THE COSTS OF KYOTO

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Climate Change Policy and Its Implications

edited by Jonathan H. Adler

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TABLE OF CONTENTS

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– J.H.A.
October 1997

INTRODUCTION

Jonathan H. Adler

In December 1997, world leaders will meet in Kyoto, Japan, to consider an international treaty on global warming. President Bill Clinton and British Prime Minister Tony Blair, among others, are calling for a treaty that will establish strict limits on emissions of carbon dioxide and other greenhouse gases for every nation on earth. While there is pressure to impose lesser requirements on developing nations, President Clinton has stated his clear intent to sign a global treaty. The decision whether or not to adopt this course will have profound economic and social implications. Indeed, the Kyoto meeting may turn out to be the most significant international economic gathering since Bretton Woods.

The Clinton Administration and western environmental groups are pushing hard for a treaty. In the past year, they have seized upon recent weather extremes to promote the fear of global warming. Speaking to flood victims in North Dakota, President Clinton remarked, "We do not know for sure that the warming of the earth is responsible for what seems to be a substantial increase in highly disruptive weather events; but many people believe that it is . . ." Assistant Secretary of State Eileen Claussen, who coordinated global warming policies for the administration, echoed this concern: "We can expect that a continued warming of the Earth's atmosphere is likely to result in much more . . . extremely severe weather."

The Kyoto meeting may turn out to be the most significant international economic gathering since Bretton Woods.

At the 1997 United Nations "Rio plus 5" meeting, President Clinton promised to step up efforts to "educate" the American public about this "critical" policy issue. This prompted Senator Larry Craig (R-ID) to warn, "We must all be prepared for an invigorated propaganda barrage from this Administration" designed to scare the American people into accepting an international treaty. Thus, the Administration has sponsored a series of local briefings on climate change in cities around the country to convince Americans that the threat from global warming is real. It also is urging television weathercasters nationwide to incorporate warming predictions into their local weather forecasts ("Tomorrow will be partly cloudy with a chance of showers with a high of 65; fifty years from now things might be hotter").

The view taken by the Administration, and indeed by most advocating international limits on greenhouse gas emissions, is that the only question is whether

human activity is impacting the global climate. If so, it is a foregone conclusion that the world must take forceful action to reduce greenhouse gas emissions by limiting the use of carbon-based fuels — oil and coal today, natural gas tomorrow. The world must kick its fossil fuel habit. That such policies might pose risks of their own, risks that rival those posed by human-induced changes in the climate, is rarely a concern. These risks — economic, social, and environmental — are the potential costs of Kyoto.

Where Things Stand

The primary basis for global warming forecasts is found in the global circulation models, highly complex computer programs that seek to simulate atmospheric changes. As these models have become more accurate at estimating present temperatures, they have also forecast less extreme temperature rises due to the accumulation of greenhouse gases. Based upon the models' findings, the United Nations' Intergovernmental Panel on Climate Change (IPCC) predicts a warming of 0.8 to 3.5 degrees C by the year 2100. This is significantly less warming than predicted in the apocalyptic scenarios with which we are all too familiar. Indeed, the IPCC's lower-bound warming estimate is just over half that predicted just a few years ago.

As the models improve they predict less warming and new uncertainties are revealed. In May, *Science*, America's most prestigious scientific journal, published a news story, "Greenhouse Forecast Still Cloudy," highlighting the raft of uncertainties that remain in predictions of global warming.[1] The article concluded that "most [computer] modelers now agree that the climate models will not be able to link greenhouse warming unambiguously to human actions for a decade or more." One month later, the *Bulletin of the American Meteorlogical Society* published a paper suggesting that computer models may be misrepresenting the effect of water vapor feedbacks within the climate system.[2] Then, *Nature* made headlines by publishing a study suggesting that global warming poses little threat to polar ice caps. Indeed, the report suggested that some ice shelves should expand, not melt, if the earth warms.[3]

The more that is known, the less it seems that humans have to fear from global warming. The indications are that a warmer world would be far more benign than previously imagined. Scorching summers, produced by an increase in daytime highs, would have far different effects on human and other life than a wintertime warming that occurs mostly at night. Yet a recent study found no indication that global warming would produce killer heatwaves in urban areas, environmentalist claims notwithstanding.[4] Nighttime warming should lengthen growing seasons, at the same time that increased levels of CO_2 accentuate the growth of plants. A rise in soil moisture levels is more likely to occur than a rise in severe droughts.

Some fear that global warming will trigger an onset of severe storms. Hurricanes, for instance, are caused, in part, by increases in ocean temperature. Whether the oceans warm along with the atmosphere, and to what extent, will have a real impact on what an enhanced greenhouse effect would bring with it. Scientific reviews of storm data cannot find any correlation between warmer temperatures and

increased hurricane activity. If anything, the existing data shows a slight decline. According to Dr. Robert Balling of Arizona State University, "the observational and theoretical evidence argues against a linkage between greenhouse gases, global warming and the intensification of hurricane activity."[5]

Obviously, any changes in weather patterns could well prove disruptive, as are all unforeseen global changes. But then the human capacity for adaptation must also be considered, particularly because unforeseen changes are the climatic norm, not the exception, irrespective of human activities. There is no guarantee that placing the modern civilization on a low-energy diet will make the world a safer place.

Pursuing the Safest Course

The real question facing the world's people is not "is warming real?" but "what, if anything, should be done about it?" Future events will always be indeterminate, and given the magnitude of human activity, this means there will be uncertainty about the impacts of civilization. Natural disasters will strike randomly whether modern industrial society contributes to climatic changes or not. Even the most sophisticated computers will be unable to forecast future events with anything approaching certainty. What then is the proper policy response to *uncertainty*?

Climatologist Stephen Schneider of Stanford University, a prominent advocate of taking significant steps to reduce the emission of greenhouse gases, compares the policy question to placing a high stakes bet. Given the potential for dramatic global changes due to greenhouse warming, Schneider decries delaying action as the equivalent of betting one's whole life savings. Even if the odds are in your favor, Schneider claims, you should not make the bet if you cannot afford to lose. This construction is compelling, as it is surely meant to be. It is also wrong.

The analogy of a bet suggests that there are no risks associated with mandated energy conservation policies. Refusing to gamble, in Schneider's view, is accomplished by seeking to stabilize, if not reduce, atmospheric levels of CO_2. But this will require drastic reductions in greenhouse gas emissions in the industrialized nations, and a limit on increases in the rest. Merely leveling off global greenhouse gas emissions at 1990 levels, as some have proposed, will not do the trick. Rather, the world will have to face severe limitations on the use of energy, particularly that generated from fossil fuels. Discussions of alternative energy sources are all fine and good, but the reality is that most alternative energy sources are not ready for prime time.[6] On the whole, they are more expensive and less reliable than their carbon-based counterparts. Solar and windpower, traditional green favorites, are not yet up to the task of powering a modern society. Nuclear power plants do not result in greenhouse gas emissions, but it is unlikely that they will become the environmentalists' energy source of choice, and hydropower, despite its potential for serving energy needs in the developing world, is on the outs. Environmentalists insist that China must find alternatives to its abundant coal reserves, but vehemently oppose proposed hydropower alternatives.

Nonetheless, many insist that reducing the use of carbon-based fuels can be

achieved at little to no cost.[7] Some even argue that it will produce a profit — as if they believe that if only the right analysts look carefully enough, they will find hundred-dollar bills strewn across the sidewalks, providing the opportunity to prevent global warming while ensuring global prosperity. Such analysts inhabit an economic fantasyland, in which government planners can radically reorganize human affairs without causing severe pain and discomfort. That is not the world we live in.

Energy is the lifeblood of industrial civilization. Because carbon-based fuels are the most economical and abundant energy source, now and in the foreseeable future, the global economy relies upon their use. To paraphrase George Orwell, our civilization is founded on fossil fuels. Changing this state of affairs through taxes, quotas, or other regulatory measures cannot but entail a wrenching transformation of the global economy, indeed of industrial civilization itself. Government-mandated changes in economic behavior *always* entail costs. Market transactions occur when parties seek mutual advantage through exchange. Inhibiting such transactions is costly, even if it serves some other valuable social end. No one is served by pretending that such policies can be enacted cost-free.

Despite the costs, some see cutting the emission of greenhouse gases as a form of insurance against a potential greenhouse world. Here the question is, "what do the costly insurance premiums buy?" If the IPCC draft projections are to be taken seriously, then one must accept that much of the potential warming over the next century is *a fait accompli*. Lowering greenhouse gas emissions will not prevent warming; at most it will modestly reduce the predicted temperature rise over the next century. More importantly, current projections suggest that there is little cost from delay. Accepting the models, the projected temperature in the middle of the next century will scarcely be affected if policies are enacted now, or if they are enacted a decade or more later, when scientists will presumably have a clearer picture of the climate system and human impacts upon it.

As the value of a proposed insurance policy diminishes, and the cost of the premium increases, fewer will consider purchasing a policy a sound investment. Insurance in the form of choking off greenhouse emissions will come at tremendous cost. But if purchased today, it will provide only modest benefits, assuming that the results of global warming will be all bad. When one also considers the potential for adaptation and benefits like the increase in agricultural productivity that higher carbon dioxide levels produce, it is possible that effects of global warming will be a wash. On the other hand, reducing economic activity by choking off its lifeblood — energy use — will have real adverse consequences. Health is a function of standards of living; so too is environmental protection. Wealthier *is* healthier. Limiting economic activity can therefore have a dramatic impact on the quality of life.

The arguments for dramatic greenhouse gas reductions are all variants of the precautionary principle, essentially that it is better to be safe than be sorry. If only it were that simple. It is true that economic growth and technological advance pose environmental risks. But stagnation is hardly a safer course. In the words of the late Aaron Wildavsky, "the results of doing too much can be as disastrous as

doing too little." In the case of global warming, it is certain that effective emission reduction strategies will impose significant costs. However, the costs associated with inaction are speculative, the latest IPCC reports notwithstanding.

Policymakers should pursue the "safest" course. But it would be wrong to assume that this always means increased government action. In some cases the "safer" course is simply to maximize societal resiliency. The proper prescription in this instance is not greater government controls on economic activity, but fewer. Economic growth, market institutions and technological advance are the most automatic forms of insurance that a civilization can have. In the debate over the proper global warming policy, the burden of proof still rests with those who would divert societal resources to guard against an uncertain future.

The Costs of Kyoto

To clarify these concerns, the Competitive Enterprise Institute hosted "The Costs of Kyoto," a conference on global climate change policy and its implications on July 15, 1997. The conference examined the economic and social implications of climate change policies, and reviewed how such policies are developed. A premium was placed on the real world impacts of climate change policy, both in the United States and abroad, and on the trade-offs inherent in environmental policy. The papers in this book are based upon presentations from the conference.

The first half of the book focuses on the "costs," economic and otherwise, of adopting greenhouse gas emission limitations. The two sections address domestic and global impacts of emission reductions, respectively, though there is obvious overlap. Wilbur Steger of CONSAD domestically, and Brian Fisher of ABARE and David Montgomery of Charles River Associates internationally, present the findings of their economic research. All three conclude that the impacts of such limitations will be severe both at home and abroad. Frances Smith of Consumer Alert and Eugene Trisko of the United Mine Workers of America consider these assessments and clarify their impact for real people. They explain why the impacts of emission reduction policies go beyond a drop in GDP to directly affect the lives of consumers and workers. UCLA's Deepak Lal examines how greenhouse policies could mortgage the economic future of people in the developing world. As CEI President Fred L. Smith, Jr. remarks, an energy starved world could become a world of starving people.

The second half of the book focuses on how policy is developed and what considerations are — or should be — included. Part III assesses the use of science in the policy debate, pointing out that uncertainties remain within the science despite the claims that all scientific debate is over. Roy Spencer, a senior scientist at NASA, provides his view of what is, and is not, known about humanity's impact on the climate. David Murray of the Statistical Assessment Service assesses how uncertainty is portrayed in the media, and he finds a definite predilection toward emphasizing the threat of climate change. Part of the explanation for this may be found in the incentives faced by the scientists themselves, which is the focus of the chapter by Roger Bate of the Institute of Economic Affairs.

The final section considers how policymakers should approach issues of such magnitude and uncertainty as climate change. Robert Crandall of the Brookings Institution suggests that economists place too much emphasis on how to implement policies "efficiently," through "market mechanisms" of some kind or other, rather than questioning whether a policy is worth doing at all. Oxford University professor Wilfred Beckerman adds a discussion of the precautionary principle, pointing out that "better safe than sorry" is not always safer. Finally, Fred Smith wraps things up with a discussion of how to account for trade-offs and uncertainty in policy development. All of the authors suggest that the global warming policy discussion needs to be much broader than it has been to date.

The conference was held because the conventional framing of the climate change debate is not only detrimental to sound policy making, it is fundamentally flawed. Climate change may well pose some threats, but so does climate change *policy*. A wealth of economic literature conclusively demonstrates that wealthier is healthier and poorer is sicker. Rising sea levels are certainly a concern in Bangladesh, but so is the risk that curbs on energy use will forever condemn the peoples of less-developed nations to lives of poverty and despair. Environmental policies that restrain economic development inherently pose a threat to human health and well-being. This does not necessarily mean that global warming policies are not worth considering. Rather it suggests that the case for dramatic policy measures is less clear than is suggested in most policy discussions.

As Senator Chuck Hagel (R-NE) commented at the conference, "how our nation addresses global warming will prove to be one of the most significant decisions that we make over the next few years because it will affect our lifestyles, our standard of living, our economy, our jobs, and our growth. We need to come at this based on good science and common sense. We should not rush headlong into these things until we're sure we have a problem and then fully explore that problem and understand and be aware of the consequences."

Notes

[1] Richard Kerr, "Greenhouse Forecasting Still Cloudy," *Science*, May 16, 1997.

[2] Roy W. Spencer and William D. Braswell, "How Dry Is the Tropical Free Troposphere? Implications for Global Warming Theory," *Bulletin of the American Meteorlogical Society*, Vol. 78, No. 6, June 1997.

[3] K.W. Nicholls, "Predicted reduction in basal melt rates on an Antarctic ice shelf in a warmer climate," *Nature*, July 31, 1997.

[4] Thomas Karl and Richard Knight, "The 1995 Chicago Heat Wave: How Likely Is a Recurrence?" *Bulletin of the American Meteorological Society*, Vol. 78, No. 6, June 1997.

[5] Robert Balling, "Calmer Weather: The Spin on Greenhouse Hurricanes," Competitive Enterprise Institute, May 1997.

[6] See Robert L. Bradley, Jr., "Renewable Energy: Not Cheap, Not 'Green,'"Cato Institute *Policy Analysis* No. 280, August 27, 1997.

[7] See, for example, *Energy Innovations: A Prosperous Path to a Clean Environment*, (Washington, D.C.: Alliance to Save Energy, American Council for an Energy-Efficient Economy, Natural Resources Defense Council, Tellus Institute, and Union of Concerned Scientists, 1997).

PART I

DOMESTIC ECONOMIC IMPACTS

1. TRANSITIONAL ECONOMIC IMPACTS OF CLIMATE CHANGE POLICIES

WILBUR STEGER AND FREDERICK RUETER

In considering the domestic economic impacts of policies to reduce greenhouse gas emissions, there are three subjects to consider: current research on the economic consequences of dramatic emission reductions, including their regional, sectoral, and employment impacts; improving the analytic methods for estimating these consequences; and finding good institutional approaches to developing socially, politically, and technically credible economic impact estimates. This paper seeks to address these three issues. It is not the "last word," certainly, but paints a picture of current (1997) analyses of regionalized economic impacts from climate change policies and how such analyses might evolve.

Where We've Been

Five years ago, CONSAD produced its first climate change economic impact study, *Jobs-at-Risk: Short-Term and Transitional Employment Impacts of Global Climate Policy Options*.[1] This study was sponsored partially by private sector associations interested in public policy affecting the use of energy resources and their transportation. In that report — despite the acerbic scientific controversy over the existence, magnitude, and causes of reputed global warming — we evaluated a number of policy proposals which had been advanced in both the world and national communities to stabilize, and subsequently reduce, the levels of carbon dioxide and other greenhouse gases.

Job losses would be accompanied by adverse economic conditions.

CONSAD's 1992 study estimated the impacts on U.S. domestic employment and output from a significant carbon tax or equivalent alternatives which were believed to have similar impacts. More specifically, the study identified a variety of short-to-longer-term effects of such policies on employment in specific industries, disaggregated to state-by-state levels based on where those industries are located. These impacts represented a range of employment consequences, including job losses, lower wages, underemployment, and diminished job security.

This early report arrived at the following conclusions regarding the economic impacts of a substantial, phased-in carbon tax proposed in the early 1990s:

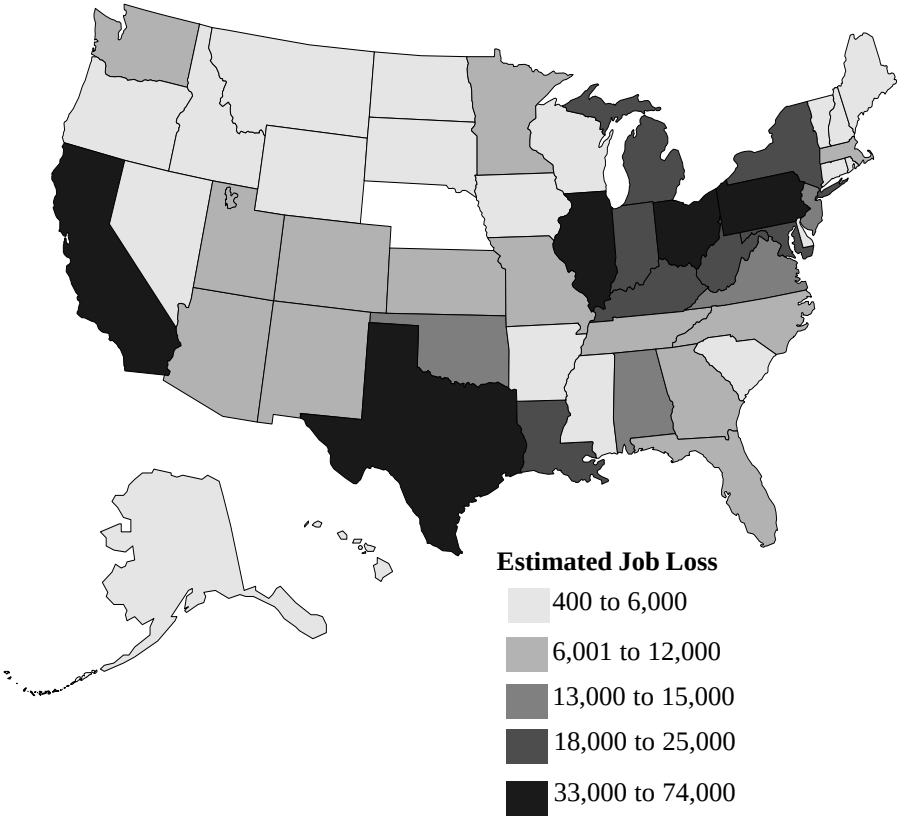
Job losses would be substantial. In the short run — the first three to five years — resulting job losses in directly affected industries would range from 240,000 to 360,000, and would be accompanied by adverse economic conditions, including high inflation, resembling the energy price shocks of the 1970s. By the year

2000, the decrease in directly affected employment in that year could reach 600,000 or higher, depending on the magnitude of the carbon tax, and, in the longer run — beyond the year 2000 — job losses could rise beyond 1.6 million.

The jobs of nearly five million workers employed in vulnerable industries would be at *substantial* risk during the first several years. In addition to an increase in the jobless, substantial numbers of other workers would experience tangible adverse changes in their terms of employment: reductions in wages and hours worked, increased frequency and duration of layoffs, and diminished prospects for job growth.

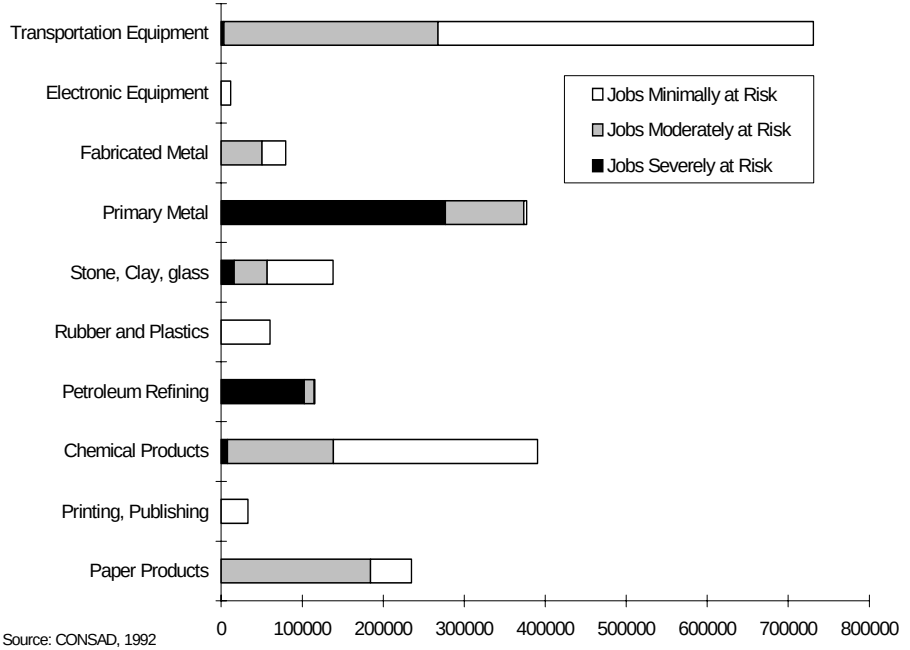
Job consequences would vary among states and industries. Those states most likely to experience the largest declines in employment were: California, Illinois, Ohio, Pennsylvania, and Texas, and to a slightly lesser degree, Indiana, Kentucky, Louisiana, Michigan, New York, and West Virginia (see Exhibit 1). Industries with less than five percent of the nation's employment would incur more than 30 percent of the decline in employment; these included coal, metal mining, and oil and gas extraction. The probability that workers in these industries would

Exhibit 1: Estimated State Job Loss in the Intermediate Term



Source: CONSAD Research Corporation, 1992

Exhibit 2: Distribution of Manufacturing Sector Jobs Directly Affected by Carbon Tax -- By Industry (1992)



Source: CONSAD, 1992

lose their jobs was estimated to be 8.5 times greater than in the remainder of the economy. Other vulnerable industries were utility and transportation services, as well as a number of manufacturing industries (see Exhibits 2, 3 and 4).

Alternatives to a carbon tax would have even greater adverse effects on employment. Alternative policies under discussion at the time, such as "command-and-control," "technological fixes," or enforced "voluntary" time tables, were seen as causing at least as much job loss and jobs-at-risk as would occur with an equivalent carbon tax.

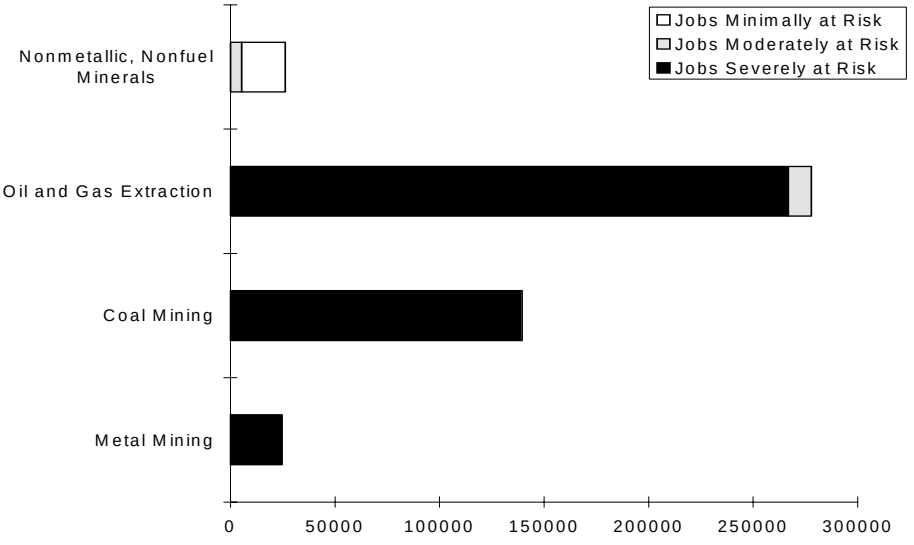
Some jobs would be created, but the number was seen to be meager compared with the losses, and they were to be experienced in different occupations, sectors, and regions. While substantial job losses were to occur among "blue collar" manufacturing workers, the relatively small number of job gainers would principally be scientists, engineers, and skilled technicians involved in technology development.

Lasting Policy Impressions

Subsequent research, discussed below, has *not* changed several "policy impressions" left by the earlier study. These impressions are:

- **The economic and social costs of achieving short-run CO_2 emission reductions are extremely high**. CO_2 emitted into the earth's atmosphere will reside there for an extended period (one or two centuries) before it is fully assimilated. Therefore and most importantly, no appreciable advantage is gained by achieving the reductions early in the period rather than deferring them until later in the period. Given that fuel use is embodied in capital equipment, which is gradually replaced over time, short-term reductions in carbon utilization and CO_2 emissions can be accomplished principally through decreases in production and consumption. This necessarily requires, for an unfortunate small but significant percentage of the workforce, substantial sacrifices in income and employment.
- **Investment capability for developing and implementing needed technological change would be significantly reduced in industries hardest hit.** The reduced capacity to invest, which industries hit hard by the carbon tax would experience, was seen as a substantial real cost. Industries most in need of capital funds for restructuring and technological change would be hardpressed to make such investments. The economic incentives of the carbon tax and most of the other alternatives are *negatively* correlated with needed research and development programs.
- **Massive and widespread relocation, retraining and other dislocation costs would be incurred by private sector businesses and**

Exhibit 3: Distribution of Mining Sector Jobs Directly Affected by Carbon Tax -- By Industry (1992)



Source: CONSAD, 1992

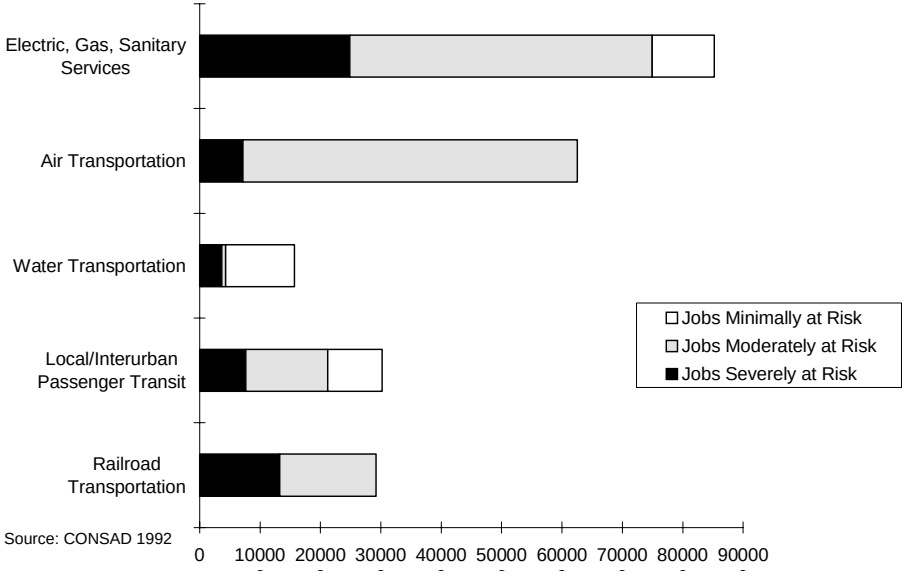
their employees. Many of these transition-related costs will be borne, partially or totally, by the workers themselves, and by the private sector generally. Given the magnitude of significant structural changes involved in the economy described above, and the likely differences in technical skills and skill levels between declining and growing industries, we can expect long, personally costly periods of unemployment and underemployment.

- **There's simply no role for a carbon tax.** A carbon tax or any other equivalent policy would impose enormously expensive and hidden costs on the economy — which would be borne substantially by an unsuspecting labor force. Even if the scientific proof of the benefits were more conclusive, the negative jobs consequences of the carbon tax would eliminate those benefits. If one were to design the most immediately damaging method to mitigate the effects of global climate change, a carbon tax would be high on the list.

Where Things Stand Today

The third session of the Conference of Parties (COP-3) to the Framework Convention on Climate Change will be held in Kyoto, Japan in December 1997. The apparent objective of COP-3 is to obtain binding commitments by industrialized (developed) nations to reduce emissions and increase sequestrations by specific amounts (targets) by specific dates (timetables, e.g., 2005, 2010, 2015, 2020).

Exhibit 4: Distribution of Transportation and Utility Sector Jobs Directly Affected by Carbon Tax -- By Industry (1992)



It appears that little or no firm commitment will be sought from developing nations (including China and India) during that period.

In the last several years, the economic incentives have turned from the carbon tax, first to a fuel-cost-adder and, most recently to a global system of tradable emission permits, each of which is discussed below. In the words of the Interagency Analytical Team:

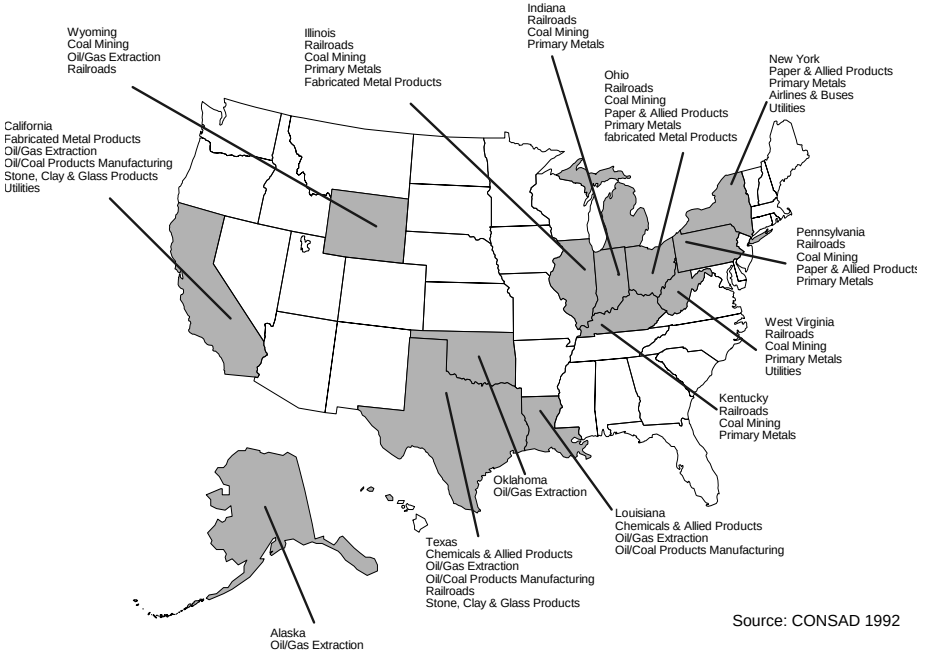
> under a system of tradable permits, a country could either reduce emissions or purchase additional emissions "rights" (i.e., permits) from other countries. Countries with opportunities to reduce emissions that cost less than the going permit price would have an incentive to reduce emissions and sell their "right to emit" for cash. Countries that had only high cost options to reduce emissions (that is, reduction options that cost more than the permit prices) could purchase emission permits. The forces of supply and demand would set the permit price and the market incentives would push the trading group, as a whole, to institute the least cost emissions reductions first.[2]

On the surface, the shift away from a carbon tax is a good one: taxes (like the carbon tax) on the use of inputs are *not* economically efficient mechanisms for internalizing the external costs caused by byproducts generated during the production of outputs. Such taxes do not distinguish between different uses of fossil fuels (e.g., as fuels, chemical feedstocks, reducing agents). Furthermore, establishing appropriate tax exemptions to account for these distinctions greatly complicates the design and administration of the taxes.

What is seriously lacking at this juncture are credible, adequately detailed estimates of the economic impact of the extant policy proposal options. What we have, instead, are the much too broad, too long-run, too "sterile" industry and regional impacts/effects' estimates produced to date by the agencies responsible for informing the public as to the economic consequences of one or another of the economic policy "incentives" that have emerged in and by the U.S. during this decade. As of this writing, the involved U.S. agencies "hope to provide further detail to their macro-oriented industry analysis by examining jobs, international trade, industries comparisons between countries, and the possibility that domestic industries might relocate overseas due to increased domestic costs."[3] Clearly, the challenge is formidable: neither the Energy Modeling Forum EMF-12 Report or the Interagency Analytical Team have published their detailed findings concerning the domestic economic impact arena. [Indeed, in August, the Clinton Administration announced that it was discontinuing further study and analysis by the Interagency Analytical Team. At that time, no Federal agency was actively conducting such study.]

The analyses that follow in this paper are an attempt to begin to fill this critical void. We believe there is great need to initiate the domestic and regional/local economic impact estimation process, certainly long before the Kyoto meetings, so that the public (both lay and professional) can digest and understand, not just

Exhibit 5: Most Vulnerable Industries in Selected States



where the science (so uncertainly) is telling us we're heading; but, also, what changes in our quality-of-life (economic and social) that different policy options are likely to bring about.

CONSAD's Recent Research

CONSAD's early efforts focused on what economists refer to as *transitional* (i.e., short-to-medium-term) and *distributional* (i.e., who wins and who loses) effects. CONSAD's interest and research in such short-term effects were, at that time, unique among studies of this kind.

We believed then, and continue to believe, that short-term, transitional output and employment consequences are a critical concern, economically, socially and politically — particularly when economic conditions are rapidly changing at local and individual firm and sectoral levels, such that job anxiety, not merely aggregate levels of unemployment, are high and troublesome. Plants *can* and *do* close. In this, we are joined strongly by key elements of the AFL-CIO, whose basic interest is jobs and the health of businesses which yields these jobs. Workers can and do lose jobs they have held for long periods, and then suffer prolonged layoffs or experience substantial reductions in their wages or hours worked.

CONSAD's investigation of these immediate, short-term effects were not originally rooted in complex, econometric models. Data and knowhow were simply

considered inadequate to develop a comprehensive economic model of how firms adjust in the short run to increased costs caused by global climate change policies.

Instead, CONSAD, in its prior studies in the early 1990s, assessed the practical way that businesses react once an exogenous cost, e.g., a carbon tax, is imposed and the impact this will have on employment and output. Responses to the increased tax/cost were seen to depend on: (a) the degree of cost increase, (b) the ability to absorb the tax (e.g., its relationship to total costs and profits), (c) the ability to pass on the tax, and (d) the flexibility in restructuring business practices to mitigate the cost increase. The analysis of those issues for each industrial sector and region of the country —essentially, partial analyses — were used to determine the vulnerability of firms and sectors to adverse economic consequences and their employees' risk of job loss or other, severe impacts on their terms of employment.

The purpose of CONSAD's most recent domestic economic impact studies has been analytical, systems oriented, and methodological in nature. For this study, we have performed a systematic comparison of the estimates of the economic consequences of a specific policy initiative — sequences of fuel-cost-adders or permit fees — producing consequences that were estimated by seven alternative macroeconomic interindustry modeling systems. Each modeling system is composed of a distinct combination of four components: a macroeconomic forecasting and simulation model, an input-output table describing interindustry purchases and sales of specific commodities, an analytic procedure for estimating the employment levels associated with any level and composition of industrial production, and a data base for disaggregating impact estimates from the national or regional level to the state level.

CONSAD's continued search for improved subnational, transitional, and more behaviorally realistic economic impact regionalization methodology has led to increased experimentation with and use of the Regional Economic Models, Inc. (REMI) Economic and Demographic Forecasting and Simulation 53-Sector (EDFS-53) Model. Public and private sector support has provided an opportunity for both CONSAD to gain more information about and insights into the merits of the REMI regional econometric model system relative to other models.

During the early part of 1997, hypothetical policy initiatives were characterized in terms of a sequence of fuel-cost-adders. The fuel-cost-adders represented increases in the costs of fossil fuels per metric ton of carbon contained in the fuel. They were assumed to occur beginning in the year 2000. The precise policy mechanism that generated the fuel-cost-adders was not specified, but it was believed to be sufficient to reduce the emission levels of 2010 to ten percent less than those of 1990. Clearly, like the carbon tax proposals before it: while different in some ways, the cost increases considered are *very* substantial.

Important technical innovations are employed in this effort: the use of industry experts to obtain additional information about likely behavioral/decisional responses to the fuel-cost-adder policy under assessment; the comparison of what are called "closure" approaches, i.e., the degree to which outside the model monetary policy responses are applied to dampen and temper substantial model output fluctuations (a "Passive," little or no "corrective" monetary policy, and a "Histori-

cal," a business as usual, "reactive" monetary policy); and the electricity-sensitive multi-state regionalization of the REMI national model.

Industry experts were interviewed to obtain additional information about likely industry responses to the fuel-cost-adders. Such responses regarding investment, technology and location decisions are *not* described in sufficient detail or accuracy in the structural equations and associated data bases of extant macroeconomic models. Together, the magnitude of the exogenously imposed costs and the fact that certain nations would incur these costs, while other countries wouldn't, were so unique experientially that we believed human intuition and experience should replace the model's historical data in these arenas in specific model runs. Expert judgments were elicited for six energy-intensive industries: the aluminum, cement, chemicals, paper and paper products, petroleum refining, and steel industries. Further perspective on probable industry responses to similar policy initiatives was obtained from an important study conducted for by the Argonne National Laboratory.[4]

CONSAD has converted the information obtained from these experts into input data for one of the macroeconomic models, the REMI EDFS-53 Model. (REMI was selected because of its regionalization capabilities, discussed below.) The information obtained in the interviews of industry experts, augmented by the draft reports prepared for the Argonne study, comprised the data used in this study to characterize, within the REMI model, the likely responses of the six energy-intensive industries to the hypothetical policy initiative. (We labeled such model runs as "modified" cases.)

The aluminum sector provides a useful illustration of the use of experts in this study. For this industry, experts provided information about: the important distinction between smelters that purchase electricity and those that use fossil fuels to generate electricity; how fuel cost adder increases would *not* be completely passed on to those smelters holding contracts with electricity suppliers which tie the price of power to the London Metal Exchange (LME) price of aluminum ingots (an international index); and how timing the consumption of electric power in relation to the total demand for electricity throughout the power grid is another way of reducing energy costs. Nevertheless, the bottom-line prospects (suggested in these expert interviews) for reducing electricity costs appeared to be very limited. For example, relocating to the Northwest U.S., where hydroelectric power currently is the major source of energy, was not seen as a particularly viable option, because there were few, if any, available sites for new hydroelectric power installations or for major energy consumers.

Further, respondents agreed that there were no feasible technologies in sight that would significantly change this predicted situation. For the foreseeable future, the maximum possible improvement in energy efficiency throughout the aluminum industry was considered to be about five percent.

Importantly, and unanimously, respondents agreed that production cost increases in excess of five percent would make it near-impossible for domestic aluminum smelters to continue their operations. On this basis, if the hypothesized fuel-cost-adders occur, most if not all aluminum smelters in the U.S. would become

inactive by 2005. Moreover, because aluminum smelting is more profitable than aluminum fabricating, unless a domestic fabrication plant obtained a very advantageous contract for ingots — with prices below the LME and a very stable supply stream — there would be no incentive to continue to fabricate. (Prospects were considered to be somewhat better, however, for specific downstream products, such as construction products.) Even without the hypothesized cost increases, experts held that recent trends strongly suggested that all domestic smelters would most likely close by 2015.

Where aluminum smelters would relocate internationally, it was held, depended on the extent to which other nations also experience fuel-cost-adders. Smelters, simply put, would migrate to locations with inexpensive electricity. If the U.S. were the only country to incur fuel-cost-adders, the availability of untapped potential for hydroelectric power generation in Canada and the substantial current importation of aluminum ingots from Canada into the U.S. made that country a likely choice for relocation. Imports from Iceland or Norway were also expected to increase. European aluminum producers were anticipated to realize a cost advantage that would allow them to increase their exports to the U.S.

If all industrialized nations were to experience fuel-cost-adders, but the developing nations not, it was believed that Japan would be in the most advantageous position: Japan has already developed aluminum smelters near bauxite mines in certain developing nations. The U.S. and other industrialized nations could also enter into public joint ventures in the developing nations. Participation by U.S., Japan, and European countries in foreign production ventures to date ranges from five to 50 percent. The Export-Import Bank and the World Bank were also thought to play an important role in this international migration.

Results for both the “Historical” and “Passive” closures were produced. Under the former, the model assumes that the Federal Reserve will partially anticipate the impacts of the climate change policy, and act in the first years of implementation to mitigate effects on unemployment. Under the Passive closure, the model assumes that the Federal Reserve does not act, enabling the policy to have longer-term effects on unemployment, unabated, by government “mitigation” policy.

As expected and, in our opinion somewhat unrealistically effective and prescient, the REMI modeling system analysis under the Historical closure assumption produces relatively small employment impact estimates, while at the same time, estimating significant declines in output and value added over time. The presence and foresightedness assumed in “Historical” monetary closures — present in DRI runs and clearly also so in any of the “unmodified” (by expert information) REMI runs — are considered much too unrealistic to be used, solely, for policy analysis purposes. Results, possibly, the more realistic for the short-to-medium-run, would be those produced for the initial impact years in between the Historical and Passive closures, modified by expert opinion overrides regarding investment, technology and location decisions. Neither monetary policy closure is satisfactory, *per se*. The current closure “solutions” need to be better explained in realistic behavioral, economically consistent terms, which *also* produce desired climate control outcomes. Merely mechanistic model runs which achieve the “proper” numerical

balance are, *per se*, far from satisfactory. What is needed is a *new* paradigm respecting model closure.

For modeling the REMI Regional system, separate data inputs were prepared for each of four regions for which distinct models were constructed for the analysis. The regions and affiliated states are:

Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.
Mideast: Alabama, Delaware, the District of Columbia, Florida, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Minnesota, Mississippi, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin.
Northwest: Alaska, Colorado, Idaho, Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.
Southwest: Arizona, Arkansas, California, Hawaii, Louisiana, Nevada, New Mexico, Oklahoma, and Texas.

The grouping of states into regions was based primarily on similarities among their technologies and cost structures for electricity generation.

CONSAD examined estimates of employment, output, and value added for each model at the national level. Criteria for policy use include: (a) valid technical underpinnings, (b) realistic assumptions for short-to-longer-term impacts, and (c) similarities to real world economic processes. Are these fully adequate model runs for serious policy analysis use? Not yet. However, the results *do* have increased methodological merit and deserve consideration in the ensuing debates. We have since made considerably further headway in such analyses.[5]

Two classes of results emerge from CONSAD's experience with the use of analytic methodologies to estimate and assess the economic impact of alternative climate change regulatory policies.

Turning to *methodology* conclusions, first:

- The use of macroeconomic interindustry modeling systems are a necessary component of any serious analytical approach: there is absolutely no other way to consider the hundreds upon hundreds of changing "trends" in dozens of key variables over time and their implications for the changing interrelationships between these variables. Nevertheless, the studies *strongly* support the important — front and center — use of expert opinion where decisions concerning changing technologies and production functions — in the face of major structural transformation — are critical to the model's outputs. We recognize the potential flaws of such man-machine systems (e.g., difficulty of replication, mismatch of "macro" assumptions used by the human decision-maker and that of the model, etc.) but believe the analytical gains far outweigh the costs.

- Where subnational regionalization is important (e.g., outputs shown to national regions or states), a national model capable of reflecting regional differences in supply prices and production processes (e.g., low-price electricity in the Northwest U.S.) such as REMI (or the U.S. Department of Commerce regional econometric system, not assessed in this study) has considerable advantage over a non-regional system (e.g., DRI) in estimating regional economic consequences. We have less evidence that this is true for national level sectoral decomposition though logic would appear to hold that, if regional/state level sectoral disaggregation is superior with a REMI-like model, then so should the national-level sectoral estimates. (We are currently analyzing this further.)
- With respect to monetary policy response (model system closure), neither "Historical" nor "Passive" is fully realistic, though we believe the Passive approach may be superior for short-term forecasting of policy changes so different in magnitude from any before this. "Historical" closure assumes not only higher degrees of economic clairvoyance than we have learned to expect. It also assumes that the "countercyclical" balancing policy would be effective, i.e., that it could be tailored in such a way to restore jobs and income while simultaneously creating sufficient reductions in sectoral and regional energy use so that climate change policy goals can be met. Nor is the use of default closure assumptions completely satisfying, either, for some of the same reasons.

Now, to the economic impact findings. While we do not have a sufficient number of relevant studies for a comprehensive "meta-analysis," we believe it is fair to ask whether these latest results, basically, either bolster or refute the basic conclusions of our earlier carbon tax studies? Is the fuel-cost-adder policy sufficiently similar — both in how it seeks to achieve its energy technology switching objective and, also, in the direct and indirect economic consequences it is estimated to bring about — for us to reaffirm our original conclusions about this cost-increasing class of policy tools?

The answer, we believe, is a resounding affirmative. *Not only is the direction of the estimated consequences identical; in addition, the projected employment, output and value added magnitudes are, if anything, significantly larger.* In 1992, the policy objective was stabilization of emissions at 1990 levels. In the 1997 study, it was reduction of emissions to 90 percent of 1990 levels. The fuel-cost-adders in this study are as large as they would need to be to accomplish their objectives; consequently, we are looking at magnitudes of short-to-medium-term output, employment and value added effects that are double, triple, or possibly even five times greater than those we estimated five years ago.

Moderating the REMI (modified Passive) results with the more temperate DRI estimates, we are *still* left with job and output loss estimates that begin at twice the level and, then, to one or two millions of more jobs lost and a trillion

dollars of lost output in subsequent years. Furthermore, the same states — California, Illinois, Ohio, Pennsylvania and Texas — and the same directly affected heavy industry and energy sectors, not surprisingly, are again the most adversely affected. In addition, the use of macroeconomic models permit, for the first time, more economically consistent employment and output change estimates for the *indirectly* affected sectors, notably communication, construction, eating/drinking/restaurants, retail, wholesale, and business services — sectors, incidentally, whose estimated impacts are, not surprisingly, greater than those of the directly affected sectors.

The macroeconomic results, for the "modified regional Passive" REMI run also allow these other observations about the impact on the economy:

- Total fixed investment — primarily producer durables and equipment, as opposed to residential and non-residential — falls dramatically, more than $400 billion, over the ten to 15 year period.
- Total exports, not surprisingly, fall substantially, approximately one-quarter of a trillion dollars, over the period. Total imports increase by almost $300 billion.
- Competing economic forces produce a not-too-surprising small (almost three percent) but significant fall in the price index over the period.

Significantly lesser impacts are estimated utilizing the Historic, reactive monetary closure option. The most recent CONSAD study has the most valid estimates of the results of these scenarios.

Institutional Considerations and Conclusions

Perhaps what is most clear from this exercise is the substantial difficulty of comparing results from different models, data bases, monetary policy assumptions, and behavioral/decisional representation. Particularly when there is the additional condition of different parties performing the analyses, the amount and degree of cooperation and understanding among and between the analysts is very substantial and should not be minimized. Whether or not the current public/private sector arrangements are adequate to meet this challenge remains to be seen. We have significant doubts in this regard.

What more can we learn about the prospective transitional economic consequences of a substantial fuel cost-increasing tax or add-on? Is it possible that, through new study, we will learn something new that will cause us to have less faith in the primary policy conclusions of the earlier studies, i.e., that:

- Alternatives to a carbon tax would also have similar economic effects?
- Some jobs would be created but the number would be relatively meager compared with the losses?
- The economic and social costs of achieving short-run CO_2 emission reductions (e.g., ten to 20 years) are extremely high?

- Needed investment capability for technological change would be significantly reduced in hardest hit industries?
- Unintended but widespread and massive relocation, retraining and other personal and monetary dislocation costs would be incurred by the private business sector and many of its employees?
- There's simply no role for an incremental fuel cost, whether it be a "carbon tax" or a similar proposal, for climate change control purposes?

We believe that, indeed, these policy analysis conclusions are, perhaps, *more believable* today than they were five to seven years ago. Credibility, today, is enhanced by substantial agreement with the earlier carbon tax study. Trust is increased by the presence played by both the public and private sectors in sponsorship, management and review roles. Our own experience tends to reject the public perception that public sector review and management is both considerably less biased and technically better than private sector review and management. Neither public or private is clearly superior in this regard. Biases of different types are always present, in both, and we have experienced what we consider good and fair judgment, siding with our own professional objectives much more often than not. Does this mean that peer review — public and private sector expertise and experience — has no role? Not so. We believe that there is good reason and increasing opportunity and need for unbiased, objective review.

This is even more important when relatively immature and non-traditional technical methods and approaches are used as, for example, were employed in the studies discussed in this paper. Not only was the emphasis on transitional costs and the distribution of social and economic pain but, also, regional estimates of effects were highlighted, and a man-machine model system utilizing expert judgment replaced the computer model's behavioral choices concerning investment, technology choice and locational decisions. None of these, we believe, had merely trivial effects on the results: each was important in its own right.

We believe the availability of PC-accessible models such as REMI are an important step in broadening hands-on analysis for a wide and diverse user group. These smaller but no less elegant model systems can be run in different closure modes, with differing regionalization boundaries and, with care and proper attention, the replacement of computer choices by human intuition, scope and experience. That both the public and private sectors have found an approach over this period to both advance methodological excellence and to provide policy-worthy estimates is an admirable process.

None of this "comes easy." There is constant maneuvering and by-play on the part of all the policy "players," with the public sector having the awesome responsibility of fairness and objectivity. This is made particularly difficult, but not necessarily self-defeating, when agencies of the Federal government are not in agreement about method or results. In fact, the competition so engendered can have salutary effects, both in terms of intellectual incentive and in creating that degree of modeling and results uncertainty that befits the policy environment under study.

The climate change economic impact policy process is far from over. CONSAD's October 1997 study assesses stabilization policies implemented through a system of tradable permits. We intend to make further headway regarding climate change-induced technology options, and implementation and feasibility issues concerning trading in global emissions credits. As in the most recent study, we will increase the scope and depth of expert judgment used to replace the purely econometric representation of critical, unique, and novel investment, location, and technology decisions.

Given the vast scientific and technological uncertainties with which climate change confronts us, our current thinking *blends* our analytic (modeling) work with our assessment of a proper strategic approach. The result: sequential decision making, focusing initially on pertinent scientific and technological research, allowing flexibility in the timing of emission reductions, and seeking full international cooperation in policy implementation.[6] *Binding commitments of the form currently under consideration do not represent cost-effective elements of coherent policies to deal with potential changes in the global climate due to human activities.* They provide scant reductions in the risks associated with anthropogenic emissions of greenhouse gases and will, in our opinion, impose high costs that will be borne disproportionately by specific segment of the economy.

The type of models used in such a decisional environment require that provisional decisions should be made on the basis of the available information. Next, suitable actions should be taken to implement these decisions. Third, the results of the actions should be reviewed and evaluated. Then, the procedure should be repeated based on updated information. This decision-making strategy has been characterized as an "act-learn-act" approach.[7]

Clearly, none of the analytic economic impact models, to date, are completely adequate for this task. However, those that (a) feature transitional impacts, (b) are capable of "housing" realistic behavioral decisions, and (c) estimate regional consequences, are those which best meet the needs of sequential, unfolding policy analysis. That the current models are *so* imperfect and *so* difficult to understand, compare and assess is fully compatible with the need for sequential learning and decision making.

We also plan to take a hard look at the feasibility of a successful tradable emission permit or tradable emission quota program (permits apply to individual emitters of greenhouse gases; quotas apply to nations), focusing on these considerations:[8]

- If permits are allocated by auctioning them to the highest bidders, their impacts will be similar to those of energy taxes. Indeed, unless permits are allocated at no charge to the exact sources that would generate the allowable emissions at minimum cost, some expenses in excess of resource costs will be incurred, and impacts like those caused by energy taxes will occur.
- Administering a tradable emission permit policy, including, especially, monitoring and enforcing compliance with the terms of the permits,

will be difficult and expensive. For such a policy to be economically efficient, permits must be tradable internationally. Achieving uniform compliance with such a policy among a group of sovereign nations will be difficult, particularly if collective implementation by all nations is attempted, as it should be with any policy that might be adopted.

- Unless tradable emission permits are used within nations to implement and establish values for tradable emission quotas, the prices at which quotas are traded are unlikely to correspond to the marginal cost of emission reduction, as it would under a tradable emission permit system. The values of tradable emission permits are determined by exchanges among entities who bear, and hence are knowledgeable about, the costs involved in reducing emissions. The parties negotiating exchanges of quotas will, in general, have less accurate information about costs.

Our initial expectations, given this reasoning, are that the *tradable permit and emission systems impact estimation results should not be that much different from those of a tax or a fuel-add-on cost.* Thus, prospective sizable, adverse employment and output effects, to accompany *any and all* of the proposed control programs, continue to be our best estimate of domestic impact. A colleague, Dr. Mark Joensen, has succinctly summarized our work to date:

> Consider a carbon tax, fuel-cost-adder, BTU tax, and/or emission permits strategy beginning in the year 2000, which is expected to stabilize greenhouse emissions by the year 2010. The results of the macro-modeling indicate that this scenario will result in the unemployment up to two million workers within the next decade in a variety of industry sectors, and in every region of the country. Additional numbers of workers will experience job effects that will include reductions in wages and benefits, reduced number of hours worked, and decreased job security. Strategies that are expected to result in more severe emission reductions in the year 2010 — to levels below those in 1990 — would result in a considerably higher number of job losses.[9]

CONSAD will continue to examine this issue and will be conducting a new series of analyses designed to add value to what these above findings already so perturbably show. However, there is little current indication that further research will significantly alter the direction or magnitude of our present findings.

Notes

[1] Wilbur A. Steger and Frederick H. Rueter, *Jobs-at Risk: Short-Term and Transitional Employment Impacts of Global Climate Policy Options* (Pittsburgh: CONSAD Research Corporation, May 12, 1992).

[2] Interagency Analytical Team, *Economic Assessment of Potential Global Climate Change Initiatives*, draft, June 1997, p. 17.

[3] Interagency Analytical Team, p. 6.

[4] Ronald J. Sutherland, "The Impact of Potential Climate Change Commitments on Energy Intensive Industries: a Delphi Analysis," Argonne National Laboratory, February 5, 1997.

[5] See *Sectoral Regional Economic Impact Analysis of a Global Climate Change Policy* (Pittsburgh: CONSAD Research Corporation, October 1997).

[6] Frederick H. Rueter, *Economic Assessment of Potential Global Climate Change Initiatives* (St. Louis: Center for the Study of American Business, 1997).

[7] K.J. Arrow, J. Parikh, G. Pillet, "Decision-Making Frameworks for Addressing Climate Chnage," *Climate Change 1995, Economic and Social Dimensions of Climate Change: Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change*, James P. Bruce, Hoesung Lee, Erik F. Haites, eds., (Cambridge: Cambridge University Press, 1996), p. 67; Manne and Richels, 1992.

[8] Rueter.

[9] *Short Term Strategies for Reducing Emissions of Greenhouse Gases: Impacts on the U.S. Economy and on the Development of New Emission Reduction Technologies* (Pittsburgh: CONSAD Research Corporation, June 20,1997).

2. THE HUMAN COSTS OF GLOBAL WARMING POLICY

FRANCES B. SMITH

Nine out of 10 Americans don't know anything about U.S. global climate policy, according to a poll released in June 1997 by the Small Business Survival Committee. Yet, just a few months from now in Kyoto, Japan, U.S. negotiators may commit the American people to a climate change treaty that will require massive restrictions on energy use. Something is wrong here.

If we were at war — if we faced a physical threat to the U.S. — Americans at home would be asked to sacrifice, and we would willingly do so accepting gas rationing, canned food instead of fresh, and products in short supply. If we were facing an energy crisis as we did in the 1970s, people would willingly cut back on driving, car-pool, turn down their thermostats, and wait — sometimes impatiently — in long lines at gas stations. But something's different with global climate change. The stakes are just as high, but the American public does not know what is going on and how this issue will affect them.

Negotiators may commit Americans to a climate change treaty that significantly restricts our energy use.

No Need for Hasty Action

Public debates on global warming policy often focus on the science of climate change. Yet whether warming is occurring is still in question; and, if global warming is occurring, the extent of mankind's influence has not yet been clearly established. According to ground-level measurements, the earth's temperature has warmed 0.5 degrees Celsius over the past century, and computer models predict an increase of nearly two degrees Celsius over the next 100 years. However, satellite data measuring the earth's temperature show no temperature increase over the past 18 years; instead, they show a slight cooling trend. Also, as the computer models are adjusted and new data are incorporated, the predicted temperature rise has gotten smaller and smaller — from about five degrees Celsius over the next century to the current prediction of less than two degrees.[1]

Yet even with this high level of scientific uncertainty, policymakers are rushing to treat global climate change as an imminent threat. They use the mantra of the "precautionary principle," that is, if the possibility exists that global warming is occurring due to human activities, we need to take immediate action.

Opponents of precipitous action argue that given the scientific uncertainty whether global climate change is occurring, policymakers should not take drastic steps into the next century to restrict greenhouse gas emissions. They point to macro-economic models that show devastating effects on U.S. industries and re-

sultant widespread unemployment as companies shift their production to developing countries not subject to treaty restrictions. Some critics of rigid emissions cutbacks note that such restrictions would hobble industry's ability to adapt and find technological solutions if the science becomes more certain that the climate is being affected by man's activities.

The Consumer Impact

Missing from the debate is how consumers will be affected by global climate change policies. The American public deserves to know what the global climate policy proposals are and what they will mean for them. The aim of this paper is to show how global climate policies' effects on consumers will be real, substantial, and painful, and to illustrate the impact these proposals will have on their daily lives (see Exhibit 1, which shows typical energy consumption in daily routines).

Consider some of the proposals that are on the table. Some proposals for binding targets and timetables would sharply reduce greenhouse gas emissions by 15 to 20 percent below 1990 levels over time periods as short as 12 years. By the year 2000, the U.S. Department of Energy forecasts that U.S. carbon emissions will be 12.5 percent above 1990 levels. Thus, a 15 percent reduction in CO_2 from 1990 levels by 2010 — the proposal being pushed by the European Union — would actually mean a 24.4 percent reduction in a single decade.

These massive changes can't be achieved through minor reductions in energy use. People cannot simply turn up their air conditioner thermostats to 72 degrees from 70, or replace 75 watt light bulbs with 60 watt bulbs. Instead, the proposed Kyoto accord will require drastic reductions in energy use in every aspect of people's every day lives.

Some approaches being discussed to reduce emissions are a carbon tax on fossil fuel emissions (from the burning of coal, oil and natural gas) and the currently favored "cap and trade" approach, that is, a form of energy rationing to restrict emissions to, say, 1990 levels or below, and the issuing of tradable emission permits.

The Clinton Administration, not surprisingly, has backed away from energy taxes: their impacts are too obvious and their costs too visible to the American public. There is clearly no desire among Clinton Administration officials to relive the experience of trying to get an energy tax through Congress as was attempted in 1993. As an internal 1994 Environmental Protection Agency (EPA) memo on global warming policy options concluded: "Energy taxes are likely to be unpopular and would require significant political capital to legislate; they might initiate some backlash against climate change and other environmental actions."

The same document, though, gave a nod to "market-oriented" alternatives with this assessment: "A cap would likely not be as unpopular as a tax, since people are generally less familiar with the concept." This statement, of course, also shows an all-too-common cynicism toward the American public — if people don't know what's happening, they can't mobilize against it (Exhibits 2 and 3 list some proposals by the EPA and Department of Transportation to cut emissions).

Exhibit 1: Ways Americans Directly Use Energy in a Typical Day

Activity	System/appliance/product	Typical Energy Source
o Waking up	Clock/clock radio	Electricity
o Turning lights on	Light fixtures	Electricity
o Showering or bathing	Hot water heater	Gas or electricity
o Shaving; drying hair	Electric shaver; hair dryer	Electricity
o Preparing coffee	Coffee maker	Electricity
o Preparing hot breakfast	Stove, toaster, microwave	Gas; electricity
o Doing dishes	Hot water heater	Gas or electricity
o Taking kids to day care	Automobile	Motor fuel
o Commuting to work	Automobile; public transportation	Motor fuel; electricity
o Working in office	Heaters or air conditioners; telephones, computers, printers, reproduction machines, postage meters	Fuel oil or gas; electricity
o Commuting from work	Automobile; public transport	Motor fuel; electricity
o Picking up kids from day care	Automobile	Motor fuel
o Grocery shopping	Automobile	Motor fuel
o Storing fresh food; frozen food	Refrigerator; freezer	Electricity
o Taking kids to soccer game	Automobile	Motor fuel
o Turning lights on	Light fixtures	Electricity
o Watching television; listening to stereo	Television set; stereo	Electricity
o Kids' doing research, writing	Home computer	Electricity
o Preparing dinner	Stove; microwave	Gas; electricity
o Dishwashing	Hot water heater; dishwasher	Gas or electricity; electricity
o Washing clothes	Washing machine; hot water heater	Gas or electricity
o Drying clothes	Clothes dryer	Gas or electricity
o Sleeping - Heating or cooling	Heating or air conditioning system	Fuel oil, gas, or electricity

Other proposals include combining energy taxes with massive subsidies for "alternative technologies" — subsidies that will provide huge profits to the politically preferred companies — such as ethanol or electric cars, and "renewable energy sources," like windmills and solar panels. Electric cars sound good, but can you commute to work day in and day out in a car that's less reliable, less comfortable, and, most importantly, less safe? Solar panels might work in San Diego, but what about in Seattle? Windmills might work in Wisconsin, but what about in Washington, D.C.?

So-called renewables or alternative energy sources would take years for widespread practical applications before they could be considered economically viable alternative energy sources. Many renewables would also require energy-intensive production for widespread use, which could result in environmental damage — for example, some solar applications could cause microclimate changes; wind towers can kill birds; hydro-power can damage habitats and certain fish. Indeed, both solar and hydropower projects have faced environmental opposition. Taxpayer subsidies for major government research and development in alternative energy sources, new technology, and energy efficiency is an increasingly popular option, even though such expansive programs in the past have produced little or no results.[2]

Electric cars have been an environmental dream for decades. The first electric car race in the United States was held near the turn of the century. Yet a practical battery-powered automobile has yet to materialize. Current models are neither durable nor are they affordable. Limited range, long refueling times, and the lack of infrastructure make the widespread use of electric vehicles highly unlikely at any time in the near future, even if the federal government shells out millions in subsidies or imposes electric vehicle sales mandates. Even a minor sales mandate, calling for only two percent of new vehicles sold to be electric, provoked fierce opposition in California and the northeastern United States.

Regulatory mandates and "technology-forcing" may be more politically palatable, but shifting from visible taxes to hidden regulatory quotas or subsidies gains nothing. Any plan that makes energy less abundant will significantly lower living standards. *Global warming policies will not simply change U.S. citizens' lifestyles — the policies will drastically change their standard of living.*

Omnipresent Effects

Higher energy costs mean increased costs of housing, heating and air conditioning, lighting, transportation, food, and consumer products. Electricity costs would increase by over 50 percent, as outlined in a Department of Energy report.[3] Household fuel prices would jump by 50 percent; the price of gasoline would rise by 60 cents per gallon, according to the economic consulting firms, Charles River Associates and DRI/McGraw-Hill.[4]

All consumers will bear the brunt of hasty action. Energy taxes and restrictions will affect people in every aspect of their lives:

- In their homes, which will be smaller and yet more expensive since fewer houses will be built. "Sealed" building standards will trap indoor air pollution and may increase respiratory problems such as asthma.
- The indoor temperature will be colder in the winter and hotter in the summer because of higher costs for fuels and electricity.
- On the dinner table, the cost of both fresh and prepared foods will rise.
- Families will cut back on recreational activities because of the high

cost of gasoline and restrictions on "discretionary" activities that use fuel.

- Air travel, hit with special energy taxes, will rise in price and service will be cut back.
- Other services for family members — nursing homes, day care centers, hospitals — will be more expensive as those firms find their own energy costs skyrocketing.
- Police and fire departments, schools, and other municipal services will see their costs rise, which will lead to tax increases at the local level or cutting back on services.
- Families will be driving smaller, less comfortable cars and face restrictions on when they can drive. Most importantly, those much smaller cars will be much less safe. Controls such as rationing of gas will cause long lines and waiting times at gas stations reminiscent of the energy crises of the 1970s.

As shown earlier (Exhibit 1), people will feel the pinch of higher costs, fewer choices, more restrictions — at home, driving, eating, traveling, working, living.

The effects are likely to be reminiscent of the energy crisis of the 1970s, where the federal government instituted a system of government price controls, allowances, rationing, regulations, and other restrictions that caused gasoline shortages and long waiting lines; heating oil allocations; "nonessential" lighting extinguished in major cities; and official rationing plans imposed in many states. In many areas,

Exhibit 2: Some Proposals Offered by Federal Agencies to Reduce Greenhouse Gas Emissions

From the U.S. Environmental Protection Agency, Internal Draft for Discussion, May 31, 1994

- Levy a 50 cents per gallon fee on gasoline
- Introduce a new tax on the carbon content of fossil fuels
- Install solar hot water heaters in Southern low-income homes
- Use weatherization assistance funds to switch housing in the Northeast from primarily coal or oil to natural gas
- Establish a national deposit on beverage containers
- Phase in a national ban or surcharge on yard landfilling; use monies to help develop composting industry and markets for compost
- Work with the roofing industry to eliminate or at least reduce the amount of dark materials produced; stimulate interest in light colored roofing.
- Showcase emissions reductions programs in low-income housing
- Encourage high-density living; require Fannie Mae to set lending guidelines so that home mortgage amounts would be higher if a home is located in a dense population area and close to public transit

Exhibit 3: Some Proposals Offered by Federal Agencies to Reduce Greenhouse Gas Emissions
From the Department of Transportation's "Car Talk" Policy Options, 1994-95

- Higher auto registration fees
- "No-drive days" and "no-drive zones" for personal motor vehicles
- Population/Immigration policies
- School bus scheduling
- Different portrayal in advertising of personal vehicle use
- Zoning/land use controls
- Vehicle retirement programs
- Increase in fuel economy requirements
- Motor fuels tax
- Carbon tax

supplies of heating fuels were disrupted. President Nixon's "energy czar," William E. Simon, described the results of some of these measures:

> Even with a stack of sensible-sounding plans for even-handed allocation all over the country, the system kept falling apart, and chunks of the populace suddenly found themselves without gas. There was no logic to the pattern of failures. In Palm Beach suddenly there was no gas, while 10 miles away gas was plentiful. Parts of New Jersey suddenly went dry, while other parts of New Jersey were well supplied.[5]

While the 1970s can provide policymakers with examples of energy control systems that imposed enormous costs on consumers, some of the expected costs of global climate policies are not immediately obvious, especially those impacts that will be unfair, hurt the poor the the most, and even cost lives.

Inequitable Impacts

Some will feel the pain of climate change policies more than others; the policies will have inequitable impacts on individuals and families. Who gains and who loses will be outside of people's control. People who live in large states and need to drive their automobiles longer distances would be harder hit by high gasoline taxes than those who live in northeastern cities (For the different patterns of energy consumption, see Exhibits 4 and 5). A study by Glenn R. Schleede for Consumer Alert's National Consumer Coalition details the large gasoline price increases that would result in Texas. A fuel tax (or its proxy) of $.50 per gallon would mean a 43.5 percent increase in Texans' cost of motor fuel; with a $1.00 per gallon fuel tax, Texans would face an 87 percent rise.[6]

People who live in areas dependent on coal use to produce electricity, for example, will find sharp increases in electricity bills. Nationally, coal supplied the energy to produce about 55 percent of all the electricity generated in the U.S. But

Exhibit 4: Residential Energy Consumption by Regions, 1993 (Quad. Btu)

	Northeast	Midwest	South	West	Total
Natural Gas	1.11	2.07	1.18	0.91	5.27
Electricity	0.47	0.74	1.51	0.56	3.28
Fuel oil, kerosene	0.78	0.13	0.13	0.03	1.07
Liquid petroleum gas	0.03	0.19	0.13	0.04	0.38

Source: U.S. Energy Information Administration, *Household Energy Consumption and Expenditures, 1993.*

in Iowa, for example, coal supplied 85 percent of the energy used to generate electricity. Under a carbon tax of $100 per ton, or its regulatory equivalent, Iowans would see a 39.6 percent increase in electricity. With a $200 per ton carbon tax (which many economists consider the level needed now), that increase could skyrocket to 79.3 percent, according to an unpublished 1997 study by Schleede.

People who live in older, drafty homes and own older appliances would pay significantly more in energy costs than those in newer homes. Senior citizens on fixed incomes may not be able to afford steep increases in utility bills and may suffer severe health effects as they cut back on heating and air conditioning or try

Exhibit 5: Top Ten States in Residential Energy Consumption

State	Trillion Btu
1. California	1353.5
2. Texas	1195.8
3. New York	1054.4
4. Florida	919.6
5. Illinois	898.3
6. Pennsylvania	897.4
7. Ohio	867.0
8. Michigan	734.9
9. New Jersey	552.5
10. North Carolina	508.2

Source: U.S. Energy Information Administration, *State Energy Data Report, 1994*

to spend less on food to help compensate for the higher costs.

The Clinton Administration has been reticent to release any economic assessments of emission reduction proposals, but what they have released is revealing. A draft Administration report circulated in July 1997 projected the effects on energy prices of a policy to reduce greenhouse gas emissions to their 1990 levels by 2010. Although such a proposal falls far short of what would be required to stabilize atmospheric concentrations of carbon dioxide, it would still have a significant impact on Americans. The price of gasoline would increase by 26 cents per gallon, natural gas by $1.49 per thousand cubic feet, coal by $52.52 per ton, and electricity by two cents per kilowatt-hour.[7] In other words, home power costs would increase by nearly 25 percent, just to achieve the most modest of greenhouse gas emission reduction goals. (Residential electricity prices averaged 8.4 cents per kilowatt-hour in 1995.)

Climate change policies will also worsen the distribution of income in the U.S. because they fall most heavily on the poor. Carbon taxes or their proxies would cause relatively large income losses in the poorest one-fifth of the population, according to Dr. Gary Yohe, professor of economics at Wesleyan University. The poor also pay a larger share of their income for utilities, household fuels, gasoline and motor oil. In 1995, according to the Bureau of Labor Statistics, the poorest 20 percent of Americans paid almost $1,300 for these. If costs rise 50 percent as projected, they will have to pay nearly $24 more per month for their electricity bill; and $20 more per month for gasoline and motor oil for their car. They won't be able to afford these increases without stiff cutbacks in essentials and will sink below a subsistence level (see Exhibit 6).

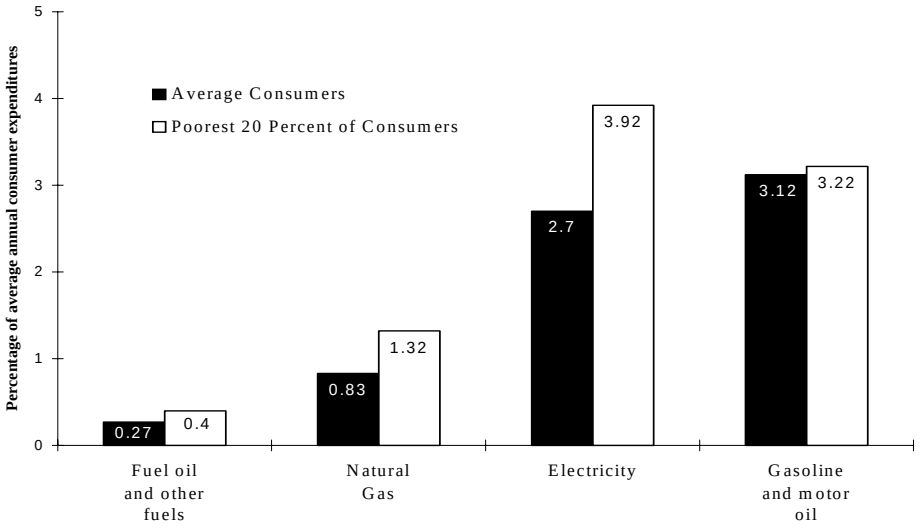
Costly Policies Can Be Lethal

Another major problem with climate change policies is that they will have a lethal effect on people. There would be an increased mortality risk as a result of global climate policies. Numerous studies have shown the relationship between income and health: Increased income means lower mortality; conversely, a loss in income can increase a person's mortality risk. In sum, wealthier is healthier.[8] As Ralph L. Keeney notes, this association is stronger for poor individuals.[9] Under global climate policies, higher costs for energy translate into less income available for other purposes. For the poor, more of their income spent on energy for heating and cooling, for appliances and transportation, means less available for nutritious diets, medical checkups, and preventative health measures. Poor people would suffer a proportionally higher mortality risk because of higher energy costs.

Climate change policies will also kill more people through raising the federal Corporate Average Fuel Economy (CAFE) mandate for cars from 27.5 mph to 45 mph — a proposal pushed by several environmental groups. President Clinton recently one-upped this by promising to *triple* auto fuel efficiency over the next few years. But the human cost of CAFE is already high. CAFE causes manufacturers to downsize cars in size and weight to meet the federal standard for their fleets, and smaller cars are much less safe than large cars in crashes.

Exhibit 6: Major Household Energy Expenses

(Average consumer compared to poorest 20 percent of households)



Source: Compiled from the Bureau of Labor and Statistic's *Consumer Expenditure Surveys*, 1995

According to a 1989 Harvard-Brookings study by Crandall and Graham, the current CAFE standard causes nearly 2,000 to 4,000 additional traffic deaths per year.[10] If the standard were raised to 40 mph, a 1992 study by Graham estimated that there would be an even greater increase in highway deaths — resulting in a total of 3,800 to 5,800 fatalities each year.[11] *Each day*, from 10 to 16 people would die unnecessarily.

Causes for Concern

Americans should be concerned about these policies, not just because they are *costly,* but because they are *wrong*. The United States is a rich country, and we can afford to do many good things foolishly. But curtailing energy use, in and of itself, is not a "good thing." The human consequences of proposals to restrict energy use, especially on the most vulnerable people in America, are difficult to defend.

Finally, let me stress this point: Before U.S. negotiators agree to any binding targets and timetables to reduce energy use, we must inform the 90 percent of the American people of the facts. They deserve analysis, discussion, and public debate — for a clearer picture of the real risks of global warming policies. Instead, they are being fed scare stories — global warming is the cause of floods in North Dakota, hurricanes in Florida, tornadoes in Texas, malaria in Mexico, cholera in Peru, and so on. Yet such scares are not grounded in fact. Recent malarial outbreaks, for example, have more to do with restrictions on pesticide use than any other factor. Cholera outbreaks like those in Peru in 1991 can be linked more closely to cutbacks

on chlorine for water treatment than to the weather.

While climate change proponents are painting these apocalyptic pictures, the true risks — the drastic consequences of the proposals on the American public — have been ignored. The risks of global warming are highly speculative; the risks of global warming policies are all too real. As the over 100 scientists who signed the Leipzig Declaration noted: "In a world in which poverty is the greatest social pollutant, any restriction on energy use that inhibits economic growth should be viewed with caution."

Notes

[1] See, e.g., *The Global Warming Debate*, J. Emsley and R. Bate, eds. (London: European Science and Environment Forum, 1996).

[2] See, e.g., Robert L. Bradley, Jr., "Renewable Energy: Not Cheap, Not 'Green'," *Cato Institute Policy Analysis* No. 280, August 27, 1997.

[3] Ronald J. Sutherland, "The Impact of Potential Climate Change Commitments on Energy Intensive Industries: A Delphi Analysis," February 5, 1997, pp. 4-5.

[4] Lawrence M. Horwitz, *The Impact of Carbon Dioxide Emission Reductions on Living Standards and Lifestyles*, DRI/McGraw-Hill, September 1996; Paul M. Bernstein, W. David Montgomery, and Thomas F. Rutherford, *World Economic Impacts Of U.S. Commitments To Medium Term Carbon Emissions Limits*, Charles River Associates, January 1997.

[5] Quoted in H.A. Merklein and William P. Murchison, Jr., *Those Gasoline Lines and How They Got There* (Dallas: Fisher Institute, 1980), p. 109.

[6] Glenn R. Schleede, "Impact of Potential Greenhouse Gas Emissions on the People and Economy of Texas," National Consumer Coalition, September 1997.

[7] "Raising Energy Prices Dramatically Would Harm Six U.S. Industries, DOE Finds," *BNA Daily Environment Report*, July 15, 1997, p. A-4.

[8] See, for example, Frank B. Cross, "When Environmental Regulations Kill: The Role of Health/Health Analysis," *Ecology Law Quarterly*, Vol. 22, No. 4., 1995; John D. Graham, et al., "Poorer is Riskier," *Risk Analysis*, Vol. 12, No. 3, 1992; Aaron Wildavsky, *Searching For Safety* (New Brunswick: Transaction Publishers, 1988).

[9] Ralph L. Keeney, "Risks Induced by Economic Expenditures," *Risk Analysis*, Vol. 10, No. 1, 1990.

[10] Robert Crandall and John Graham, "The Effects of Fuel Economy on Auto Safety," *Journal of Law and Economics*, April 1989.

[11] John Graham, "The Safety Risks of Proposed Fuel Economy Legislation," *Risk — Issues in Health and Safety*, Spring 1992.

3. WHAT CLIMATE CHANGE POLICY MEANS FOR AMERICAN WORKERS

EUGENE TRISKO

In 1992, the U.S. Department of Commerce released a study by DRI, Inc., estimating the economic impacts of achieving a 20 percent reduction of U.S. carbon emissions from 1988 levels. DRI found that up to 1.7 million American jobs would be lost by the year 2010. A recent draft analysis prepared for the Clinton Administration indicated that 900,000 jobs would be sacrificed in an attempt to achieve stabilization of carbon emissions at 1990 levels by 2010.

These job impacts underscore the statement of the AFL-CIO Executive Council dated February 20, 1997:

> We believe the parties to the Rio Treaty made a fundamental error when they agreed to negotiate legally binding carbon restrictions on the United States and other industrialized countries while simultaneously agreeing to exempt high growth developing countries like China, Mexico, Brazil, and Korea from any new carbon reduction commitments. The exclusion of new commitments by developing nations under the Berlin Mandate will create a powerful incentive for transnational corporations to export jobs, capital, and pollution, and will do little or nothing to stabilize atmospheric concentrations of carbon. . . . The AFL-CIO Executive Council urges that in the ongoing negotiations to amend the Rio Treaty on climate change, the United States insist upon the incorporation of appropriate commitments from all nations to reduce carbon emissions and seek a reduction schedule compatible with the urgent need to avoid unfair and unnecessary job loss in developed economies. The President should not accept, and the Congress should not ratify, any amendment or protocol that does not meet these standards.

This position has attracted considerable support in Congress. Indeed, the Senate voted unanimously, 95-0, in favor of Senator Robert C. Byrd's Sense of the Senate Resolution (S. Res. 98) opposing any amendment to the Rio Treaty that fails to include "new specified schedule commitments to limit or reduce greenhouse gas emissions for Developing Countries . . . within the same compliance period."

Heads You Win, Tails We Lose

The United Mine Workers of America (UMWA) is concerned about the impacts of a Kyoto protocol limiting U.S. carbon emissions without appropriate commitments by developing nations for three reasons:

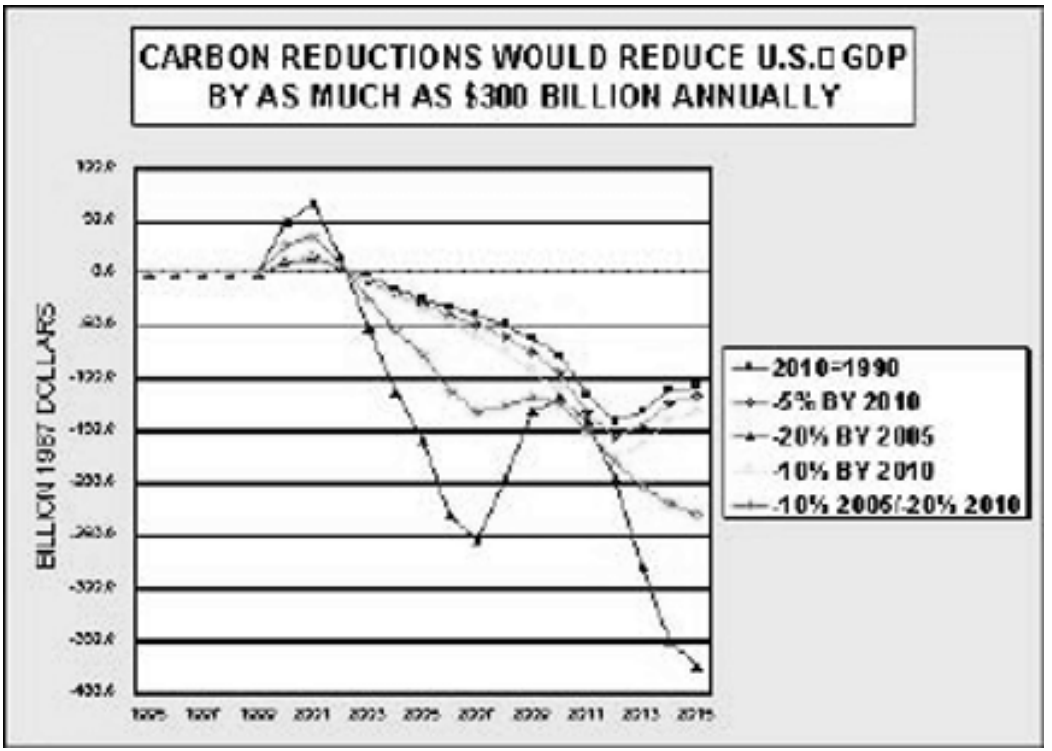
1) the U.S. would lose its coal and other energy-intensive industries;

2) jobs and pollution would be exported abroad; and
3) no measurable benefit to the global environment would result.

As Senator Wendell Ford (D-KY) remarked in supporting S. Res. 98: "It comes down to this simple equation. Rules benefitting the economies of developing nations plus rules penalizing the economies of developed nations add up to a big fat zero for the global environment."

How much do we stand to lose? Most credible estimates of the costs of reducing carbon emissions in the U.S. show cumulative GDP losses of $1 to $3 trillion over a 15 or 20 year period following implementation, with the loss of 1 to 1.5 million jobs in energy-intensive industries.

In June 1996, the Clinton Administration released DRI estimates of the impact of a variety of carbon reduction policies, ranging from stabilization at 1990 levels through 10 percent to 20 percent reductions from 1990 levels. DRI found that these policies could reduce overall GDP from $100 to $250 billion dollars annually, expressed in 1987 dollars. In current dollars, these GDP impacts convert to roughly $500 to $1,500 per capita per year in lost production of goods and services (see Exhibit 1).



The 1996 DRI results provide a useful benchmark for evaluating more recent impact estimates prepared by the Administration. The 1996 Administration study included the following findings on cumulative GDP losses (converted from 1987 to 1995 dollars by a factor of 1.30):

1996 Administration DRI Study
Cumulative GDP Losses 2000-2015
All Permits Given to Consumers
(In trillions of 1995 dollars)

Stabilization at 1990	**$1.15**
-5% by 2010	**$1.32**
-20% by 2005	**$3.20**
-10 by 2010	**$1.53**
-10/2005, -20%/2010	**$2.19**

The administration's on-going analyses indicate smaller impacts from similar carbon reduction targets, typically on the order of a cumulative loss of $0.5 to $1.0 trillion over the 2000 to 2015 period, with increased GDP in later years. These reduced impact estimates result primarily from changes in two key assumptions: the rate at which the economy adjusts to carbon reduction policies, and the methods of distributing carbon emission permits. The more recent studies assume a "10-year ramp" for implementing reductions, with carbon permits auctioned to businesses or consumers similar to FCC licenses. The proceeds of these auctions in turn are used to reduce the deficit, with a variety of beneficial effects such as reductions in the cost of capital and long-term interest rates.

When more realistic assumptions are used, such as a five-year implementation ramp or "grandfathered" distribution of carbon permits similar to the way sulfur allowances are distributed to utilities under the acid rain program, GDP impacts in the Administration's analyses are similar to those released in June 1996.

Finding the Target

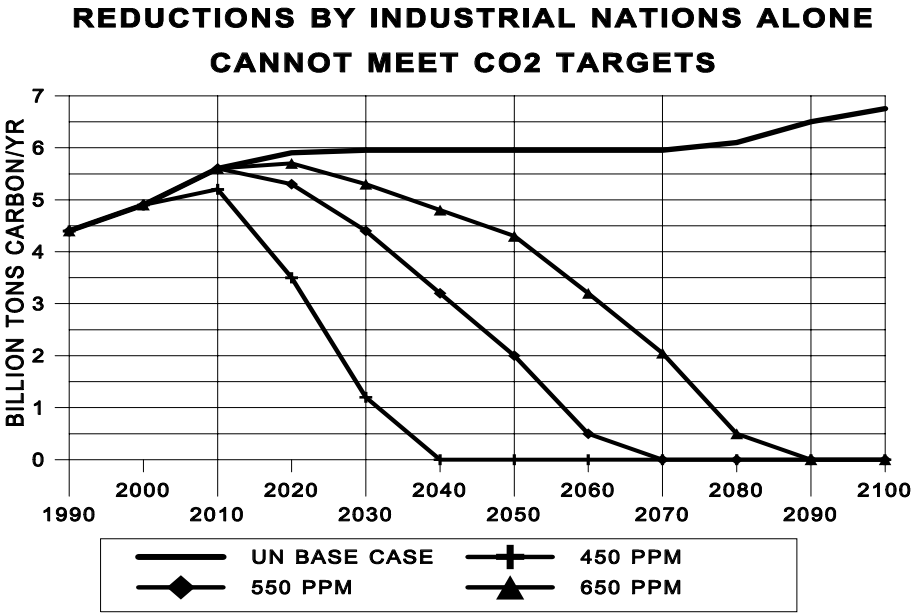
The Rio Treaty calls for an atmospheric stabilization target for greenhouse emissions to prevent so-called "dangerous anthropogenic interference with global climate."

An equitable and science-based approach to meeting the Rio Treaty's stabilization objective is to set a target CO_2 concentration level and allocate emission control responsibilities globally. Industrial nations may require larger reductions in shorter timeframes than rapidly growing economies. Very poor nations may have no limits at all. But all nations would be bound to maintain emissions at levels consistent with an agreed-upon target. That is not what is happening in the pre-Kyoto negotiations. We are negotiating arbitrary emission limits for only half of the world independent of the ultimate target called for by the Rio Framework Convention.

Different levels of carbon emissions — as high as 11 to 13 billion tons a year compared to current global emissions of some 6.5 billion tons — would be allowable over the course of the next hundred years under different atmospheric stabilization targets, say 450 to 650 parts per million (ppm) of CO_2 equivalent. Most Kyoto protocol proposals are consistent with industrial countries meeting a 450 ppm

atmospheric concentration target. However, actions by industrial countries alone cannot achieve any of the target concentrations considered appropriate by the scientific community (see Exhibit 2).

Exhibit 2: Industrial Nations' Impact on CO_2 Reduction



Source: Wigley, Richels, Edmonds (1996).

In order to approach target concentrations of 450 to 650 ppm, emissions from industrial countries must be reduced below zero. This is because emissions from developing nations continue to grow rapidly, even if our emissions were eliminated. Unilateral emission reductions by industrial nations like those being considered now would have no measurable impact on global climate or on atmospheric concentrations of CO_2.

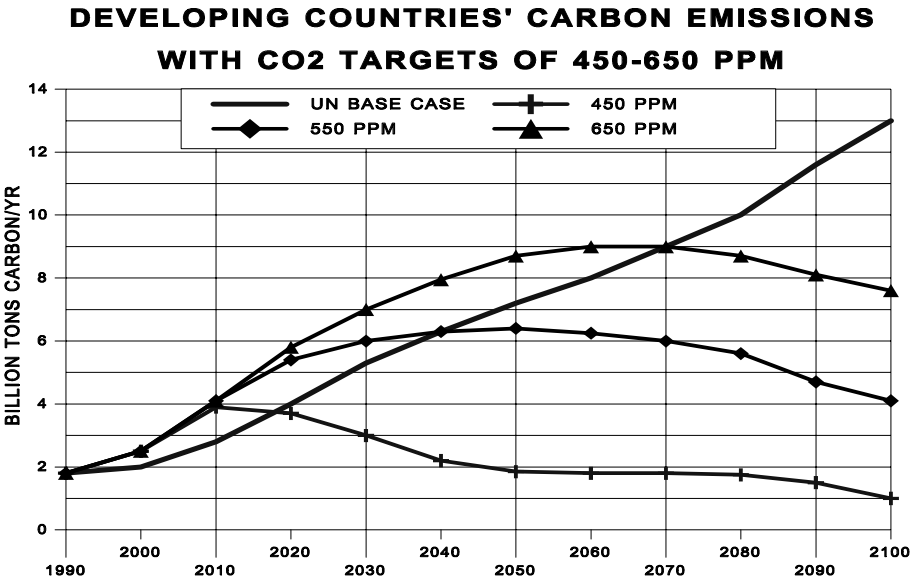
Beware of the double-counting of domestic environmental benefits. Some argue that climate-related emissions reductions can be justified solely by cleaner air at home. But having recently announced support for stringent new ozone and particulate matter regulations, the Administration cannot claim air quality benefits for its climate change program unless resulting ambient air quality exceeds the levels of the proposed standards. This is extremely unlikely, since the new ozone standard alone cannot be met by conventional control measures short of removing 50 million cars from the road.

In solving the global climate equation, one must consider the rate of allowable growth of emissions for developing countries. Countries representing some 50 percent of global emissions are not yet at the table bargaining with us, and are refusing to bargain over the reduction of their own rates of growth. How much

time would be available under alternative emission targets for developing countries to continue to grow until they must join a truly global effort to address global climate change?

Developing countries, as a matter of self-interest, would never agree to a target of 450 ppm because they would need to begin a course of emission reductions very shortly. At a level of 550 ppm, developing nations would have approximately another 40 years to continue to grow before reducing their emissions. At a target of 650 ppm, these nations would have until roughly the year 2060 to grow (see Exhibit 3).

Exhibit 3: Carbon Emissions of Developing Countries



Source: Wigley, Richels, Edmonds (assumes Annex I parties stabilize emissions at 1990 levels by 2010 and reduce 1% per year thereafter).

No matter how one tries to solve the climate equation, one cannot escape the fact that developing countries control the majority of votes in the United Nations. They will never agree to emission reductions that unduly constrain their own economic growth. That is why the United States and western Europe agreed in the Berlin Mandate to let half of the world off the hook on this issue. Without conceding to the majority position, represented by the G-77 and China, the Berlin Mandate would not have been possible.

Consequently, America's labor community looks very skeptically at proposals that would bind the United States to premature reductions unrelated to an ultimate atmospheric concentration target. The reductions to be considered later this year in Kyoto may not be necessary to achieve the ultimate target called for by the Rio Treaty. But they will cost more than a million American jobs and trillions of dollars of foregone production of goods and services. In our view, the Berlin Mandate should be allowed to expire. We

need to go back to the drawing board to determine the extent of global interest in a truly global solution to climate change.