Some consumers will place a high value on being first to adopt new technology, while others will relish cutting their direct dependence on petroleum-based fuels. A state law passed in July 2000 provides the additional perk of access to freeway carpool lanes, even when driving alone. ZEV drivers can also park for free at the Los Angeles International Airport, park in more convenient locations at some shopping malls, drive through public toll roads without

paying, and receive free electricity at the Los Angeles Department of Water and Power headquarters, Costco stores, and other businesses in southern California. Some ZEV advocates even suggest that California should get a free ride, recommending that the car companies' stockholders or new car buyers outside the state cover ZEV costs. Whether ZEV opponents or ZEV advocates are correct, consumer response would appear to be a fruitful area for additional research.

### The Good News

Although I expect that the ZEV program as presently constituted will hurt rather than help air quality, the big picture is that the air is getting cleaner in California. In the 1970s, Los Angeles residents experienced over 100 Stage 1 smog alerts each year, indicating that ozone concentration had reached a very unhealthy level—an average of 0.20 parts per million for one hour. Policymakers took immediate action to curb emissions from vehicles, factories, and power plants. During the 1990s, air pollution was significantly reduced—Stage 1 smog alerts were announced no more than 14 times per year—and this year, the South Coast Air Quality Management Board boasts that the greater Los Angeles metropolitan area has not had any Stage 1 episodes for the second year in a row.

Despite improvements to date, more than 95% of Californians reside in areas that still do not comply with current federal or state air quality standards. However, further improvements in emissions performance—as more cars emitting fewer pollutants are driven on California freeways—would significantly reduce vehicle emissions despite continued increases in vehicle use. For example, total ROG and NO<sub>x</sub> emissions from cars and light-duty trucks in California are projected to fall by roughly 75% between 2000 and 2020, despite a projected 35% increase in vehicle miles traveled. These estimates reflect programs that

are already on the books—further improvements that might be implemented before 2020 could further reduce emissions.

It is also not too late for California to limit the damage from CARB's decision to affirm the ZEV mandate. In December 2000, just as this article was being finalized, CARB staff issued a new proposal to revise the ZEV program that CARB will consider in January. On the positive side, the new proposal would reduce the number of "true" battery-powered ZEVs required, reducing the level of costs and emissions increases resulting from the program. However, the CARB staff again missed an opportunity to provide credible estimates of environmental impacts by failing to incorporate likely consumer responses in their analysis. Additional elements of the new staff proposal—such as the introduction of factors unrelated to emissions performance into the ZEV credit system, and a "ramp up" of the overall ZEV target to 16% over the 2009 to 2018 period—appear likely to weaken the program's focus and performance compared to the current ZEV rules.

Other, better options are available. If politics preclude a complete retreat from the electric car mandate, for example, the state could provide increased tax subsidies to the purchasers of electric cars, an action that could reduce emissions increases by moderating price impacts in new car markets and the resulting shift away from new cars. The state could also improve air quality and save consumers money by expanding options for manufacturers to earn credits toward their ZEV obligation by identifying and implementing emissions reductions from any in-state sources that would not otherwise be obligated to make those reductions.

Howard Gruenspecht is a resident scholar at Resources for the Future. He recently served as Director of Economic, Electricity, and Natural Gas Analysis at the U.S. Department of Energy.



# Climate Change Diplomacy: The Next Step

*J.W. Anderson*

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Talks at the world climate conference held this past November in The Hague stalled because the draft treaty on the table—the Kyoto Protocol—tries to do too much too fast. When the talks resume this spring in Bonn, negotiators will need to address deep-seated differences between the United States and Europe about how to implement a broad array of fundamental changes.

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**A**s negotiators work toward the resumption of the world climate conference this May, they will first try to mend the breach between the United States and Europe. The goal is to work out international rules for reducing the emissions of the greenhouse gases that, most scientists now believe, are warming the Earth's climate.

Beneath all the intricate technical issues, this dispute is a collision between deep-seated social traditions. On the American side, there is a strong reluctance to impose rapid and severe cuts on energy consumption, especially by individual consumers. On the European side, there is profound mistrust of the market mechanisms that the Americans propose to reduce the cost and impact of reductions. Developing countries, which form a third bloc, are warily watching this negotiating process to see that it offers them help in coping with climate change without threatening their own hopes of economic growth.

The conference in Bonn this spring will be a continuation of the conference last November in The Hague where, after two weeks of intense discussion, the world's governments were unable to come to agreement. While it has been widely denounced as a failure, the Novem-

ber conference was, in one crucial respect, a success—it kept the negotiating process going.

The decisions on which the Hague talks foundered have only been postponed, for the rise in the global average temperature continues and appears to be accelerating. The negotiators are working under the pressure of accumulating evidence that human activity—chiefly the burning of coal, oil, and gas—is changing the world's climate.

The conference at The Hague broke down—at least temporarily—because the draft treaty on the table, the Kyoto Protocol, tries to do too much too fast. The Kyoto structure would require the efficient operation of international institutions that have not yet been established, under rules that have not yet been written. It would impose rapid and substantial changes in energy use at a cost that no one can clearly foresee.

The purpose of the conference at The Hague was to work out the rules implementing the often vague and general language of the Kyoto Protocol. The precise details of those rules could make huge differences in the way that the Kyoto provisions would actually work and in the impact they would have on both industrial and develop-

ing economies. With those rules remaining in doubt, no major industrial country has yet ratified Kyoto. Supporters of the treaty, especially in Europe, had hoped that this conference would result in the Kyoto treaty's going into force in 2002. That would require ratification by at least 55 countries, including countries that in 1990 produced 55% of the industrial countries' emissions of carbon dioxide, the most important of the greenhouse gases.

The issues in the next round could be somewhat different, for the negotiators will soon have to acknowledge that there may not be enough time, as a matter of practical politics, to meet the goals and timetables set down in the present Kyoto text. As it now stands, Kyoto would impose binding limits on the emissions of industrialized countries beginning in 2008, requiring deep cuts in many countries, including the United States.

As the conference at The Hague ended on a note of dissonance, negotiators told the press that it had been moving toward agreement until, at the last moment, a compromise on "sinks" fell apart. (Sinks are the repositories in which natural processes store carbon; growing plants, including trees, and soils are considered carbon sinks.) This is a puzzling claim, because apart from sinks there is a long list of issues that one party or another considers crucial and that remain unresolved.

### 'Crunch' Issues for Negotiators

In the United States, the Clinton administration has said that it will not send a climate treaty to the Senate for a vote on ratification unless it provides for "meaningful participation" by the larger developing countries. The present Kyoto text puts no legal limits on the greenhouse gas emissions of the developing countries. While there was discussion at The Hague of the developing countries' role, the question of what might constitute meaningful participation never came into focus. Similarly, the Clinton administration has said that it wants explicit rules on international trading of emissions permits before it ratifies, but the trading rules also remain unclear.

Jan Pronk, the Dutch minister of the environment and president of the conference, outlined early in the talks four clusters of what he called "crunch" issues.

The first were the issues of greatest interest to the develop-

ing countries. The Kyoto text promises to facilitate the transfer of clean technologies to them and to provide aid to help them adapt to climate change and develop the capacity to track their own emissions. But the developing countries want to know exactly how much money will be provided and how it will be allocated—by whom and under what conditions. During the conference, the United States and several other countries proposed a new fund of \$1 billion a year to help poor countries cope with climate change, but this idea was never clearly defined.

Even if the Americans and the Europeans had managed to work out an eleventh-hour deal on sinks, the long list of unresolved issues concerning the developing countries would have prevented any final agreement on the Kyoto text.

Pronk's second category of open issues was sinks. The primary question is how much credit a country ought to get for its land use and forestry practices. The dispute here came to dominate the public discussion during the closing days of the November conference. The United States argued that it would need rules giving it wide access to credits for its sinks in order to meet the large reductions from business-as-usual emissions trends that Kyoto would impose. Without those credits for sinks, the U.S. negotiators declared, they would never have agreed to Kyoto in the

first place. But the European governments, and environmental organizations on both sides of the Atlantic, denounced the American proposal as a gigantic loophole that would undercut the integrity of the whole Kyoto regime.

Sinks, the most arcane of the major issues, are well understood only by the specialists. For that reason a disagreement here is, as a matter of politics, more easily repaired than, say, an ideological breach between the developed and developing countries, or a public quarrel between the United States and Europe over what the European Greens see as American consumers' wasteful and destructive habits. (France's President Jacques Chirac tried to open that subject when he addressed the conference, but none of the negotiators pursued it.)

The third cluster in Pronk's list was the Kyoto mechanisms—the trading of emissions permits and the two programs, Joint Implementation and the Clean Development Mechanism, which

While the conference at The Hague was a setback, the longer future looks more hopeful. Throughout the world, public opinion is taking note of the accumulating evidence of global warming.

## RESOURCES FOR THE FUTURE

would permit one country to earn additional emissions permits by investing in reductions in another country. Progress is being made in understanding and developing the technical procedures for these mechanisms, but a number of fundamental policy questions remain unanswered.

Chief among them is the issue of supplementarity—the extent to which a country can buy permits abroad to supplement its domestic action to cut emissions. The Europeans entered the negotiations arguing that, on principle, no country should be allowed to buy permits to cover the bulk of its required reductions. The United States replied that it doesn't see why a country shouldn't buy as much as it wants, if cuts are cheaper overseas than at home. That's another one that remains unresolved.

Pronk's fourth category of "crunch" issues involved compliance—how to measure it and how to enforce it. Here again the November conference supplied no clear answers. Because complying in good faith with the Kyoto targets for emissions reduction will impose substantial costs on industrial economies, quite possibly affecting the terms of international trade, governments are likely to want assurance that their competitors can't simply ignore their commitments.

The Kyoto text makes no provision for enforcement. During the talks, Pronk himself at one point proposed that a country's shortfall in emissions reductions in one five-year commitment period should be added to its reduction target in the next, with a penalty of an additional reduction. But that invites the question why a country, once in default, might not simply continue rolling up shortfalls and penalties or refuse to accept tighter future targets in the negotiations. Until there's a persuasive answer to that question, the U.S. Senate is unlikely to proceed with ratification.

### Changing Circumstances

The high hopes for the November conference—that it could resolve enough of these issues to result in widespread ratification and entry into force of the treaty within two years—were probably unrealistic from the beginning. When the date for the conference was first set, a year earlier, the Americans warned that it would fall in the lame-duck period after the U.S. presidential election. While no one could have foreseen the degree of confusion that in fact followed the election, it would have been a very difficult time for the United States to negotiate effec-

tively in any case. The Europeans brushed those warnings aside and, over American protests, went ahead with a conference as scheduled. It appeared that some Europeans saw the conference as an opportunity for European governments to show leadership and initiative.

That prospect changed suddenly in September, with the furious public protests throughout western Europe to the rising prices of gasoline and oil. Governments were thrown on the defensive. The French government immediately gave truckers a substantial cut in fuel taxes, and, before long, the British promised to do the same. With that, the prospect of any broad surtaxes or restrictions on fuel use evaporated. With neither the Europeans nor the Americans capable of taking the lead in a serious attempt to reduce emissions, the prospects for a comprehensive agreement on climate change began to fade well before the conference opened. The public quarreling among several of the European ministers, as the conference ended, also suggested that any common strategy within the European Union had broken down.

### Looking Ahead

But while the conference at The Hague was a setback, the longer future looks more hopeful. Throughout the world, public opinion is increasingly taking note of the accumulating evidence of global warming. References to warming are becoming frequent in news accounts of storms and droughts, for example. In developing countries, officials are beginning to consider the possibility that a world climate agreement might not be merely a crude attempt to cut off their economic growth, but rather a possible source of help in dealing with the air pollution that is emerging as a major menace to public health.

Progress toward a world climate agreement is likely to be incremental, not the sudden dramatic leap that the Kyoto Protocol's supporters had hoped. But there was some slow progress at The Hague, and there is likely to be more when the conference resumes in Bonn this May. Should a final agreement ever be reached, it is quite likely to be very different from the present Kyoto text. What counts is whether the world can work out a long-term response to a threat that will rise gradually through the coming century.

J.W. Anderson is journalist-in-residence at RFF.



# How Much Will People Pay for Longevity?

*Alan J. Krupnick*

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Cost-benefit analyses having anything to do with air pollution generally show huge benefits, primarily in terms of an individual's willingness to pay to reduce mortality risks, which far outweigh the costs incurred. In a controversial case to be decided this spring, the U.S. Supreme Court will consider whether the U.S. Environmental Protection Agency (EPA) should rely on these analyses to set its air quality standards, among other issues. New research at RFF indicates that individuals, particularly the older ones most at risk, may place a much smaller dollar value on how much they would pay to live longer than has previously been used by EPA.

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**P**rolonging people's lives is arguably the most important outcome from improving air quality and drinking water. Together with morbidity improvements, these effects serve as the primary drivers for many of the major legislative mandates in the United States and Canada, such as the U.S. Clean Air Act and the Canadian Environmental Protection Act. The challenge before policymakers is to strike a balance between potential benefits in terms of lives prolonged (or, equivalently, death risks reduced) and the use of scarce resources to prolong them.

Striking this balance requires not only an estimate of the risk reductions related to reductions in pollution, but also an estimate of the public's preferences for obtaining this benefit, expressed in terms of their willingness to pay for it. Existing methods for determining the value of a statistical life (VSL)—a shorthand expression for the willingness to pay divided by the mortality risk reduction being experienced—have common shortcomings,

according to our research. They tend to focus on the value adults in the prime of their life place on reducing their risk of dying, even though most of the people who benefit from environmental programs are older and/or may be suffering from chronic heart and lung diseases.

The existing methods also tend to focus only on immediate risk changes. When environmental programs reduce exposure to a carcinogen, the costs of doing so are often incurred in the present, whereas cancer-related mortality risks are reduced in the future, following a latency period. What is needed for an effective policy addressing pollutants with latent effects is an estimate of how much people would pay now for a reduction in their risk of dying in the future.

In our research, we aimed to address these shortcomings by focusing on persons 40 to 75 years old to elicit their "willingness to pay" (WTP) for reductions in current and future risks of death. We wanted to determine the WTP for a reduction in death risk in an

appropriate context for pollution, how WTP would vary with age, whether WTP would be influenced by current health status, and how latency would affect WTP.

Our findings yielded interesting and, in some cases, somewhat unexpected results. In general terms, what turns out to matter more than income or educational level in explaining people's WTP was their overall mental health and, specifically, whether or not they were specifically suffering from cancer. If they were in good mental health or had cancer, they were willing to pay more to see their risks reduced; with regard to cancer, respondents would pay substantially more (about 45%). At the same time, other expressions of physical health—and many were included in our survey—were not related to WTP.

Age does not influence WTP until age 70, according to our statistical findings. The 70–75 age group was willing to pay approximately one-third less than the average for a given reduction in annual mortality risk.

Our mean WTP estimates for a reduction in the risk of death over the next 10 years show that the value of a statistical life varies from approximately \$1.2 million to \$3.8 million (1999 C\$), depending on the size of the risk value changed. These figures are 10% to 70% lower than Health Canada's age-adjusted VSL of \$4.3 million (1999 C\$), which was recently used in an analysis of proposed ambient air quality standards, and one-half (or less) the size of the \$7.5 million (1999 C\$) figure used by the U.S. Environmental Protection Agency (EPA).

## Research Methods

The methods for developing empirical estimates of individual WTP for mortality risk reductions may be divided into two groups. Revealed preference studies primarily examine whether more risky jobs come with a higher wage. Stated preference studies rely on survey methods (termed contingent valuation methods) that pose realistic but hypothetical situations to individuals in which they can express their preferences in money terms for these complex effects.

Each approach to measuring WTP has its drawbacks. Revealed preference studies make untested assumptions about individuals' risk perceptions: that is, that risk perceptions correspond to objectively measured risks. Furthermore, it is often difficult to separate objective risk measures from other attributes of the job or product being examined. Stated preference studies are, in principle, capable of testing whether individuals correctly perceive mortality risks or changes in mortality risks.

However, these stated preference studies are not without their own pitfalls: respondents may not understand the risk changes they are asked to value, may not believe that the risk changes apply to themselves, and may lack experience in trading money for quantitative risk changes or lack the realization they are engaged in this activity. The result may be that WTP is found not to vary with the size of the risk change—an essential method of testing whether individuals correctly comprehend risk information that many existing studies omit.

Our approach was to devise and implement a contingent valuation study that would address these problems by:

- developing graphic depictions of risk and a series of education statements to enhance respondent comprehension;
- testing in several ways for respondent understanding of risk and other facets of the survey; and
- providing examples of comparable activities from everyday life, such as obtaining mammograms or colon cancer screening tests, to inform people about how they spend money to reduce death risks in their everyday lives.

## Survey Sample Profile

The survey was administered to 930 people in Hamilton, Ontario, in 1999, by a Canadian survey-research firm. Respondents were recruited by phone through random-digit dialing and asked to go to a facility in downtown Hamilton to participate in the survey. There, they worked on computers with simplified keypads, which were color-coded and specially labeled for use with the survey. Respondents moved through the survey at their own pace. Words on each screen appeared in a large font and there was a voice-over accompaniment.

The goals of the survey were to estimate what older people would pay for a reduction in their risk of dying and to examine the impact of health status on WTP. We sought a target population aged 40 years (the mean age of workers in the wage compensation studies) to 75 years and were able to assemble a sample of people that was very similar to the Ontario population in age, income, and the like.

The average age of the respondents was 54 years, with 31% of the sample above age 60, and 9% above age 70. Although 80% of the sample completed high school, only 20% had completed a university degree. The average household income in the sample was \$54,000 (1999 C\$). Most respondents rated their health as very good to excellent, although 41% reported some chronic respiratory or heart disease. The majority of

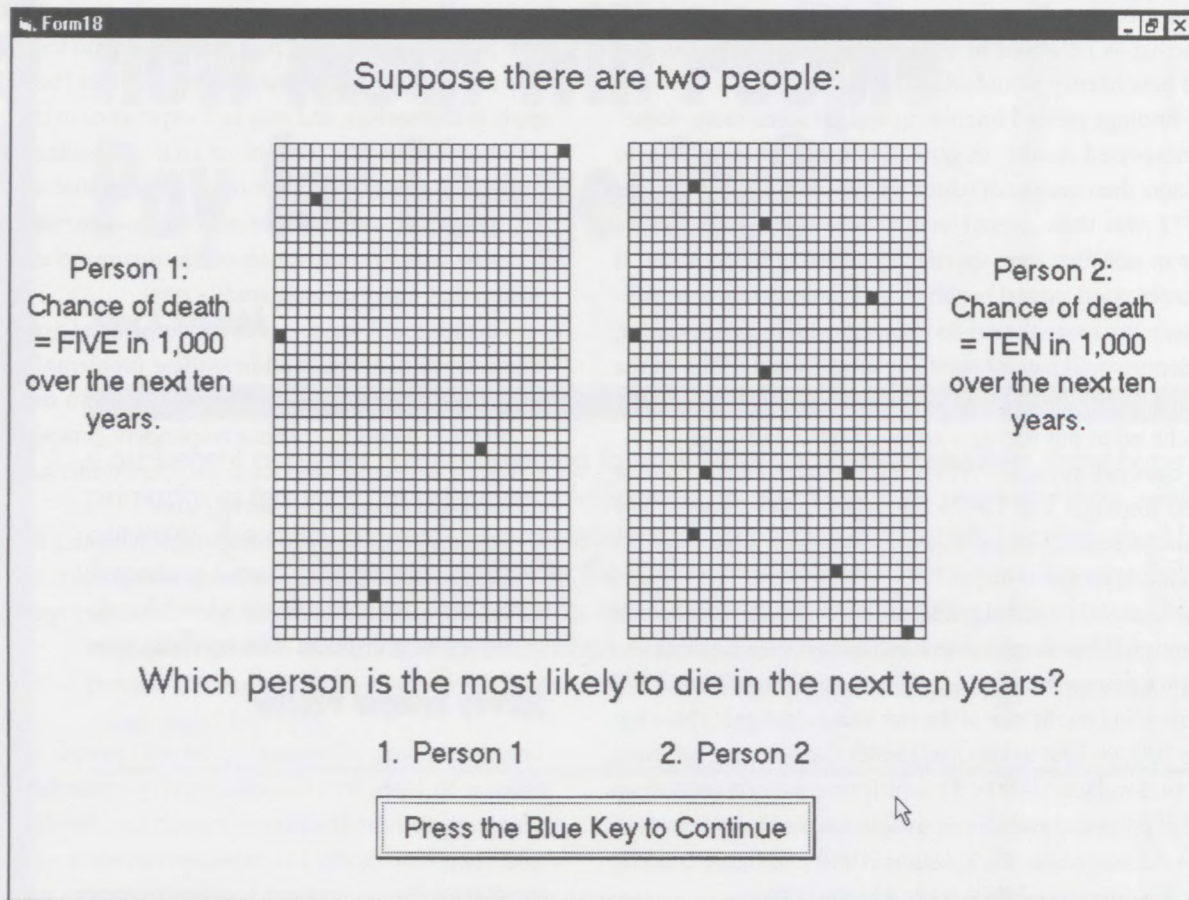


Figure 1. Use of Grids to Represent Probabilities in Mortality Risk Questionnaire.

respondents also described themselves as being in good mental health.

### Survey Structure

Survey development is still more of an art than a science. Our survey instrument was developed over several years and is based on extensive one-on-one interviews, work with many focus groups, and even a 300-person pretest survey administered in Japan. The survey was divided into five parts. Part I introduced the project's sponsors—RFF, Health Canada, and McMaster University in Hamilton, Ontario—and elicited personal information about the respondent, including questions about the respondent's health as well as the health of immediate family members.

Part II introduced the subject to simple probability concepts through coin tosses and roulette wheels. The probabilities of dying and surviving over 10-year periods were then depicted

using a 1,000-square grid. The respondent went through simple exercises to become acquainted with our method of representing the probability of dying. The respondent was then shown two 25 by 40 grids: one for person 1, with 5 red squares (representing death), and one for person 2, with 10 red squares (see figure 1 above).

The respondent was asked to indicate which person faces the higher risk. If the respondent picked person 1, he or she was provided with additional information about probabilities and the question was asked again. The respondent was then asked which person he or she would rather be. Individuals responding "person 2" (the person with the higher risk) were asked a followup question to verify this answer and were given the opportunity to change their answer if they wished. The baseline risk of death for a person of the respondent's age and gender was then presented numerically and graphically.



Part III presented the leading causes of death for someone of the respondent's age and gender. Common risk-mitigating behaviors were listed together with the quantitative risk reductions they achieve and a qualitative estimate of the costs associated with them ("inexpensive," "moderate," and "expensive"). The purpose of this section is twofold. We wanted, first, to acquaint the respondent with the magnitude of risk changes delivered by common risk-reducing actions and products (for example, cancer screening tests and blood pressure medication) and, second, to remind the respondent that such actions have a cost, whether out-of-pocket or not.

Part IV elicited WTP by asking if respondents were willing to pay a given amount and then, depending on their answer, they were given a followup bid to accept or reject. In all, three sets of WTP questions were asked. Respondents were first asked if they were willing to pay for an abstract product that, when used and paid for over the next 10 years, would reduce their current risk of dying over the next 10-year period by 5 in 1,000; that is, by 5 in 10,000 annually. In the second WTP question, risks were reduced by 1 in 1,000; that is, by 1 in 10,000 annually. And in the third WTP question (to those 65 and under), risks were reduced by 5 in 1,000 again, but not until age 70, reminding respondents that they might not be alive to experience this benefit and asking them how likely it was they thought they would live to this age. The first and second questions were reversed for half the sample in order to test formally, and with separate samples, whether the larger risk change resulted in a larger WTP.

The product in question was defined in abstract terms—"a drug or a product not covered by health insurance"—because we found that more specificity resulted in many respondents rejecting the scenarios as not applicable to them. We also made it clear that the risk reductions would be obtained by use of a private good. In practice, most environmental programs reduce mortality risks for all persons in an exposed population—in other words, risk reductions are a public good. However, in order to factor out potential altruism on the part of respondents, it was necessary to focus only on private WTP. To the extent that it is appropriate to consider altruism—a complicated issue—our estimates are biased downward, but no more so than the existing estimates commonly used by EPA and others.

Part V included an extensive series of debriefing questions, followed by some final questions regarding education and household income. The debriefing questions were used to identify respondents who had trouble comprehending the survey or did

not accept the risk reduction being valued. The computerized survey was then followed by a standard 36-question, pencil-and-paper survey addressing the respondent's physical and mental health in detail and permitting the construction of standardized physical and mental health indexes for use in explaining why WTP varied across individuals.

## Conclusion

One key measure of the success of a contingent valuation study like this one is that, when different groups of respondents are asked to value risk changes of different magnitudes, WTP increases with the size of the risk change. Our research shows that the size of the risk reduction has a strong influence on WTP. Mean WTP for an annual reduction in risk of death of 5 in 10,000 is about 1.5 times the WTP for an annual risk reduction of 1 in 10,000. WTP, therefore, is sensitive to the size of the risk reduction but not strictly proportional to it (median WTP is closer to changing proportionally with risk). This lack of proportionality means that the VSL also varies with the size of the risk change, raising a question as to which VSL is appropriate in any given case.

Indeed, the overarching technical conclusion of our study is not only that the VSL may be lower than that in use for pollution-related benefit-cost analyses, but also that different VSLs may be appropriate in some circumstances regarding the age and health of affected populations. The lack of an effect of physical health status on WTP (with the possible exception of the presence of cancer) suggests that any potential proliferation of VSLs may be limited.

In terms of public policy, we would conclude that benefits of air pollution reductions, which do not have a cancer effect and affect primarily an older population, are being significantly overestimated in the United States and possibly in Canada, as well as in other countries that rely on the current literature or mimic U.S. practice.

Alan J. Krupnick is the director of RFF's Quality of the Environment Division and a senior fellow. This article is adapted from a longer article he co-authored with Anna Alberini, Maureen Cropper, Nathalie Simon, Bernie O'Brien, Ron Goeree, and Martin Heintzelman. "Age, Health, and the Willingness to Pay for Mortality Risk Reductions: A Contingent Valuation Survey of Ontario Residents" can be found on the RFF Web site, at [www.rff.org/disc\\_papers/PDF\\_files/0037.pdf](http://www.rff.org/disc_papers/PDF_files/0037.pdf).

Funding for this project came in part from Health Canada, the umbrella federal agency focusing on health policy and disease prevention, and from a grant program run jointly by EPA and the National Science Foundation.



## INSIDE RFF

### RFF Welcomes Three New Board Members

At the October Board of Directors meeting, RFF elected three new members: Dod A. Fraser, James F. O'Grady, and Roger W. Sant.

**Dod A. Fraser** currently acts as an adviser to environmental, educational, arts and cultural, and educational institutions in the nonprofit sector. Previously, he was the managing director of the Global Oil and Gas Group of Chase Securities, Inc., where he was responsible for shifting the focus of the business from solely commercial banking to full-service investment banking.

Fraser also worked at Lazard Frères and Co., first as a generalist investment banker and then as a merger-and-acquisition specialist for oil, gas, and natural resource clients. During his 17 years with the company, he also established and ran Lazard's first capital markets group.

Fraser also held positions in Lehman Brothers, Inc., as vice president, and in Bankers Trust Co. as assistant treasurer. In

addition, he served on the board of directors of Forest Oil Corporation and was a member of the National Petroleum Council, an advisory committee to the U.S. Secretary of Energy. Fraser received his B.A. in art and archeology from Princeton University.

**James F. O'Grady** is the president of O'Grady & Associates, a media brokerage and consulting firm located in Vero Beach, FL. He brings to RFF more than 40 years of experience in the legal, financial, and operations aspects of the radio, television, and cable industries. He has had ownership stakes in over 20 radio stations and three television stations.

O'Grady has served on the board of directors of SFX Entertainment, Inc.; the Insurance Broadcast System, Inc.; and Orange and Rockland Utilities, Inc. He has held positions as managing director for the Coalition for Lithuanian Development, counsel for John A. Cahill, Esq., and co-owner of Allcom Marketing Corporation.

O'Grady received his L.L.B., J.D., and B.A. from St. John's University.



*Roger W. Sant*

**Roger W. Sant** is the chairman of the board of the AES Corp., which he cofounded in 1981. AES is a leading global power company comprised of competitive generation, distribution, and retail supply businesses all over the world.

Sant also chairs the board of the Summit Foundation and is a board member of Marriott International, World Wildlife Fund-International, and the National Symphony. He is co-author of *Creating Abundance—America's Least-Cost Energy Strategy* (McGraw Hill 1984) and has written numerous articles and publications on energy conservation.

Prior to founding AES, Sant was the director of the Mellon Institute's Energy Productivity Center and a political appointee in the Ford administration. He received a B.S. from Brigham Young University and an M.B.A. with distinction from the Harvard Graduate School of Business Administration.



*Dod A. Fraser, left, and James F. O'Grady, right*

STYVA JOHNSON PHOTOGRAPHY



### Honors and Awards

The American Association for the Advancement of Science (AAAS) has recently awarded **Terry Davies**, a senior fellow and former director of RFF's Center for Risk Management, the distinction of Fellow for his "distinguished contributions to the use of science and analysis in environmental policy and to its scholarly evaluation and reform." The AAAS Fellows distinction, a tradition started in 1874, honors those individuals whose work has contributed significantly to the advancement of science.

Senior Fellow **Kate Probst** has been appointed to the Environmental Management Advisory Board, a team of committees that provides recommendations to the U.S. Department of Energy's Assistant Secretary for Environmental Management on a broad range of issues, including cleanup criteria and risk assessment, land use, management effectiveness, cost-versus-benefit analyses, waste management, and long-term stewardship. The advisory board is comprised of experts from tribal nations, state and local governments, environmental and citizen activist groups, labor organizations, industry, and the scientific and academic communities.

The American Agricultural Economics Association (AAEA) gave RFF Fellow **James Sanchirico** and James Wilen, Professor at the University of California at Davis's Department of Agricultural and Resource Economics, with honorable mention, the 2000 Quality of Research Discovery Award for their paper, "Bioeconomics of Spatial Exploitation in a Patchy Environment," which was published in the *Journal of Environmental Economics and Management*, volume 37. Sanchirico and Wilen's work was considered "highly original, timely, and forward looking." The

award is given to members of AAEA for excellence in publications in all areas of agricultural economics.

Senior Fellows **Richard Morgenstern** and **Winston Harrington** and Research Associate **Peter Nelson** received the Vernon Prize from the Association of Public Policy Analysis and Management for the best article of the year published in the *Journal of Policy Analysis and Management*. The Vernon Prize Committee chose their article, "On the Accuracy of Regulatory Cost Estimates," because it "helped to clarify the issues in a long-standing debate about whether regulatory agencies typically overestimate the costs of complying with new standards. . . . Future discussions of this issue will need to take their contribution into account."

The Policy Studies Organization has awarded RFF Fellow **Thomas Beierle** the Jeffrey Pressman Award for the best article published in *Policy Studies Review* in 1999. His article, "Using Social Goals to Evaluate Public Participation in Environmental Decisions" describes a way to evaluate public participation programs based on social goals, such as educating the public, incorporating public values into decisions, increasing the substantive quality of decisions, resolving conflict, and building trust. According to the Jeffrey Pressman Award's judges, Beierle presented an innovative way of looking at participation with a good balance between theoretical underpinnings and practical utility.

### Summer Internships

RFF is now accepting applications for its 2001 summer internships. Approximately a dozen students will be selected to work directly with RFF researchers on a variety of ongoing projects and assist in develop-

ing new areas of research and policy analysis. A modest stipend will be offered for an average 10-week assignment.

RFF seeks candidates in the social or natural sciences with policy analysis experience, excellent writing skills, and an interest in environmental policy problems that lend themselves to interdisciplinary analysis. Two of RFF's research divisions, Energy and Natural Resources and Quality of the Environment, additionally require a strong background and an interest in microeconomics and quantitative methods. The Center for Risk Management (CRM), RFF's third research division, seeks students with a strong interest in environmental policy and experience in policy analysis.

Applicants may apply to one or more RFF divisions by submitting the following materials: cover letter describing interests, resume, academic transcript, and letter of recommendation sent directly by a faculty member. Applicants should specify which division they are applying to in the cover letter. Students applying to CRM should also send a brief writing sample.

Internships run from June 4 through August 31. All materials can be faxed to 202-939-3460 or mailed to: Resources for the Future; Summer Internship Program; 1616 P Street, NW; Washington, DC 20036. All materials should be post-marked or faxed by 5:00 p.m., **March 15**. For more information, see our website outlining some of the projects that interns may be working on this summer: [www.rff.org/about\\_rff/internships.htm](http://www.rff.org/about_rff/internships.htm).

### China Program

RFF is offering a paid internship for graduate students with a special interest in Chinese environmental issues to work with RFF researchers on a variety of ongoing



## INSIDE RFF

projects or to assist in the development of entirely new areas of research and policy analyses. Candidates for the **Walter O. Spofford Jr. Memorial Internship**, named to honor the late RFF researcher who helped launch RFF's China Program, should have outstanding policy analysis and writing skills. Highly motivated candidates in their first or second year of graduate training in the social or natural sciences are preferred.

Students wishing to apply for the Spofford Internship should send a cover letter describing their areas of interests, a resume, and a recent transcript. One letter of recommendation from a faculty member should be sent directly by the professor to RFF. All materials can be faxed to 202-939-3460 or mailed to: John Mankin, Coordinator for Academic Programs; Resources for the Future; 1616 P Street, NW; Washington, DC 20036. Applications must be postmarked or faxed no later than **March 9**.

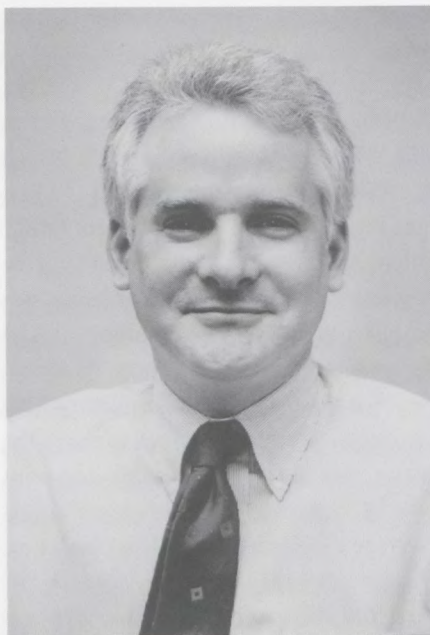
### Halperin Joins RFF as Director of Communications Planning and Strategy

Jonathan J. Halperin has joined RFF as Director of Communications Planning and Strategy. With a background in international business and research, as well as the nonprofit sector,

Halperin comes to RFF after 13 years as the head of FYI Information Resources, a strategic research and communications firm serving western business clients in the former Soviet Union. He has provided strategic counsel to leading multinational firms in the water, food and beverage, and oil and gas sectors.

Halperin's public policy experience includes service with a number of non-

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*Jonathan J. Halperin*

profit organizations, including the New York-based Public Agenda Foundation and the Committee for National Security in Washington, DC. Author or co-author of hundreds of client reports and op-ed articles and a frequent speaker at professional and trade association conferences and workshops, Halperin has served as an expert source for journalists for many years.

RFF President Paul Portney welcomed Halperin, noting, "his years of entrepreneurial and strategic communications experience will help us dramatically increase RFF's impact. It is not enough to know the questions to ask, or even know some of the answers. To be effective, we all have to communicate powerfully by reaching the right people, at the right time, with the best analysis. With Halperin now part of the RFF team, that's what we'll be doing."

In addition to his responsibilities as part of the senior management team at RFF, Halperin maintains research and policy interests in the oil and gas sector, in emerg-

ing technologies, environmentally sustainable industrial practices, and food-chain safety and security issues.

Halperin's published works (with co-authors) include *The Other Side: How Soviets and Americans Perceive Each Other*; *SIBD: The Soviet Independent Business Directory*; *Difficult Choices on Environmental Protection*, and numerous manuals, guides, and reports.

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For more information, please contact  
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## Fall Council Meeting Explores Energy Issues

RFF recently brought together leaders from business, government, and the environmental advocacy community for a daylong event on environmental regulation, fuel use, and the availability of natural gas. Participants at the RFF Council's annual fall meeting included Kenneth Lay, chairman and chief executive officer of Enron Corporation, and Victoria Tschinkel, senior

consultant at Landers & Parsons in Tallahassee, FL.

At the first of two panels, David Hawkins, director of the Natural Resources Defense Council's air and energy program, and James Hendricks, vice president, environment, health, and safety for Duke Energy, offered their perspectives on the environmental constraints on coal as a primary fuel for

electricity generation. They also addressed how proposed legislation that would establish new limits on emissions of four pollutants from coal-fired power plants—nitrogen oxides, sulfur dioxide, mercury, and carbon dioxide—could lead to a shift away from coal and an increase in the use of natural gas for power generation. Comments made by the panelists sparked further debate on the ways in which fuel choices made by electric utilities are influenced by federal environmental regulations.

During the second panel, R. Skip Horvath, president of the Natural Gas Supply Association, offered his view of the major obstacles facing utilities that are shifting an increased share of generation capacity to natural gas. Respondents Catherine Abbott, chief executive officer and president of Columbia Gas, and former investment banker Dod Fraser provided key insights into how financial, environmental, and political constraints could limit the availability of natural gas and/or make it significantly more expensive, inhibiting utilities' shift to natural gas for an increased share of generation. A reception and dinner followed the day's event during which Kenneth Lay gave an insightful presentation on the evolution of Enron as a modern energy company.



*Kenneth Lay, left, and Vicki Tschinkel, right*



*Dod Fraser, left, and Catherine Abbott, right*



*David Hawkins*

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The generous financial support of our many donors and contributors enables RFF to fulfill its mission to improve environmental and natural resource policymaking worldwide through objective social science research. We are honored to recognize the many generous benefactors for their contributions in 2000. Additionally, we would like to extend a special thank you to the members of the RFF Council, those individuals and corporations that provided significant financial support to RFF this past year.

Council membership is extended to those organizations that provide \$25,000 annually and to individuals who contribute at least \$5,000 annually to RFF. Members receive complimentary copies of all RFF publications and invitations to both public and members-only events, including the semi-annual Council meetings. Beyond regularly scheduled events, Council members meet informally with RFF staff members on issues of importance to their business and civic interests and participate on RFF advisory boards. If you would like more information on the RFF Council and how you can become involved, please contact Russell Ray at 202-328-5154 or ray@rff.org.

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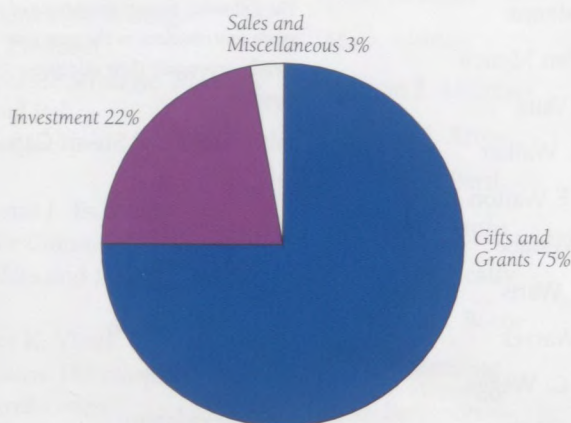
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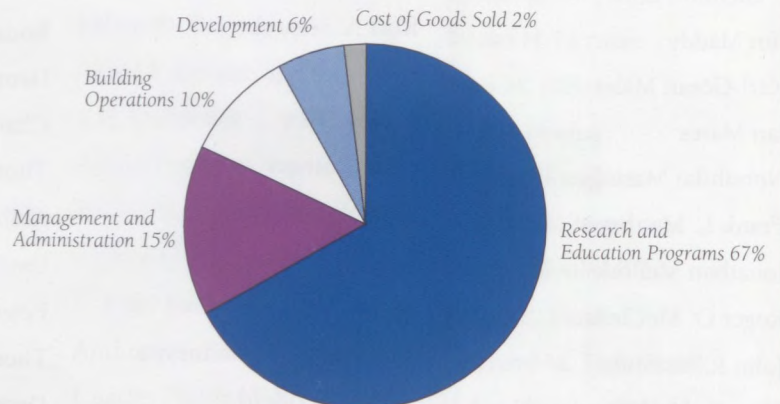
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*RFF research and education programs continued to grow in 2000, representing two-thirds of the total expenses. Management and administration, and development expenses combined were only 21% of the total. The remaining 13% was allocated to building operations and the cost of goods sold, which includes RFF Press operations.*

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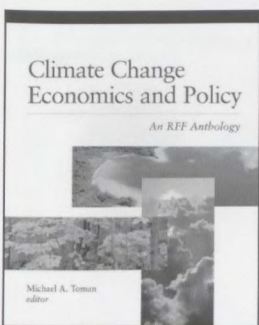
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