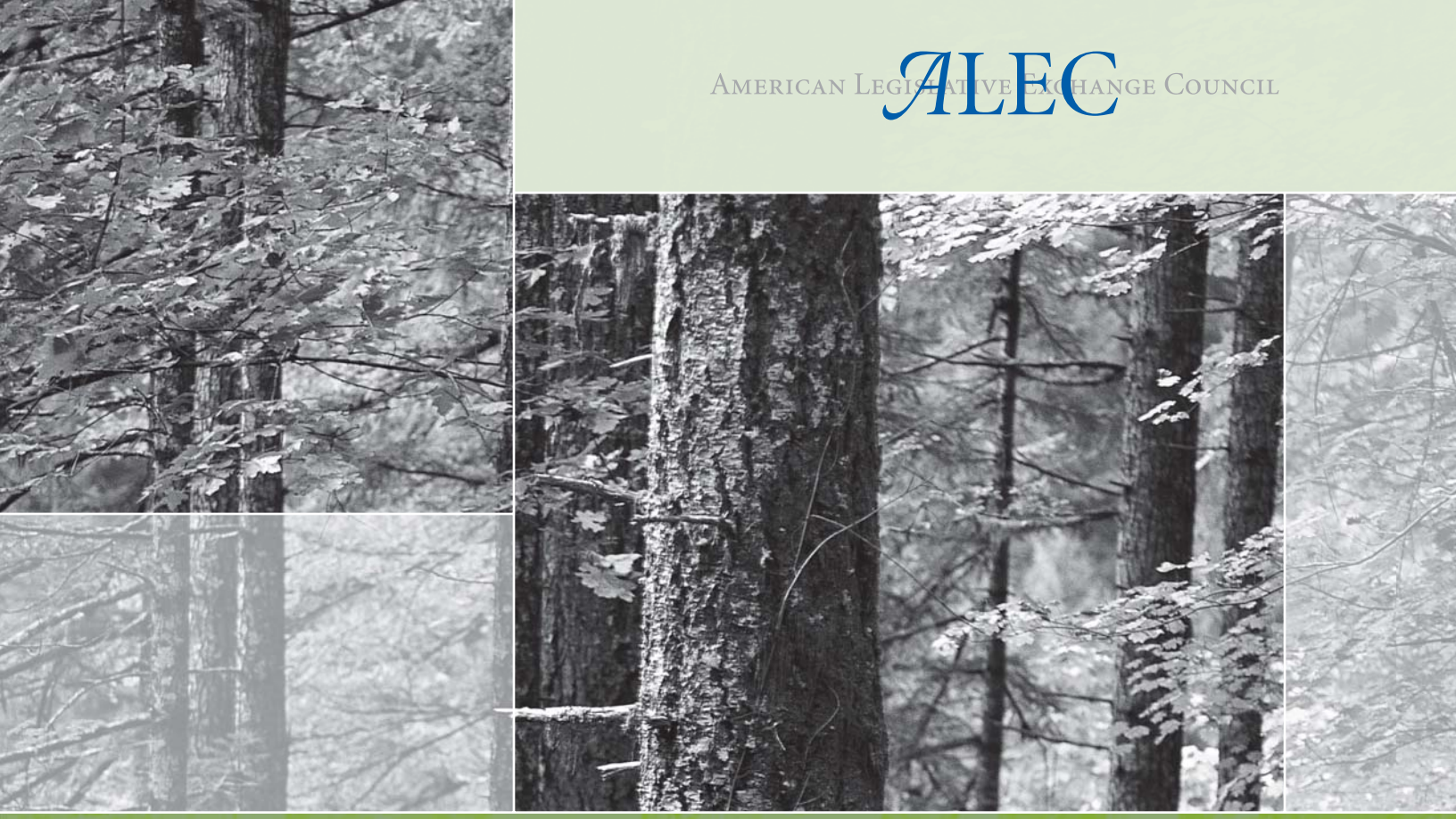

American Legislative Exchange Council

ALEC

Energy, Environment, And Economics

A Guide for State Legislators

Fifth Edition

AMERICAN LEGISLATIVE EXCHANGE COUNCIL

The American Legislative Exchange Council (ALEC) was founded in 1973 by a small group of Democratic and Republican state legislators who shared a common commitment to the Jeffersonian principles of individual liberty, limited government and free markets. Today, ALEC has grown to become the nation's largest nonpartisan, individual membership organization of state legislators, with 2,400 members throughout the 50 states. Nearly one-third of ALEC's members hold leadership positions in their legislatures.

ALEC provides the private sector with an unparalleled opportunity to have their voices heard with an appreciation for their perspective. Through ALEC, legislators and the private sector work in a dynamic partnership to develop public policies that harness the immense power of free markets and free enterprise to encourage economic growth, increase the nation's competitiveness, and improve the quality of life for all Americans.

This publication is a product of the policy project entitled: *Energy Sustainability in the 21st Century: The Case for Optimism*, under the supervision of the membership of the **Natural Resources Task Force**.

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ENERGY, ENVIRONMENT, AND ECONOMICS: A Guide for State Legislators, The Fifth Edition

Editor: Jorge Amselle, *Director of Public Affairs*

A Message from the National Chairman

Dear ALEC Member,

Energy issues continue to be on everyone's mind. In 2005, Hurricanes Katrina and Rita caused large supply disruptions and resulted in high prices for oil and natural gas. In 2006, increasing global demand, coupled with jitters about the supply of oil, made prices increase again. In 2007, energy prices have remained higher than in the past.

Despite the pain that consumers feel from higher energy prices, some activists think that we ought to pay an even higher price for energy. Concerns about climate change have many people calling for cap-and-trade programs such as the Kyoto Protocol at the international level. These programs are designed to increase energy prices and Europe is already feeling the pain from high energy prices.

Despite Europe's experiment many people are promoting "Sons of Kyoto" legislation at the state level. This year has seen an explosion in bills that regulate or set up the groundwork to regulate greenhouse gases at the state level. Promoters of these policies claim that these programs use "market mechanisms," but in reality, it is the framework for government price-setting of hydrocarbon-based energy resources that are used by our citizens for electricity, heat, and transportation on a daily basis.

Energy drives our economy. A critical component in the free market approach to the production and transmission of that energy is that of fuel diversity. A diverse portfolio of fuel sources enhances our energy security and independence. Our abundance of opportunity and economic growth is threatened by the encroachment of regulatory restraints put into place under the auspices of concern about global climate change.

Hydrocarbons, found in fossil fuels such as coal, petroleum, and natural gas, provide over 85 percent of America's energy. Although there are many alternative sources of energy, none have the capacity of hydrocarbons to meet today's demand or tomorrow's call for energy. Research is underway to develop new technologies for improvement in energy efficiency, but we have a long way to go.

As state policymakers, the best way to encourage innovation is to allow the free market work and to remove regulatory barriers that create disincentives for progress. I am optimistic that our American ingenuity will provide the answers to the challenges of energy security in the future while keeping our economy strong.

Sincerely,

Iowa Representative Dolores Mertz
2007 ALEC National Chairman

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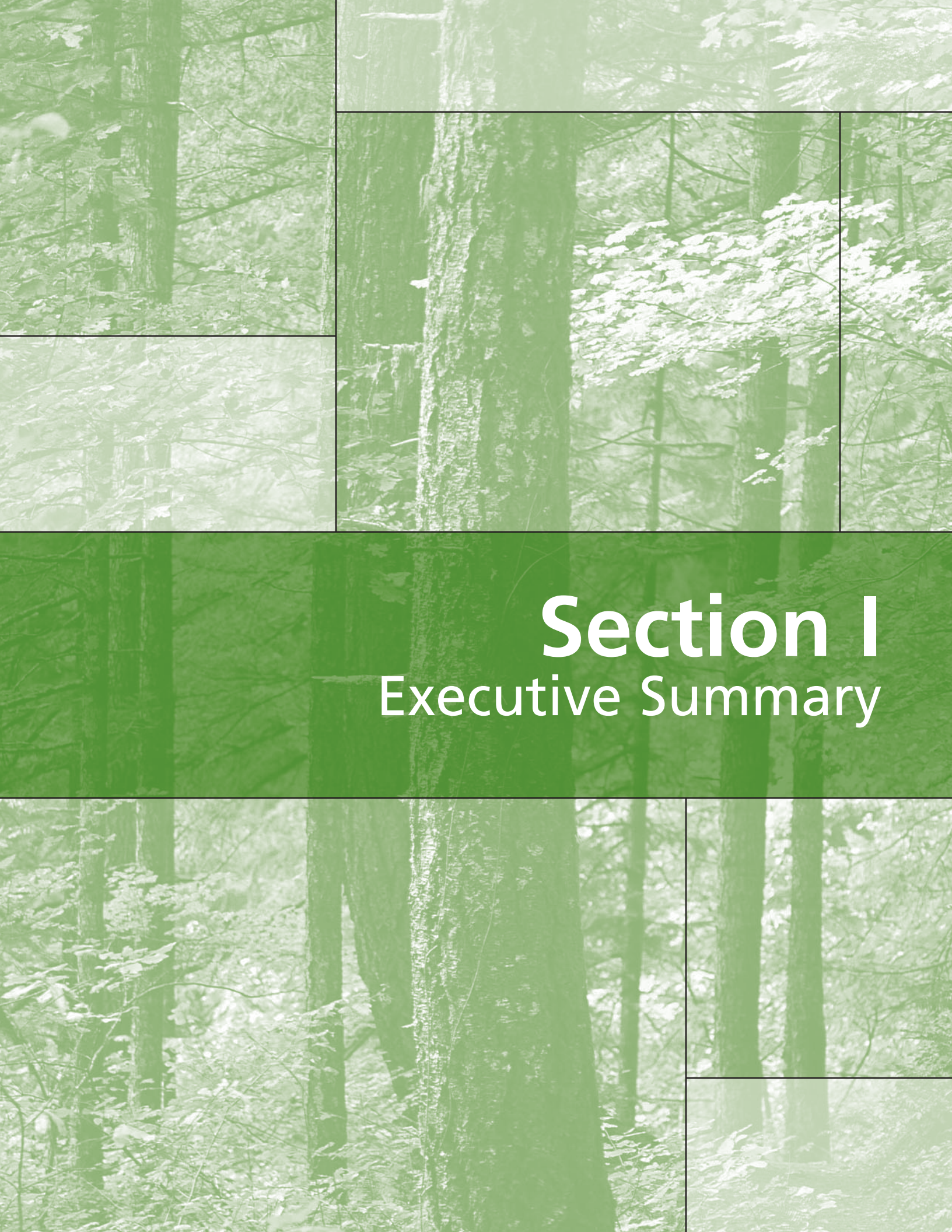


Section I
Executive Summary

Energy Sustainability in the 21st Century

By Daniel R. Simmons, Esq.
Director of the Natural Resources Task Force
American Legislative Exchange Council

Recently I spoke on global warming at the Annual Summer Meeting of the National Association of Attorneys General. Many of the state AGs wanted to know of reliable sources for information on climate change. This is exactly why we produce this publication—to provide an informational resource that state legislators can turn to for reliable information on climate change. At a time when state legislators are bombarded with the distortions, half truths, and downright wrong assertions about climate change, now more than ever state legislators need good information on these issues. Here are some highlights in this guidebook.

- In *Kyoto Spawn: The Progeny of the Kyoto Protocol*, I write about the growth of programs put forward to "do something" about global warming. In short, these programs are costly to consumers and will not have any impact on the environment.
- *Climate Change Overview* provides an easily-digestible overview of information about the most important issues regarding climate change.
- *Global Warming FAQ* was written by Iain Murray of the Competitive Enterprise Institute. It covers all of the frequently asked questions about global warming.
- The *Issues Briefs* on Renewable Portfolio Standards and Energy Independence deal with issues state legislators frequently deal with in climate change debates—renewable portfolio standards and calls for energy independence. While neither of these issues are strictly climate change issues, they are sold as fixes to climate change concerns.
- State legislators frequently hear claims that climate change will lead to droughts, reduced snow pack, and a variety of other ills. The problem is that climate models are not good enough to make these claims. Patrick Michaels, in *Do Climate Models Project a Useful Picture of Regional Climate*, explains some of the problems with the current state of climate change models.

Much of the climate change debate is really about energy, not climate. The section of this guide titled *Our Energy Future* explains that despite current high energy prices, we will have plentiful amounts of energy in the future, as long as we do not artificially restrict our energy choices. State legislators are frequently seeing threats to energy markets in the form of calls to enact price gouging legislation. In *Motor Fuel and Natural Disasters: Don't Regulate*, Robert Bradley and Thomas Tanton demonstrate how price gouging laws actually hurt consumers by failing to provide incentives for plentiful energy.

This guidebook also contains policy tools for state legislators. This section includes *ALEC's Energy Principles*, which is ALEC's policy, created and approved by the Natural Resources Task Force, on improving our access to affordable and plentiful energy. *Policy Tools for Energy Sustainability: What Works and What Doesn't* provides a realistic assessment of our potential energy options. Debates over energy and the environment frequently revolve around scientific questions. The article, *How Good is the Science*, contains ten questions to ask scientific experts in order to better assess the information they are providing. *Getting a Healthy Environment Without Paying Kyoto Prices* describes proactive measures we can take to improve the environment without falling into the pitfalls of the Kyoto Protocol or similar state-based plans.

Lastly, the guidebook contains ALEC model bills relevant to energy and the environment. And the final section is a glossary, which provides a guide to important scientific terms relevant to energy and environmental debates.

It is our hope that this guide will help state legislators as they engage in climate change and energy debates in state houses around the country. As you engage in these debates and if ALEC can help, please contact Daniel Simmons, ALEC's Natural Resources Task Force Director, at 202-466-3800 or dsimmons@alec.org and I will assist you in any way possible. ■

Section II

Kyoto Spawn - Progeny of the Kyoto Protocol

Kyoto Spawn: The Progeny of the Kyoto Protocol

By Daniel R. Simmons, Esq.
June 2007

The only thing constant about the earth's climate is that it is constantly changing. The Jurassic period, when dinosaurs walked the earth, was much warmer than today. The last Ice Age, which ended about 10,000 years ago, was much cooler than it is today. While everyone acknowledges that Earth's climate is constantly changing, many fear that humans might be altering the climate outside of previous norms.

These worries are causing many nations and some states to adopt policies in an effort "to do something" about the perceived problem. Many nations have joined the Kyoto Protocol and some states are "doing something" by adopting programs such as the Regional Greenhouse Gas Initiative in the Northeastern United States or California's "Global Warming Solutions Act" to "combat global warming." These plans, however, have no environmental benefits, but will cost billions upon billions of dollars each year.

The Run up to the Kyoto Protocol

Since the late 1800s, when the "Little Ice Age" ended, the earth has been warming. This warming continued through 1940, but from 1940 through about 1970, temperatures decreased. This decrease in temperature happened just as human-caused emissions of carbon dioxide and other greenhouse gases started increasing rapidly. Because of the cooling during the late 1960s and early 1970s, many people weren't concerned about global warming. They were concerned that we were headed into another ice age. However, the fears of global cooling were short-lived as the temperatures began warming again and continued to warm until about 1998.[1]

In response to the earth's warming, many people have become concerned that humans are altering the global climate with carbon dioxide emissions. They argue that because carbon dioxide is a greenhouse gas, and humankind burns fossil fuels that emit carbon dioxide, the warming temperatures must have been caused by humanity's actions.

In response to these concerns, many governments joined together to create the Kyoto Protocol in late 1997. The Kyoto Protocol is an attempt to reduce the greenhouse gas emissions by some countries and reduce global warming. Kyoto requires developed countries to reduce their emissions to at least 5 percent below levels in 1990 by the year 2012.[2] While the developed countries have to reduce their emissions, the Kyoto Protocol does not create binding limits on third world countries, even though their greenhouse gas emissions will overtake the developed countries' emissions by about 2010.[3] It is estimated that 85 percent of carbon dioxide emissions growth from now until 2030 will come from the third world.[4] The reason for the increased emissions growth from the third world is simple—they have growth economies and they do not want to jeopardize that growth by using expensive sources of energy. In fact, China already is the world's largest producer of coal, the world's second largest consumer of energy, [5] and this year they are on track to become the biggest emitter of carbon dioxide.[6]

Would the Kyoto Protocol Reduce Global Warming?

The stated purpose of the Kyoto Protocol is to reduce global warming. But even its supporters admit that it will not reduce global temperatures by any appreciable amount. Tom Wigely of the National Center for Atmospheric Research (a federally funded research and development center) has calculated that if the Kyoto Protocol were implemented, it would only avert increases in temperature of 0.07 of a degree Celsius by 2050 and 0.14 of a degree Celsius by 2100.[7] The previous sentence is not a misprint. The full Kyoto Protocol, which would commit the United States to reduce greenhouse gas emissions to seven percent below 1990 levels (or about 20 percent below today's levels), would only avert 0.07 of a degree Celsius in warming in 2050 and 0.14 of a degree Celsius by 2100. This tiny amount likely is not measurable and because it is so small it will not have an effect on the climate or ecosystems.

Because the Kyoto Protocol has no environmental benefits, Kyoto's supporters now claim that Kyoto is only a "first step."[8] But this begs the question—why is such an expensive first step being taken?

How Expensive is Kyoto?

Not only would Kyoto Protocol produce no environmental benefits, it would entail great economic costs. Stephen P.A. Brown, a Senior Economist and Assistant Vice President at the Federal Reserve Bank of Dallas analyzed the predicted outcome of the Kyoto Protocol and found that:

- Without any offsets or credits, U.S. GDP would be 3.6 percent to 5.1 percent lower in 2010, representing a loss of $330 billion to $467 billion or about $1,100 to $1,600 per capita.

- Using offsets and credits, compliance would cost the U.S. from 3 percent to 4.3 percent of GDP, representing a loss of between $921 and $1,320 for every man, woman and child in the country.[9]

The Energy Information Administration has estimated that Kyoto would cost taxpayers between $100 billion and $400 billion per year.[10] And the Heartland Institute estimates that implementation of Kyoto would require increasing gas taxes by 65 cents per gallon and doubling the price of electricity. This would result in the elimination of 2.4 million jobs and it would cause the average household income to fall by $3,372, and cost state governments $116 billion a year in revenue.[11]

The reason that the Kyoto Protocol would cost Americans so much money is because we use a lot of fossil fuels. Fifty-two percent of all electricity comes from coal-fired power plants and 14 percent from natural gas fired power plants.[12] If the U.S. were to comply with the Kyoto Protocol and reduce our greenhouse gas emissions, we would need to come up with alternatives to power our cars and produce electricity. Currently, alternative technologies do not exist to fuel cars or produce electricity cost-effectively.

The Kyoto Protocol in the United States

At the end of the Clinton Administration, the United States and Europe were negotiating the Kyoto Protocol, but talks broke down. The United States realized at that time that the Kyoto Protocol was just too expensive, especially since it provided no benefits. The

Bush Administration kept the same basic negotiating position as the Clinton Administration, and as a result, the United States has not agreed to any binding commitments to reduce our greenhouse gas emissions.

Kyoto-Lite

Neither the Bush nor the Clinton Administrations ever put the Kyoto Protocol to a vote before the Senate. The Senate hasn't been predisposed to take up the Kyoto Protocol, but in 1997, the Senate passed a resolution 95-0 which stated that the Kyoto Protocol, "could result in serious harm to the United States economy, including significant job loss, trade disadvantages, increased energy and consumer costs, or any combination thereof."[13]

Despite projected massive economic losses, coupled with a lack of environmental benefits, some Senators are still trying regulate greenhouse gas emissions. Senators McCain and Lieberman have been working for the last few years to produce Kyoto-like legislation. In 2003, McCain and Lieberman introduced a bill that would require the commercial, industrial, transportation and electric power sectors to reduce their greenhouse gas emission to 2000 levels by 2010 and to 1990 levels by 2016. This is strikingly similar to the Kyoto Protocol. The Senators' bill was defeated by a tally of 43-55 in 2003. But undaunted, in 2005 Senators McCain and Lieberman introduced a bill similar to their last bill that had new incentives for nuclear energy. But like its predecessor, this bill was voted down, this by a count of 38-60. There are rumblings in the 110th Congress that Congress will pass some type of greenhouse gas cap-and-trade program, but it is unlikely. Lawmakers will likely view the economic cost and lack of environmental improvement of European efforts and instead follow President Bush's leadership promoting voluntary reduction and technological exchange and improvement.

Kyoto Spawn—Coming to a State Near You

Because the proponents of the Kyoto Protocol have repeatedly lost at the federal level, both by failing to get approval of the Kyoto Protocol and by having their bills, such as the McCain-Lieberman bills defeated, attention of many activist groups have shifted to the state level.

After President Bush was elected in 2000 and it became obvious that the Administration opposed the Kyoto Protocol, the pace of introduction of bills that would regulate greenhouse gases, or lay the foundation to regulate greenhouse gases increased in the states. Above is a graph that shows the number of greenhouse gas regulating bills introduced in the last few years, the number of states in which the bills were introduced, and the number of bills that were passed.

The number of bills introduced peaked in 2004 and fell afterwards. But the surge of Democrats elected in 2006 reversed the trend in a massive way.

The maps on the next page show the variety of enacted greenhouse gas regulatory programs and carbon dioxide emission and sequestration programs in the states.

Greenhouse Gas Regulating Bills in the States

Year	Number of Bills Introduced to Regulate Greenhouse Gases	Number of Different States	Number of Greenhouse Gas Regulating Bills Passed
2001-2002	66	25	21
2003	99	27	9
2004	110	27	16
2005	78	24	10
2006	68	19	13
2007*	358	41	33

*(year to date)

Figure 1: Greenhouse Gas Regulations in the States 1997-2006

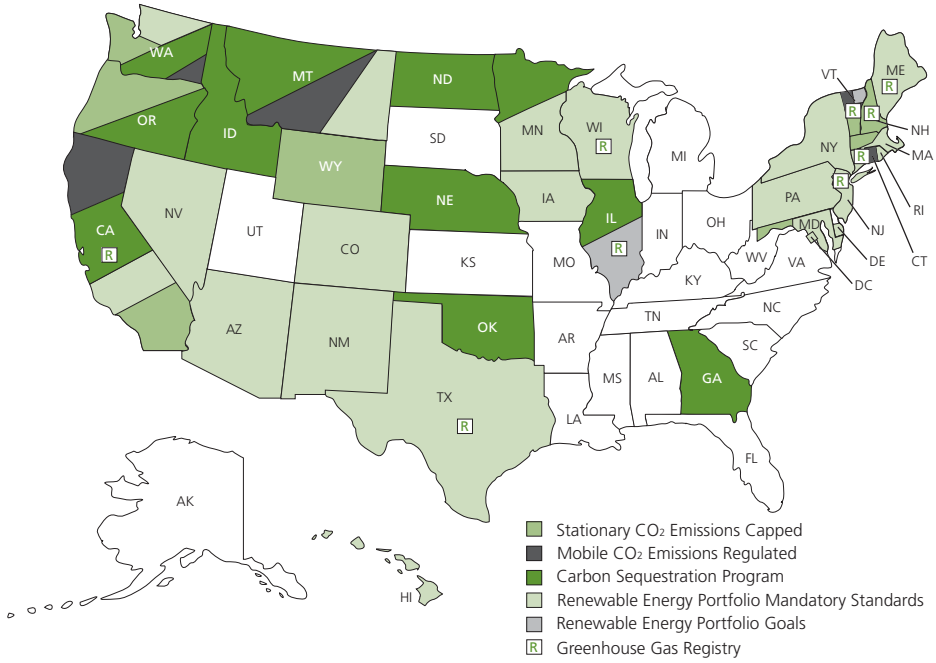


Figure 2: Renewable Energy Portfolio Standards in the States

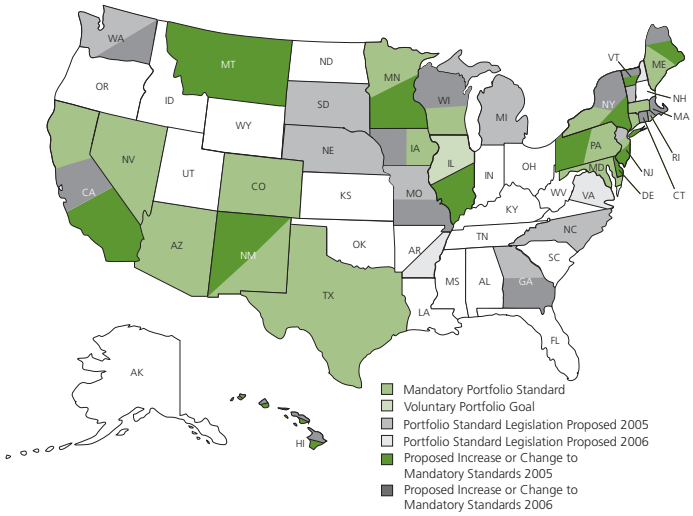


Figure 4: State Activity Targeting Mobile Emissions of CO_2

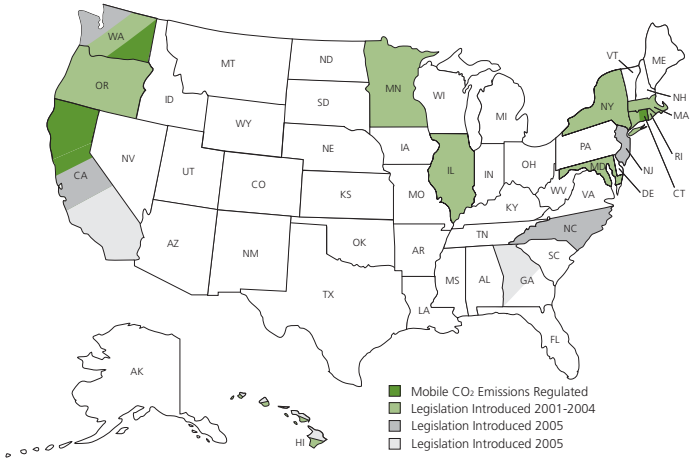


Figure 3: Carbon Sequestration Programs in the States

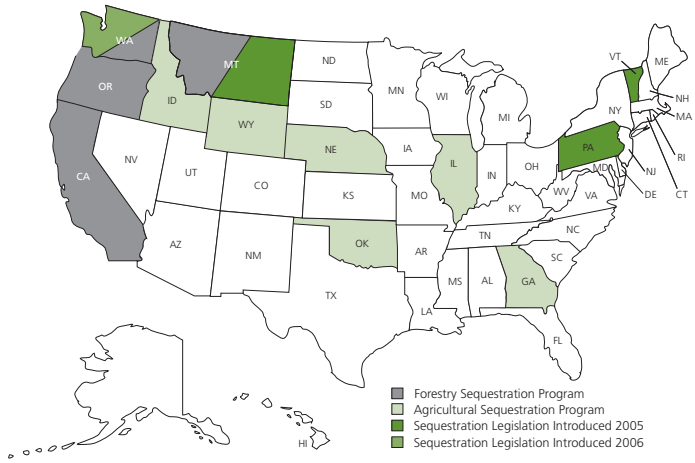
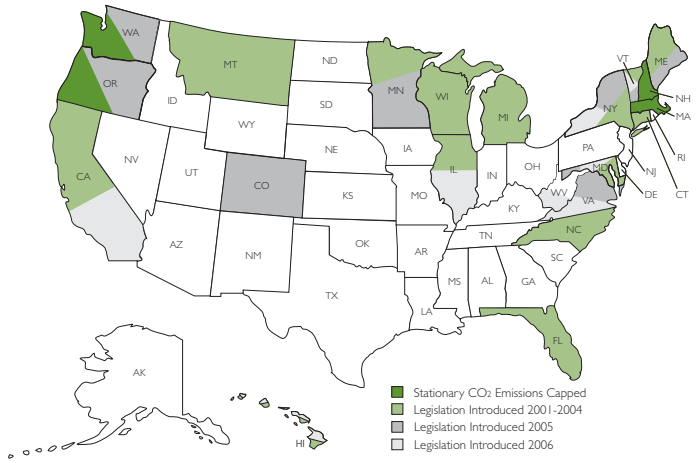


Figure 5: States Requiring Mandatory Reduction of Stationary CO_2



Regional Greenhouse Gas Initiative—RGGI

One of the latest developments at the state level is the Regional Greenhouse Gas Initiative in the Northeastern United States. In 2003, New York Governor George Pataki sent letters to 11 governors from Maine to Maryland inviting the governors to develop a mini-Kyoto Protocol and cap carbon dioxide emissions in their states.[14]

After a few years of negotiating, the current plan is to cap carbon dioxide emissions from electrical generation units at "current levels" (an average of the emissions from 2002–2004) by 2014 and then reduce carbon dioxide levels by 10 percent by 2019. In December 2005, seven states (New York, New Jersey, Connecticut, Delaware, New Hampshire, Vermont and Maine) signed a memorandum of understanding committing to RGGI. Two notable exceptions refused to sign on to the pact - Massachusetts and Rhode Island. Massachusetts Governor Romney refused to join RGGI because he did not want to increase electrical rates for only symbolic environmental gains.

Romney understood that the Kyoto Protocol and RGGI would only produce symbolic benefits. As Romney explained to the New York Times, "We're seeing huge rate increases now in the cost of energy. To add to that burden for the purposes of symbolism is something our business community is not about to undertake."[15] After Governor Romney left office, however, Massachusetts joined RGGI.

While RGGI only produces symbolic benefits, the costs are real. The latest data from Charles River Associates shows that RGGI will cost each family about $180 per year in 2010 and $270 a year in 2020. Admittedly, these costs are not great, but it is questionable to pay $180 or more for a program that does not have any environmental benefits.

Dr. Robert Crandall, an economist with the Brookings Institution has explained, "Every dollar dedicated to greenhouse gas abatement today could be invested to grow into $117 in the next 50 years at a 10 percent social rate of return, even at a puny 5 percent annual return, each dollar would grow into $12 in 50 years. Therefore, we need to be sure that the prospective benefits, when realized, are at least 12 to 117 times the current cost of securing them. Otherwise, we should simply not act, but use our scarce resources in other ways."[16] It's too bad that only Massachusetts and Rhode Island understand that RGGI's benefits are symbolic, but the costs are all too real and as Dr. Crandall explains, these costs compound over time.

California's Global Warming Solutions Act

On September 27, 2006 California Governor Arnold Schwarzenegger signed the "Global Warming Solutions Act." This bill promises to reduce California's greenhouse gas emissions to 1990 levels by 2020. This is a 25 percent decrease from current levels.

The most interesting part of the law is that it did not specify exactly how to achieve these emission cuts. Instead, the law relies on the California Air Resources Board (CARB) to develop the regulations to achieve the desired

Residential Electricity Costs—Sorted by Least to Most Expensive

	Residential Electricity Cost (Fn 1)			Electricity from Selected Fuel Sources (Fn 2)				
State	Feb-06	Feb-05	Percentage Change 2005-2006	Coal	Natural Gas	Nuclear	Hydroelectric Conventional	Total % for these Fuel Sources
Missouri	6.55	6.3	4%	86%	3%	9%	2%	100%
Kentucky	6.53	6.05	8%	91%	1%	0%	4%	96%
Tennessee	7.33	6.77	8%	60%	0%	29%	11%	100%
North Dakota	6.45	6.08	6%	94%	0%	0%	5%	99%
Indiana	7.77	7.14	9%	94%	2%	0%	0%	96%
Kansas	7.43	7.37	1%	74%	2%	22%	0%	98%
West Virginia	6.15	6.03	2%	98%	0%	0%	1%	99%
Nebraska	6.55	6.15	7%	64%	1%	32%	3%	100%
Arkansas	7.78	6.88	13%	49%	10%	30%	7%	95%
Oklahoma	8.46	7.05	20%	56%	38%	0%	5%	99%
Ohio	8.94	7.84	14%	86%	1%	11%	0%	98%
South Dakota	7.33	7.1	3%	48%	1%	0%	48%	97%
Virginia	7.94	7.56	5%	45%	8%	36%	2%	91%
Minnesota	8.63	7.62	13%	65%	3%	25%	1%	94%
Georgia	8.71	7.9	10%	63%	5%	27%	3%	98%
South Carolina	8.82	8.32	6%	40%	4%	52%	2%	98%
Iowa	9.68	8.73	11%	82%	2%	11%	2%	97%
Alabama	8.23	7.29	13%	55%	12%	23%	8%	97%
Michigan	9.56	8.42	14%	58%	13%	26%	1%	98%
Idaho	6.14	5.89	4%	1%	16%	0%	78%	95%
Wyoming	7.07	7.02	1%	97%	0%	0%	1%	98%
Illinois	8.05	7.83	3%	49%	2%	48%	0%	99%
Delaware	8.66	7.9	10%	60%	22%	0%	0%	82%
North Carolina	8.95	8.4	7%	60%	2%	32%	4%	98%
Maryland	7.93	7.46	6%	56%	2%	28%	5%	91%
Mississippi	9.66	7.79	24%	40%	27%	23%	0%	90%
Washington	6.67	6.43	4%	10%	8%	9%	70%	97%
Arizona	8.17	8.02	2%	38%	27%	27%	7%	99%
Texas	11.85	9.47	25%	38%	48%	10%	0%	96%
Louisiana	9.59	7.9	21%	24%	47%	13%	2%	86%
Oregon	7.46	7.19	4%	7%	26%	0%	64%	97%
Montana	8.22	7.53	9%	65%	0%	0%	33%	98%
Utah	7.35	7.09	4%	96%	2%	0%	1%	99%
Pennsylvania	10.05	9.31	8%	55%	5%	36%	1%	97%
Wisconsin	10.2	9.16	11%	70%	4%	20%	3%	97%
New Jersey	11.38	10.56	8%	18%	29%	48%	0%	95%
Florida	11.14	9.37	19%	30%	35%	14%	0%	79%
New Mexico	9.01	8.84	2%	89%	9%	0%	0%	98%
Colorado	9.2	8.73	5%	75%	23%	0%	3%	100%
New Hampshire	15.02	13.54	11%	17%	23%	43%	6%	89%
Maine	14.07	12.52	12%	22%	44%	13%	2%	81%
Vermont	13.36	12.9	4%	0%	0%	71%	22%	93%
Rhode Island	14.73	10.55	40%	0%	97%	0%	0%	97%
Massachusetts	18.43	13.17	40%	22%	44%	13%	2%	81%
California	13.47	11.84	14%	1%	52%	16%	18%	86%
Nevada	10.88	10.25	6%	48%	44%	0%	4%	96%
Connecticut	16.26	13.09	24%	13%	25%	51%	1%	90%
New York	16.52	14.53	14%	17%	20%	29%	17%	83%
Alaska	13.71	12.5	10%	10%	56%	0%	23%	88%
Hawaii	22.94	18.57	24%	14%	1%	0%	1%	16%

Fn 1: http://www.eia.doe.gov/cneaf/electricity/epm/epmxlfile5_6_a.xls
Fn 2: http://www.eia.doe.gov/cneaf/electricity/epa/generation_state.xls

greenhouse gas reductions. So far, CARB has yet to develop regulation necessary to implement the requisite cuts.

Kyoto and RGGI Spawn—Driving Up Energy Costs

Energy prices have been rising in the United States. The reason for the high prices is simple—increasing worldwide demand and threats (perceived or real) to the supply of oil.

The price of electricity has been increasing as well—mostly because the price of natural gas has increased. For years natural gas has been a favored fuel for power plants to allow them to comply with regulations imposed by the Clean Air Act Amendments of 1990. Natural gas has been as an inexpensive, clean burning fuel. The problem is that natural gas prices have rapidly increased because demand has increased without similar increase in supply.

The previous page shows a state-by-state listing of residential electricity prices and the most common fuels for producing electricity. There are a few important lessons in this data. First, there is a strong correlation between low electricity prices and coal use. The states with the lowest electricity prices, such as Idaho, West Virginia, North Dakota, Kentucky, Missouri all either receive the overwhelming majority of their electricity from coal or hydroelectric power. Second, the states with high electricity prices, such as Hawaii, Massachusetts, New York, Connecticut, New Hampshire, receive most of their electricity from sources other than coal. Hawaii gets most of its electricity from petroleum fired power plants, Massachusetts gets 44 percent of its electricity from natural gas, and Connecticut gets 51 percent of its electricity from nuclear power.

Curiously, the states with the highest energy prices are the states that are involved in schemes to cap carbon dioxide emissions. New York, Connecticut, New Hampshire, Maine and Vermont are all involved in RGGI, and respectively they have the third, fourth, fifth, sixth, and tenth most expensive residential electricity prices.

Conclusion

The science of climate change is unsettled and a number of articles in this book discuss it. But there are a few things we know for certain. We know that the earth started warming in the late 1800s and has warmed since then. The question is how much, if any, of this warming is caused by human activities. We also know that plans such as the Kyoto Protocol, Regional Greenhouse Gas Initiative, and California's Global Warming Solutions Act are both costly and provide no environmental benefits. If we are concerned about future generations, we owe it to them study the issues of global warming, but not dramatically limit our economic competitiveness by embarking on misguided schemes. ■

Daniel R. Simmons is the Natural Resources Task Force Director at the American Legislative Exchange Council.

Endnotes

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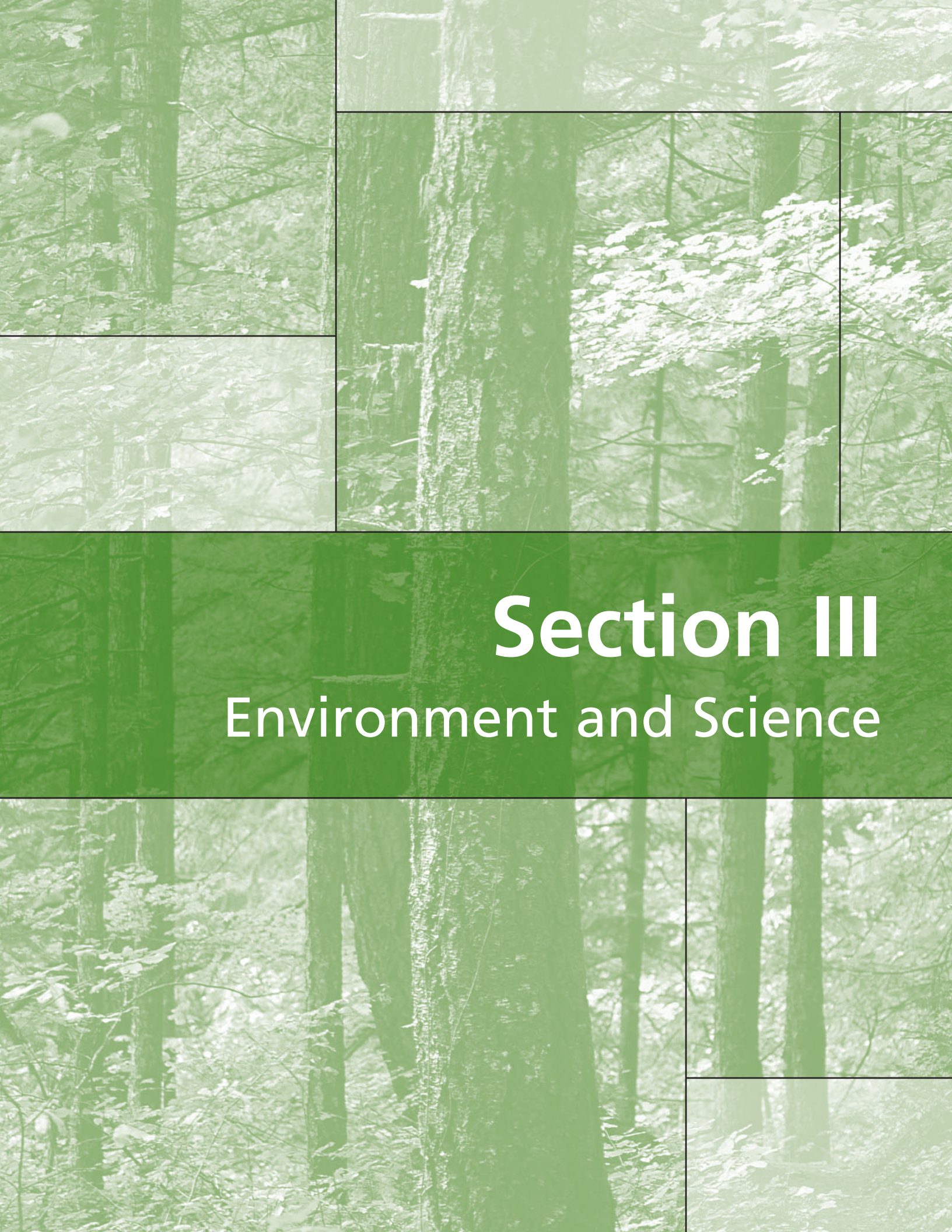


Section III

Environment and Science

Climate Change Overview for State Legislators

By Daniel R. Simmons, Esq.
American Legislative Exchange Council

In this edition of Energy, Environment, and Economics we wanted to provide more easily-available information. To this end, the next four articles provide state legislators with a quick reference on issues they frequently see in the states—climate change, renewable portfolio standards, and calls for energy independence.

What We Know about Climate Change

- The Earth has warmed since the late 1800s when the Earth was in the Little Ice Age.
- Carbon dioxide levels are increasing.
  - Humans are helping to increase carbon dioxide levels in the atmosphere.
- Carbon dioxide is a greenhouse gas.

What May Be True

- Humans may be causing some of the warming.
  - Because human activities emit greenhouse gases, and because greenhouse gases help retain heat, human activities are likely responsible for some of the warming. The real question is how much.
  - At the local level, humans definitely are causing warming because of "urban heat islands." Concrete, pavement, and other built surfaces retain heat more than vegetation.

What We Don't Know

- **We don't know how well computer models can model the future.** As the American Association of State Climatologists has stated, "climate predictions have not demonstrated skill in projecting future variability and changes in such important climate conditions as growing season, drought, flood producing rainfall, heat waves, tropical cyclones, and winter storms."[1]
  - The claims of how much humans have impacted the climate are contingent on computer models.
  - The reason models have a difficult time predicting the future is because we don't understand all climate "forcings" very well. Climate forcings are the ways in which factors such as the sun and the chemical makeup of the atmosphere cause climate to change.
  - We think we understand how greenhouse gas force temperatures, but we don't have a good understanding of ozone's impact, aerosols,[2] or solar activity.[3]
- **We don't know how a changing global climate will affect climate on a regional level.** Models cannot skillfully predict regional climate.[4] This is important because what matters to people is not the climate on the other side of the world, but the climate in their region.

Climate Change Policy

The Kyoto Protocol will not reduce temperature an appreciable amount, but it will increase energy prices

- If the Kyoto Protocol were implemented, it would only avert 0.07 of a degree Celsius temperature increase by 2050 and 0.14 of a degree Celsius by 2100.5 As Bjorn Lomborg explains, "the temperature that we would have experienced in 2094 we have now [if Kyoto were fully implemented is] postponed to 2100."[6]
  - To implement the Kyoto Protocol the United States would reduce greenhouse gases 5.2 percent below 1990 levels (about 16 percent below 2004 greenhouse gas levels).

- **Developing Countries Will Emit the Majority of CO2 in the Future.** One reason the Kyoto Protocol is so ineffective, is that the countries that will emit the most CO2 in the future are exempt. These exempt countries including China, India, South Korea, Mexico, Brazil and 145 other nations, will emit 75 percent of CO2 by 2050 and near 90 percent by 2100.
  - According to the latest data, China is on track to because the world's number one emitter of carbon dioxide this year.[7]

- **Europe will not meet its Kyoto targets.** The European Environmental Agency predicts the EU 15 to be 7 percent above their emissions targets in 2010 unless the EU enacts more stringent regulations.[8]
  - Between 2000 and 2004, greenhouse gas emissions increased by 2.3 percent in the European Union,[9] while only increasing 1.3 percent in the United States.[10]
  - The point isn't necessarily that the United States is doing better than Europe, but that Europe's cap-and-trade program isn't reducing greenhouse gas emissions.

- **Increased energy prices is the point of cap and trade programs like Kyoto.** Lars G. Josefsson, who is an adviser to German Chancellor Angela Merkel, said higher electricity prices are "the intent of the whole exercise. . . . If there were no effects, why should you have a cap-and-trade system?"[11]
  - Already electricity rates in the UK are up 16 percent, in part because of greenhouse gas reduction policies.[12]
  - Electricity rates in Germany are up 25 percent.[13]
  - These high energy prices are causing some plants to close and many jobs to move to places without onerous energy regulations.

What Does Europe's Failure to Meet Greenhouse Gas Targets Matter to State Legislators?

- Around the country we hear that Europe is "taking leadership" on global warming. They are "doing something" because they signed the Kyoto Protocol. The problem is that there actions are leading to higher prices and they aren't meeting their commitments.
- The Kyoto Protocol is all cost and no benefits. At best there is a marginal benefit to the Kyoto Protocol (ie. It averts 0.07 degree celcius temperature increase by 2050), but it increases energy costs and drives new industrial development to countries that don't have Kyoto restrictions.
- Cap and trade programs in the United States such as California's Global Warming Solutions Act and the Regional Greenhouse Gas Initiative in the Northeastern United State are based on Kyoto Protocol. They will increase costs, and because they are less ambitious than Kyoto, the results will be even less. In other words, these programs are all cost and no benefit.

Why Do Some Companies Support Kyoto and other Cap-And-Trade Programs?

- The answer is simple; they think they can make money depending on how the program is structured.[14]
  - "The first big corporate promoter of the Kyoto Protocol and cap-and-trade programs in the United States was Enron. Enron was a natural gas distributor, and Kyoto would kill coal-fired electric generation, boosting demand for Enron's product. Enron's energy traders also expected to make juicy commissions on the purchase and sale of carbon credits and profits from creating the trading markets for those credits. According to an internal Enron memo, Kyoto would 'do more to promote Enron's business than almost any other regulatory initiative outside of

restructuring the energy and natural gas industries in Europe and the United States.'"[15]

– While cap-and-trade program may be good for some businesses, they are not good for consumers. As the Financial Times reports, "Britain's electricity generators could make windfall profits of about £1.5bn [$2.97 billion] a year from the European Union's emissions trading scheme, industry estimates suggest, raising further questions about the operation of the programme intended to combat global warming. Across Europe, the profits could add up to about €20bn (£13.6bn) [$26.8 billion] a year."[1]

Some studies show that some cap-and-trade schemes are pretty cheap, so we should do them.[17]

- We should weigh the costs and benefits to programs, rather than doing something simply because it isn't as expensive as some alternatives. For example, in past Congresses, Senators McCain and Lieberman have introduced the "Climate Stewardship Act." This act would institute a cap-and-trade system in the United States, but one that isn't as stringent as the Kyoto Protocol. MIT did a study on the act and found that a national emission trading system would cost less than $20 per household per year. That sounds great, right? Wrong. While the McCain-Lieberman program might be less expensive than other programs, it has no environmental benefits. Spending $20 a year and getting nothing is a bad deal, no matter how you look at it.

- When California passed the Global Warming Solutions Act some people claimed that it would be an economic benefit to California. But recent studies show the exact opposite. David Montgomery of the economic consultants, CRA, recently completed a study that shows "it will cost California something to meet the targets."[18] The problem with trying to find the economic impacts of California's program is that California has not finalized how they plan to meet their goals. Thusfar they have only mandated goals without designing a system to get there.

Common Climate Change Concerns

Q. Is Increasing Levels of CO2 Causing Glaciers to Retreat?

A. No, but many glaciers are retreating and have been for over 100 years.

Many glaciers around the world are retreating. One iconic example of this is the retreat of the glaciers on Mount Kilimanjaro in Africa. Many people, including Al Gore cite this as evidence of human-included global warming. But according to the authors of an article published in the July–August edition of American Scientist, "global warming has nothing to do with the decline of Kilimanjaro's ice, and using the mountain in northern Tanzania as a "poster child" for climate change is simply inaccurate."[19] The Kilimanjaro glaciers are retreating, not because of warmer climate (in fact the temperature is always substantially below zero), but because there has been a drying of the surrounding air (which means less snowfall) and the loss of ice is caused by solar radiation.[20]

What about glaciers in the rest of the world? First, it should come as no surprise that many glaciers are in retreat. The Little Ice Age, which lasted from the 1600s through the mid 1800s was a period of colder climate than today. Glaciers that grew in a colder climate would decline in today's warmer climate. It makes sense that if increasing levels of CO2 are leading to increased temperatures, and increased temperatures are driving the decline in the size of glaciers, then the rate of decline in the size of glaciers should be increasing. However, they are not. In other words, while many glaciers are decreasing in size, they are losing smaller amounts every year.[21]

Q. Are Higher Temperatures Increasing the Rate of Sea Level Rise?

A. No.

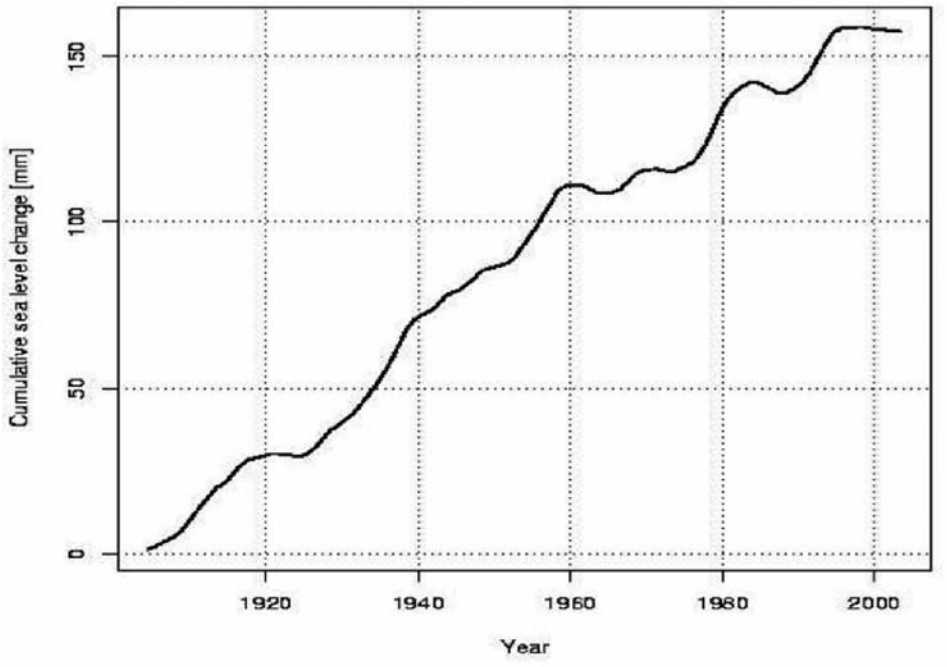
Sea levels are rising. They have been doing so for the last 10,000 years—since the end of the last ice age. If increasing levels of CO2 are leading to sea level rise, it should be increasing the rate of sea-level rise, but such is not the case. The following chart shows sea-level rise from 1904–2003. This graph is from a recent article which shows that sea level rise was slightly higher in the first half of the 20th century (1.91±0.14 mm/yr) compared to second half of the century (1.43±0.14 mm/yr).[22]

Q. Will global warming cause more hurricanes or more intense hurricanes?

A. Currently we don't know, but it is disingenuous to use Hurricane Katrina as an example without pointing out that during 2006 no hurricanes made landfall in the United States.

In Al Gore's *An Inconvenient Truth*, he prominently featured the aftermath of Hurricane Katrina to create the impression that global warming will lead to more intense hurricanes. But his view is not supported by science. In November 2006, the World Meteorological Association released a consensus statement that read, "Though there is evidence both for and against the existence of a detectable anthropogenic signal in the tropical cyclones (hurricanes) climate record to date, no firm conclusions can be made on this point."23 Even the U.N.'s Intergovernmental Panel on Climate Change recently stated that while there is some evidence of increase hurricane intensity, "there is no clear trend in the annual numbers of tropical cyclones."[24]

In its recent consensus statement on hurricanes, the World Metrological Association also stated that "No individual tropical cyclones can be directly attributed to climate change."[25] This means that it is incorrect to say that Hurricane Katrina was caused by global warming, because it was a one-time event, just like the abnormally calm 2006 hurricane season. Which is a better example of the results of global warming—Hurricane Katrina or the fact that no hurricanes



made landfall in the U.S. in 2006? The answer is neither.

Q. Are Polar Bears Doomed?

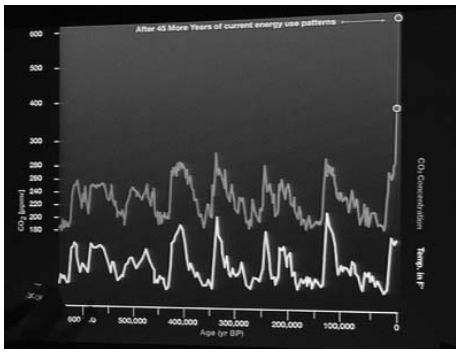
A. No. Polar bears have lived through warmer periods before, as recently as the 1930s.

As temperatures in the Arctic have increased, sea ice has decreased. Because polar bears use sea ice to hunt and to den, people have argued that less sea ice means polar bear populations will increase and they may even go extinct.[26] The problem with these arguments is that they presuppose that polar bears cannot adapt to warm arctic temperatures. Despite claims that today's warming is unprecedented, as late as the 1930s the temperatures in the arctic were as warm as they are today.[27] At that time there was a "similar shrinkage of ice cover [even though] any anthropogenic [human-caused] influence is believed to have still been negligible."[28] Furthermore, going back further in history, the U.N.'s International Panel on Climate Change points to a study that shows 5,000 years ago the temperature in Siberia was 2.5° C to 7.0° Celsius (4.5° to 12.6° F) warmer than today.[29]

Somehow despite as warm and warmer temperatures than today, polar bears have survived throughout the millennia. Polar bears have adapted to changing climate before 30 and they will do so again.

Q. In Al Gore's movie, An Inconvenient Truth, he shows a graph of temperature and CO2 levels and they appear to be correlated. Is he right?

A. The problem with Gore's graph is that he fails to mention that carbon dioxide increases follow temperature increase instead of driving it according to the historic record.



Al Gore uses this graph to argue that carbon dioxide changes drive temperature changes. The problem with this theory is that the historical record shows that carbon dioxide levels increased after temperature changes, not before. In fact, careful studies show that carbon dioxide follows temperature increases by several hundred to a thousand years.[31] Al Gore is indeed correct that there is a correlation between carbon dioxide increased and temperature, but the connection is the opposite of what he assumes. The studies show that carbon dioxide follow temperature, not the other way around.

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Global Warming FAQ: What Every Citizen Needs to Know About Global Warming

By Iain Murray
Competitive Enterprise Institute

Alarm over the prospect of the Earth warming is not warranted by the agreed science or economics of the issue. Global warming is happening and man is responsible for at least some of it. Yet this does not mean that global warming will cause enough damage to the Earth and humanity to require drastic cuts in energy use, a policy that would have damaging consequences of its own. Moreover, science cannot answer questions that are at heart economic or political, such as whether the Kyoto Protocol is worthwhile.

The Science

Isn't there a scientific consensus that global warming is real and bad for us?

- There is no "scientific consensus" that global warming will cause damaging climate change. Claims that there is such a consensus mischaracterize the scientific research of bodies like the United Nations Intergovernmental Panel on Climate Change (IPCC) and the U.S. National Academy of Sciences (NAS).

What do scientists agree on?

- Scientists do agree that: 1) global average temperature is about 0.6°Celsius—or just over 1° Fahrenheit—higher than it was a century ago; 2) atmospheric levels of carbon dioxide (CO_2) have risen by about 30 percent over the past 200 years; and 3) carbon dioxide, like water vapor, is a greenhouse gas whose increase is likely to warm the Earth's atmosphere.[1]

Doesn't this mean we should be worried?

- As Richard Lindzen of MIT summarized it in *The Wall Street Journal*,[2] "These claims are true. However, what the public fails to grasp is that the claims neither constitute support for alarm nor establish man's responsibility for the small amount of warming that has occurred. In fact, those who make the most outlandish claims of alarm are actually demonstrating skepticism of the very science they say supports them. It isn't just that the alarmists are trumpeting model results that we know must be wrong. It is that they are trumpeting catastrophes that couldn't happen *even if the models were right* as justifying costly policies to try to prevent global warming." [Emphasis in original]

What don't scientists know yet?

- Scientists do not agree on whether: 1) we know enough to ascribe past temperature changes to carbon dioxide levels; 2) we have enough data to confidently predict future temperature levels; and 3) at what level temperature change might be more damaging than beneficial to life on Earth.

Didn't the National Academy of Sciences say greenhouse gases cause global warming?

- The National Academy of Sciences reported in 2001 that, "Because of the large and still uncertain level of natural variability inherent in the climate record and the uncertainties in the time histories of the various forcing agents…a causal linkage between the buildup of greenhouse gases in the atmosphere and the observed climate changes during the 20th century cannot be unequivocally established." It also noted that 20 years' worth of data is not long enough to estimate long-term trends.[3]

Hasn't the Earth warmed precipitously over the past 100 years?

- The temperature rise of 0.6°C over the last century is at the bottom end of what climate models suggest should have happened. This suggests that either the climate is less sensitive to greenhouse gases than previously thought or that some unknown factor is depressing the temperature.[4]

Don't climate models warn of alarming future warming?

- Predictions of 6°C temperature rises over the next 100 years are at the extreme end of the IPCC range, and are the result of faulty economic modeling, not science (see economics section below).

What are the realistic current estimates of future warming?

- *Both James Hansen of NASA—the father of greenhouse theory—and Richard Lindzen of MIT—the most renowned climatologist in the world—agree that, even if nothing is done to restrict greenhouse gases, the world will only see a global temperature increase of about 1°C in the next 50-100 years. Hansen and his colleagues "predict additional warming in the next 50 years of 0.5 ± 0.2°C, a warming rate of 0.1 ± 0.04°C per decade."*[5]

What about satellite temperature measurements?

- Evidence from satellite and weather balloon soundings suggests that the atmosphere has warmed considerably less than greenhouse theory suggests.[6] These measurements, which cover the whole atmosphere and show only a very slight warming, show a disparity with the surface temperature measurements, which cover only a small fraction of the Earth but show sustained warming.

Hasn't the disagreement between satellite and surface temperatures been resolved?

- No. There is still substantial disagreement between the mid-range of the satellite measurements and the mid-range of the surface measurements. This presents a problem for climate models.

Do other man-made factors besides greenhouse gases influence temperature?

- New research suggests that the role of greenhouse gases in warming has been overestimated, as factors like atmospheric soot,[7] land use change,[8] and solar variation[9] all appear to have contributed significantly to recent warming.

The Scare Stories

Is the world in danger of plunging into a new ice age, as in the 2004 movie *The Day After Tomorrow*?

- No. The scenario presented in *The Day After Tomorrow* is physically impossible. While research does suggest that the Gulf Stream has switched on and off in the past, causing temperature drops in Europe, oceanographers are convinced that global warming does not present any such danger.[10]

Is the world in severe danger from sea level rise?

- No. Research from Nils-Axel Mörner, professor of paleogeophysics and geodynamics at Stockholm University, demonstrates that current sea levels are within the range of sea level oscillation over the past 300 years, while the satellite data show virtually no rise over the past decade.[11] The IPCC foresees sea-level rise of between 0.1 and 0.9 meters by 2100. The Earth experienced a sea-level rise of 0.2 meters over the past century with no noticeable ill effects.

- Another study relevant to this controversy is Zwally et al. (2005),[12] which examined changes in ice mass "from elevation changes derived from 10.5 years (Greenland) and 9 years

(Antarctica) of satellite radar altimetry data from the European Remote-sensing Satellites ERS-1 and -2." The researchers report a net contribution of the three ice sheets to sea level of +0.05 ± 0.03 millimeters per year. CO2Science.Org puts this in perspective: "At the current sea-level-equivalent ice-loss rate of 0.05 millimeters per year, it would take a full *millennium* to raise global sea level by *just 5 cm*, and it would take fully *20,000 years* to raise it a *single meter*."

Weren't recent extreme weather events caused by global warming?

- There is no provable link between weather events like Hurricane Katrina and global warming. For example, research by German scientists has demonstrated that the devastating floods in central Europe in 2002 were perfectly normal events when compared against the historical record.[13] Allegations that extreme weather has been more damaging recently do not take into account the fact that mankind is now living and investing resources in more dangerous areas. Moreover, the World Meteorological Organization has acknowledged that increases in the recorded number of extreme weather events may be due to better observation and reporting.[14] A top expert from the IPCC resigned in January 2005 in protest that IPCC science was being misrepresented by claims that last year's hurricane season was exacerbated by global warming. Most hurricane scientists agree that there is no way that Hurricane Katrina can be blamed on global warming.
- Recent published research casts extreme doubt on the influence of warming on hurricanes. Philip Klotzbach[15] of Colorado State University finds that, "The data indicate a large increasing trend in tropical cyclone intensity and longevity for the North Atlantic basin and a considerable decreasing trend for the Northeast Pacific. All other basins showed small trends, and there has been no significant change in global net tropical cyclone activity. There has been a small increase in global Category 4-5 hurricanes from the period 1986-1995 to the period 1996-2005. Most of this increase is likely due to improved observational technology. These findings indicate that other important factors govern intensity and frequency of tropical cyclones besides SSTs [sea surface temperatures]."

Aren't the snows of Kilimanjaro disappearing because of global warming?

- That's not the verdict of scientists who study Mount Kilimanjaro most closely. In "Modern Glacier Retreat on Kilimanjaro as Evidence of Climate Change: Observations and Facts,"[16] Kaser et al. "develop a new concept for investigating the retreat of Kilimanjaro's glaciers, based on the physical understanding of glacier–climate interactions." They say, "The concept considers the peculiarities of the mountain and implies that climatological processes other than air temperature control the ice recession in a direct manner. A drastic drop in atmospheric moisture at the end of the 19th century and the ensuing drier climatic conditions are likely forcing glacier retreat on Kilimanjaro."

Won't global warming lead to the spread of malaria?

- Climate is not a significant factor in the recent growth of vector-borne diseases such as malaria. Most experts on this subject agree that malaria is more closely correlated with other factors; deforestation, migration of lowland people (higher immunities, yet they bring disease with them), construction of roads and dams, and the proliferation of pools and ditches are much more important in predicting future spread of these diseases.[17]

Didn't the U.S. Department of Defense conclude global warming poses a national security threat?

- The Pentagon is not convinced that global warming represents a major security threat to the United States. The "secret paper" that garnered much publicity in Europe was a self-admitted speculative exercise that went beyond the bounds of measured research and had been released to the press long before the sensationalist stories surfaced in Europe. Nor did the paper recommend "immediate action" beyond better climate modeling.[18]

Haven't recent climate models found that global warming will be much worse than previously thought?

- The news that Oxford University has found that temperatures may increase by up to 11°C severely misrepresents the scientific findings. According to the actual scientific paper,[19] the frequency distribution of the results suggests that the lower end of temperature rises, in the 2°C to 4°C range, is the most likely.

Haven't the National Academies of all the major industrial countries agreed that global warming is a serious threat?

- Claims have been made that the scientific consensus is represented by a statement drafted by the Royal Society of London and signed by the national scientific academies of the G8 countries plus those of India, Brazil, and China. But such claims ignore the politicized nature of the statement. The climate change committee of the Russian Academy of Sciences later said that its president should not have signed the statement, while the use to which it was put was condemned by the outgoing president of the U.S. National Academy of Sciences, Bruce Alberts, who called the Royal Society's presentation of the statement "quite misleading."[20]

Aren't polar bears drowning because of melting ice?

- These claims are overblown. A leading Canadian polar bear biologist wrote recently, "Climate change is having an effect on the west Hudson population of polar bears, but really, there is no need to panic. Of the 13 populations of polar bears in Canada, 11 are stable or increasing in number. They are not going extinct, or even appear to be affected at present."[21]

Isn't there a scientific consensus such that one researcher found no disagreement about global warming in the literature?

- The research by Naomi Orsekes published in the journal *Science* in December 2004 was flawed. She studied about 1,000 scientific abstracts, but admitted to a sympathetic journalist that she made a major mistake in her search terms. In fact, she should have reviewed about 12,000 abstracts. Even taking her sample, another researcher who tried to replicate her study came to quite different conclusions.[22] In addition, the most recent survey of climate scientists by Dennis Bray and Hans von Storch, following the same methodology as a published study from 1996, found that while there had been a move towards acceptance of anthropogenic global warming, only 9.4 percent of respondents "strongly agree" that climate change is mostly the result of anthropogenic sources. A similar proportion "strongly disagree." Furthermore, only 22.8 percent of respondents "strongly agree" that the IPCC reports accurately reflect a consensus within climate science.[23]

There is scientific agreement that the world has warmed and that man is at least partly responsible for the warming—though there is no consensus on the precise extent of man's effect on the climate. There is ongoing scientific debate over the parameters used by the computer models that project future climatic conditions. We cannot be certain whether the world will warm significantly and we do not know how damaging—if at all—even significant warming will be.

The Economics

Why is economics important to the study of global warming?

- Predictions of global warming catastrophe are based on models that rely on economics as much as on science. If the science of greenhouse theory is right, then we can only

assess its consequences by estimating future production of greenhouse gases from estimates of economic activity.

Is there anything wrong with the economics underlying warming projections?

- The economic modeling by the U.N. Intergovernmental Panel on Climate Change is seriously flawed (*The Economist* called it "dangerously incompetent"), relying on economic forecasts that show much faster growth rates for developing countries than is justified.[24] The IPCC economic scenarios show significantly greater economic growth globally than do other recognized, comparable scenarios.

What will the Kyoto Protocol do to reduce warming?

- The Kyoto Protocol, most observers agree, will have virtually no effect on temperature increase, as it imposes no restrictions on greenhouse gas emissions upon major developing nations like China and India. These nations have publicly refused to accept any restrictions now or in the future.[25]

Can't we reduce emissions without affecting the economy?

- Greenhouse gas emissions derive from energy use which in turn derives from economic growth. Therefore, nations that restrict emissions are almost certain to reduce their rate of economic growth.

Isn't global warming all cost and no benefit?

- No. Even substantial global warming is likely to be of benefit to the United States. As eminent Yale Professor Robert Mendehlson testified before the Senate in 2000,[26] "Climate change is likely to result in small net benefits for the United States over the next century. The primary sector that will benefit is agriculture. The large gains in this sector will more than compensate for damages expected in the coastal, energy, and water sectors, unless warming is unexpectedly severe. Forestry is also expected to enjoy small gains. Added together, the United States will likely enjoy small benefits of between $14 and $23 billion a year and will only suffer damages in the neighborhood of $13 billion if warming reaches 5°C over the next century. Recent predictions of warming by 2100 suggest temperature increases of between 1.5°C and 4°C, suggesting that impacts are likely to be beneficial in the U.S."

Haven't economic models predicted no effect of reducing emissions on growth?

- European models of the effect of greenhouse gas emission restrictions (such as PRIMES) are sectoral models that look at the effects on only one economic sector and therefore badly underestimate the negative effects of emission restrictions throughout the economy. General equilibrium models, which take into account the effects of emissions restrictions on other economic sectors, show much greater negative economic effects than do sectoral models.[27]

What do the better economic models say Kyoto will do?

- Recent research from general equilibrium models suggests strongly negative impacts on European economies from adopting Kyoto targets (or going beyond the targets, as in the case of the United Kingdom). One model shows the economic effects by 2010 of adopting Kyoto targets as follows (remember that the Protocol achieves virtually nothing in reducing global temperature):[28]

Germany	-5.2% GDP	-1,800,000 jobs
Spain	-5.0% GDP	-1,000,000 jobs
United Kingdom	-4.5% GDP	-1,000,000 jobs
Netherlands	-3.8% GDP	-240,000 jobs

Isn't Europe on track to meet its Kyoto targets?

- Kyoto targets are unrealistic. Regardless of announced targets, 11 of the 15 pre-enlargement EU countries are on course to increase their greenhouse gas emissions well beyond their individual Kyoto targets.[29]

Specific Economic Issues

Isn't President Bush to blame for holding up Kyoto?

- It is not the case that President Bush has unilaterally held up ratification of the Kyoto treaty. The United States Senate must ratify any treaty signed by a President. In 1997, during Bill Clinton's presidency, the Senate (including recent Democratic presidential candidate John Kerry) voted 95-0 not to accept any Kyoto-style treaty that would significantly harm the U. S. economy and did not include participation by major developing countries.[30] The U.S. President has no power to impose Kyoto, or any other treaty, on an unwilling Senate.[31]

Doesn't Russia's participation demonstrate the appeal of Kyoto?

- Russia agreed to ratify the Kyoto Protocol only after being pressured by the European Union, which held out the prospect of endorsing Russia's entry into the World Trade Organization. Both the Russian Academy of Sciences and several Duma committees reported that Kyoto has no scientific substantiation and may harm Russia's economy.[32]

Isn't global warming a worse threat than terrorism?

- The charge that global warming is worse than terrorism in terms of damage to the world is hyperbole. The implausible and unsubstantiable claim of many deaths each year—the figure is often put at 150,000—owing to global warming ignores the fact that most of those alleged deaths are due to diseases such as malaria, which have historically existed even in cold climates and could easily be controlled if the environmental lobby dropped its opposition to the use of DDT.[33] Moreover, that number is itself dwarfed by the number killed by poverty, which will be increased if the world decides to suppress the use of energy.

Can't we replace fossil fuels cheaply and effectively with renewable energy?

- Alternative sources of energy such as wind and solar are not yet cost-effective and come with environmental costs of their own (the veteran British environmentalist David Bellamy is leading opposition to wind farms).[34] The only currently cost-effective alternative to fossil fuel use is nuclear power, which produces nearly no emissions, but which environmental activists continue to oppose in direct contradiction to their assertions that global warming is the gravest danger the planet faces.

Aren't market-based solutions the way to reduce emissions?

- "Cap and Trade" schemes that allow firms and governments to trade the right to emit greenhouse gases up to certain limits are not economically efficient. By creating rent-seeking opportunities, they promote the development of a carbon cartel seeking to exploit the system to make profits. The recent collapse of the carbon market in Europe shows how dependent such markets are on political considerations. A simple carbon tax would be much more economically efficient, although likely to prove unattractive to voters in democracies.[35]

Summary

The world faces severe economic consequences from currently proposed strategies to deal with global warming. These approaches will produce job losses and consume scarce resources that could be better spent on handling other global problems such as AIDS or lack of access to clean drinking water.[36] The economic consequences of global warming mitigation strategies currently proposed will probably be worse than the effects of global warming itself. Therefore, adaptation and resiliency strategies should be considered as a more cost-effective alternative. In addition, "no regrets" strategies that will provide benefits from greater economic growth whether global warming proves to be a problem or not should be adopted at once.[37]

Article courtesy of Competitive Enterprise Institute. Reprinted from On Point, July 13, 2006, No. 106. www.cei.org/pdf/5430.pdf

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Issue in Brief: Renewable Portfolio Standards

By Amy Kjose
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Summary

Renewable Portfolio Standards (RPS) are legislative mandates which require utilities to generate a minimum portion of their distributed electricity from renewable sources. They are currently en vogue at both the state and federal levels. While renewable sources of energy are appealing, they are far more expensive than traditional energy sources. Furthermore, RPS are nothing more than subsidies for renewable energy. There's nothing wrong with renewables and we should allow those who want to buy renewable energy the opportunity to purchase it. But there is no reason to force all ratepayers to pay increased energy costs to satisfy customers who want a boutique energy source.

Talking Points

- There are 74 RPS-creating or supporting bills that have been introduced in 27 states in 2007.
- RPS bills are expensive for tax payers. They increase rates to cover implementation costs, raise gas and electricity prices, and adversely affect any market requiring energy in product creation or distribution. The state of New York completed a study of the costs of implementing their RPS. The 24% renewable energy requirement by 2013 is estimated to accumulate costs of anywhere between $8.76 million and $1 billion from 2006 to 2013.[1] This is without even considering any external costs, such as effect on electricity markets, increased costs of goods requiring transportation, current and pending government subsidies in order to create a demand for renewable energy, and increased costs of transmission expansion in consumers' backyards.
- Renewable energy already receives large subsidies to attempt to make these energy resources more "market-friendly". For example, wind power, which is probably the closest to being competitive with conventional sources, gets a federal subsidy of 1.7 cents per kilowatt hour in addition to several other subsidies.
- Many renewable energy sources, while expected to be available relatively indefinitely, are not available at a constant rate each hour, day, or season. Wind averages to generate electricity only 20 to 35 percent of the time in the U.S. (when taking into account stagnant summer months and climate fluctuations), so at least three times as many windmills would have to be built in order to meet the RPS sales requirement.
- Most renewable energy sources are not entirely "green." As with everything there are tradeoffs and there are environmental drawbacks to renewables energy sources.
- Renewable energy is not cheap. It is a luxury good. If consumers are willing to pay additional costs to buy it, that's the market at work. But consumers should not be forced to pay for higher-priced electricity.
- Comprehensive studies on renewable energy in terms of the environment as well as the economy are only in their beginnings.

What is Renewable Energy?

Believe it or not, but energy that is considered renewable in one state may not be considered renewable in another. Generally wind, hydroelectric, solar, geothermal, and biomass energy are all considered renewable energy. Large hydroelectric power projects, however, are sometimes excluded from the renewable energy category, as is the case in California.

RPS: A Trend in the States

According to the Environmental Protection Agency, as of December 2006, 23 states and the District of Columbia had some version of an RPS or an RPG (renewable portfolio goal).[2]

On May 11, 2007 New Hampshire passed an RPS which creates a variety of standards depending on the industry and utility. The North Dakota house passed a resolution known as a 25 by '25 resolution (support for the vision that 25 percent of energy will come from renewable sources by 2025). 25 by '25 resolutions aren't necessarily RPS because many times these bills are purely symbolic and only express the hope that a state produces 25 percent of its energy from renewables sources by 2025. The 25 percent goal, however, is likely only achievable through regulation.

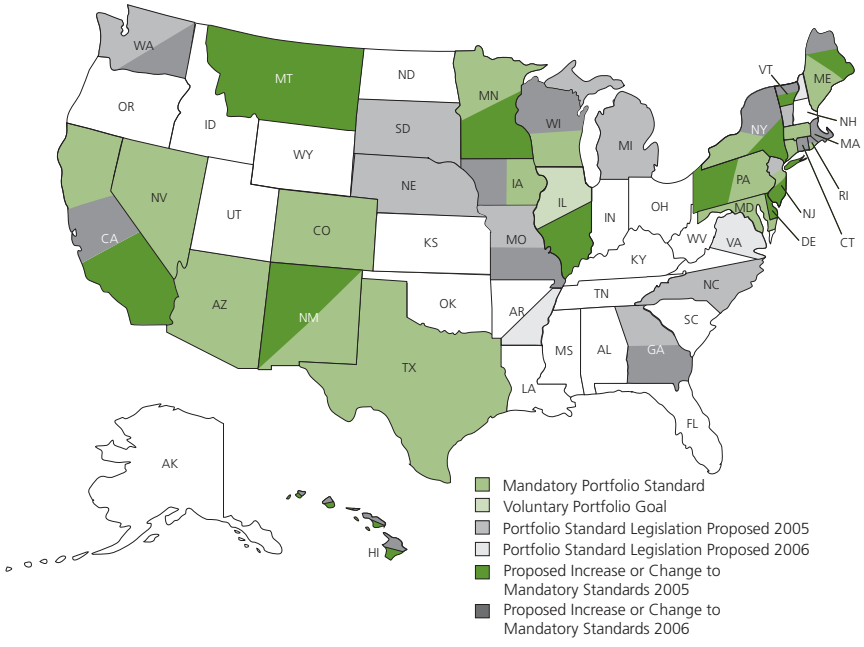
There have been other movements in the states with regard to RPS, some to merely alter previous standards, others to introduce entirely new standards. Regardless, Renewable Energy Standards are an obvious trend in legislation, requiring that legislators be equipped with the knowledge to decide what is right for their state.

So why should we be worried? These are merely efforts to help the environment, right?

RPS bills are frequently sold as win-win solutions to energy issues, but the problem with RPS are that they increase costs to consumers.

Thomas Tanton of Institute for Energy Research attempts to provide a realistic gauge of RPS costs. He points out that "the standards in those nineteen states [with an RPS in 2003] cost consumers more than a billion dollars per year."[3]

As James Taylor of the Heartland Institute highlights, when a consumer is faced with a choice among "food, clothing, shelter, medicine, or a green environment, a green environment



becomes a luxury item."[4] Forcing individuals to pay for a luxury item when they sometimes lack the means to pay for their basic needs is harmful. In a nutshell, the passage of RPS legislation, whether on the state or federal level, would result in increased costs to the American people.

How Environmentally and Economically Sustainable are Renewable Energy sources?

If we assume that current RPS standards are even achievable in the allotted time, we must next consider the actual benefits and costs, both environmental and economic.

Wind Power

In percentage terms, wind energy is the fastest growing form of energy in the world.[5] And wind energy continues to grow. Between 1985 and 2001, U.S. wind capacity rose by 146 percent[6], but in just four years, from 2001 through 2004, net generation from wind power increased 110 percent.[7]

Wind energy is attractive because it is renewable, zero-polluting, and according to wind advocates, the best wind sites can be cost competitive with fossil fuel electrical generation.[8]

While wind power does not produce pollution, wind power is far from perfect because of the simple fact that the wind doesn't always blow. Not only does the wind not always blow, but peak energy demand (late afternoon) and peak wind generation (usually at midday) seldom coincide.[9] This means that there has to be backup generation capacity, almost always in the form of fossil-fuel power plants, to meet peak electrical needs.

The location of the best sites for wind farms is also a problem. Unlike fossil fuel plants, wind farms need to be where the wind blows, not where people live. Electrical lines must be run from wind farms to cities and this can be expensive. Economists estimate that the infrastructure necessary to transport wind energy can cost nearly $1 million per mile.[10] Some of the best places for wind generation in the United States are in the Dakotas—far from any heavily populated areas.

There are other downsides to wind energy including noise, bird strikes, and the general unsightliness of large wind turbines.[11] Engineers have been working hard to reduce these problems and newer designs make less noise and they kill fewer birds. Aesthetically, however, there isn't much that can be done about wind turbines—they have to be large to produce substantial amounts of electricity.

While wind power at the best locations might be cost competitive with fossil fuel power, the cost of typical wind power is still about 1.5–3 times the average spot price of electricity.[12]

A study by Ryan Wiser at the Lawrence Berkeley National Laboratory, estimates that by 2010 wind energy will need to account for an average of 62 percent of the renewable energies required by current state RPS.[13] Assuming an average state RPS of 20 percent by 2010, about 12.4 percent of US electricity would have to be generated from wind. According to the Department of Energy, in 2005 wind energy accounted for about 0.4 percent of our electricity. EIA outlooks estimate that net electricity generation will be 4209 billion kilowatt hours, which is 326 billion kilowatt hours more than in 2005. (3883 billion in 2005)[14] This increase would translate into a need to build nearly 3 million new turbines in the next three years.[15]

Solar Power

Like wind power, solar power is a very appealing form of energy. It is abundant, clean, and renewable. Electricity from solar power is created without moving parts, it is silent, and solar power units can be moved nearly anywhere.

Between 2000 and 2004, solar energy production increased 17 percent, but it represents only a very small portion of the overall energy picture. As of 2004, solar energy produced only 0.06 percent of energy consumed in the United States. [16] By comparison, wind energy produces 0.14 percent of the energy consumed in the United States, coal produces 23 percent, and petroleum produces 40 percent of our total energy consumption.[17]

Solar power suffers from some of the same problems as wind energy. The sun doesn't always shine and there isn't always strong sunshine during times of peak energy demand.

Like all renewable energies, solar energy is expensive. While the price of solar energy is decreasing, it is far more expensive than traditional power plants. In order to provide incentives for companies to develop this form of energy, either the government would have to provide subsidies, or the consumer would have to directly pay for the increase in price. Either way, the average consumer is getting hit the hardest by an RPS that requires solar energy.

Biomass Energy

Biomass energy produces twice as much electricity as wind and 50 times more electricity than solar. [18] The majority of this electricity comes from the burning of wood waste and landfill gases. It is obvious that biomass is an economical source of renewable energy and therefore there is no need to force utilities to create it through an RPS.

What should be done?

Renewable energy sources have a place in America's energy equation. ALEC promotes free markets for a reason—free markets produce the most economically efficient outcomes. Renewables currently can seldom compete with other ways of generation electricity. They are a luxury good. People who want to pay a premium to get wind power or solar power should be able to do so, but the costs of wind power should not be forced on all electrical consumers and that is exactly what RPS legislation does.

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.4% (.004) x 3883 billion kW/h = 15.5320 billion kW/h of wind-generated electricity in 2005 12.4% (.124) x 4209 billion kW/h = 521.91600 billion kW/h needed in 2010 (2010 necessary wind electricity) – (2005 wind electricity) = 521.91600 – 15.5320 = 506.384 billion kW/h increase in wind-generated electricity To generate 506.384 billion kilowatt hours of wind electricity, 2 893 622 new turbines would have to be built (the average turbine generates 175,000 kW/h in a year).
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Issue in Brief: Energy Independence

By Jessica Lawless
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Summary

Many people are concerned that America is not energy independent enough. They point to the fact that 60 percent of the oil we use is imported[1] and assume that most of the oil is imported from troubled regions of the world. It is only natural to assume that we currently import a greater percentage of OPEC oil than we did during the 1970s. However, these concerns are misplaced due to faulty assumptions and misinformation.

The problem with many calls for "energy independence" is that many such calls are really a smokescreen to increase the price of fossil fuel in America and actually restrict our access to energy. How many people calling for "energy independence" advocate opening more areas to oil and gas exploration? In other words, if America seeks energy independence, the first thing we should do is use more of our domestic energy resources, instead of restricting access to them.

Talking Points

- While a majority of the oil we use is imported, our top oil suppliers are Canada and Mexico, not Middle Eastern countries.[2]
- In the 1970s 50 percent of the world's oil came from OPEC countries. Today that percentage has fallen to 40 percent. This lessens OPEC's ability to manipulate prices.[3]
- With current technologies, renewables are not cost-effective enough to make America energy independent.
- America has plentiful energy resources, but many of them are too expensive given current technology and current prices. That will change over time.
- Our biggest threat today is not uncertain future threats because of a lack of energy independence, but the certain, current threat of high energy prices that constantly create a drag on the economy and reduce our economic efficiency.

Importing Oil

When thinking about oil production, many people assume that most of our oil comes from the Middle East. This is not true. Forty percent of the oil we consume is produced here in the United States.[5] In fact, we import more oil from Canada and Mexico than we do from the Persian Gulf. [6]

One of the most interesting changes since the oil shocks of the 1970s is that OPEC countries now contribute a smaller percentage to the world's oil supply. In the 1970s OPEC produced 50 percent of the oil in the world, but today that percentage has fallen to 40 percent due to expanded oil supplies in other areas of the world.[7] This is a substantial development because now OPEC is less able to manipulate the market than they were able to in the 1970s.

Some people are concerned that when we import oil from the Persian Gulf we are funding governments that are enemies of the United States. Believe it or not, a similar situation with organic foods provides an example of one way to deal with this concern. Organic labeling of food allows people to decide what kind of foods they want to buy—organic or not. These labels were not started by government, but because people wanted to advertise a premium product (and get paid for a premium product). If enough people were worried about the origin of oil, we could expect to see voluntary labels that describe where the oil is from.

Domestic Energy Supplies

There are many groups that call for energy independence, but fail to advocate the use of the plentiful energy resources we currently have. If these people were truly concerned with energy independence, they would fight to open more areas of the outer continental shelf and the North Slope in Alaska to oil and gas exploration. There are vast quantities of oil and natural gas on the outer continental shelf, on the North Slope in Alaska, and other federal lands. The opening of these fossil-fuel-rich lands for exploration would reduce our dependence on foreign energy sources and increase the market supply. The House of Representatives Committee on Resources estimates that the oil in the ANWR is "more than twice the proven oil reserves in all of Texas… and almost half of the total US proven reserves of 21 billion barrels."[8] The outer continental shelf contains an estimated 76 billion barrels of technically recoverable oil, but federal law prohibits extracting this resource now or exploring for more. Because the many groups who call for "energy independence" don't call for using our current resources, it is apparent their demands for energy independence are really a call for using less fossil fuels.

Similarly, people who are concerned about energy independence should be very supportive of a greater expansion of nuclear energy in the United States. Although nuclear power has tremendous capabilities to expand our domestic supply of energy, a nuclear power plant hasn't been built in the United States since 1979[9].

When people call for energy independence, they frequently call for increased regulations designed to increase energy efficiency.

Top U.S. Petroleum Suppliers

	2005 (bpd)	% of Imports	% of Total Petroleum Consumed
1. United States	7,000,000	0	34.1
2. Canada	2,181,000	15.9	10.5
3. Mexico	1,662,000	12.1	8
4. Saudi Arabia	1,537,000	11.2	7.4
5. Venezula	1,529,000	11.1	7.4
6. Nigeria	1,166,000	8.5	5.6
7. Iraq	531,000	3.9	2.6
8. Algeria	478,000	3.5	2.3
9. Angola	473,000	3.4	2.3
10. Russia	410,000	3	2.0
11. United Kingdom	396,000	2.9	2.0
12. Virgin Islands	328,000	2.4	1.6
13. Ecuador	283,000	2.1	1.4
14. Kuwait	243,000	1.8	1.2
15. Norway	233,000	1.7	1.1
16. Colombia	196,000	1.4	1.0
Persian Gulf Nations	2,334,000	17.0	11.2
OPEC Nations	5,587,000	40.7	26.9
Non-OPEC Nations	8,127,000	59.3	39.1
Western Hemisphere Nations	6,779,000	49.4	32.6
Western Hemisphere inc. U.S.	13,867,000	n/a	66.7

Source: Max Schulz, *Energy & Environment: Myths & Facts*, p. 22
http://www.manhattan-institute.org/pdf/Energy_and_Environment_Myths.pdf

However, a fatal flaw with this argument is that as energy efficiency increases, more energy is available to be consumed. As Peter Huber and Mark Mills argue in their book, *The Bottomless Well*, "Efficiency fails to curb demand because it lets more people do more, and do it faster—and more faster invariably swamps all the efficiency gains."[10] As efficiency increases, more energy is available, thus reducing the price. At lower prices, people consume more. A 2001 study by *Forbes* on jet engines showed that increasingly efficient jet engines have led to cheaper ticket prices. Cheaper tickets in turn led to more people being able to afford plane tickets and increased passenger demand for flights. Increased demand for flights has increased the number of flights, which has lead to more energy use overall. This example applies to cars, appliances, and most things that use electricity.

Newer, more efficient technologies allow us to use the same amount of energy to do more. It surprises most people to learn that per person energy use has remained constant since the mid 1970s.[11] Therefore, energy use in the United States is only increasing because our population is increasing and consuming more, not because we are using more energy per capita.

Alternative Energy Resources

When we hear the term "alternative energy resources", we usually think of renewable energy sources such as wind or solar energy. Besides those energy resources, the United States has substantial fossil-fuel resources. Although production of crude oil has been decreasing in the United States since the 1970s, crude oil is not the only form of fossil fuel. The following graph offers some estimates of the domestic fossil fuel resources, including ones such as oil trapped in oil shale and other alternative sources.

While the United States has great unused amounts of oil resources, these resources are kept off the market because of price. The following graphic from *The Economist,* shows the price at which alternative energy resources are economically viable.

Note that according to this information, the U.S. has been subsidizing one of the more expensive sources of transportation fuel: corn based ethanol. The reason for this is simple—the farm lobby is strong in the U.S.

Costs of Alternative Sources of Energy

Energy Source	Oil Price at Which Source is Economically Viable
Biodiesel *	$80
US corn -based ethanol*	$60
Shale Oil	$50
Tar Sands	$40
Brazilian cane-based ethanol	$40
Gas-to-Liquids **	$40
Coal-to-Liquids ***	$40
Conventional Oil	$20

* Excludes the impact of tax credits

** GTL economic at $40 if gas feedstock price is $2.50 or less per m BTUs

*** CTL economic at $40 if feedstock price is $15 per tonne or less

Source: *The Economist*

But corn-based ethanol can't make us energy independent, or even close. Robert J. Samuelson wrote in a recent edition of the *Washington Post*:

> "Suppose we reach the administration's ultimate target of 60 billion gallons in 2030. That would offset less than half of the projected increase in annual oil use. Here's why. First, it's necessary to convert the 60 billion gallons into barrels. Because there are 42 gallons in a barrel, that means dividing by 42. Further: Ethanol has only about two-thirds of the energy value of an equal volume of gasoline. When you do all the arithmetic, 60 billion gallons of ethanol displace just under 1 billion barrels of gasoline. If that merely offsets increases in oil use, it won't cut existing import dependence or greenhouse gases."[13]

Simultaneously, the increasing utilization of corn for ethanol has driven the price of corn up as supplies are lowered. Approximately 20 percent of the U.S. corn crop is being used to produce ethanol. Today's corn-based ethanol is increasing the prices of chicken, pork, corn-syrup and anything that uses corn syrup as an ingredient, as well as corn itself. Additionally, the production of ethanol is diminishing the amount of corn we export.

Some people argue that to achieve energy independence we need to move to a hydrogen economy. But hydrogen as a transportation fuel is not an answer in the near future. Hydrogen isn't a fuel—it is an energy carrier. To create hydrogen we either need to use large amounts of energy to create it (by using nuclear plants or something of the same nature) or by using natural gas (as is used for the vast amount of hydrogen manufacturing today). Hydrogen has a future, but it is questionable whether that future exists without nuclear power plants to create it.

Conclusions

The biggest problem with the expansion of alternative forms of energy is competition with conventional oil. As the New Yorker explained, "oil, for all its geopolitical drawbacks, is cheap, easy to transport, and relatively clean if used efficiently."[14] The U.S. has great energy reserves, but they are either off limits (outer continental shelf or on Alaska's North Slope), or companies assume that prices will drop and make them uneconomical (coal-to-liquids and oil shale). The U.S. isn't in danger of running out of energy resources. As prices and technology change over time, alternatives such as shale oil will be used. The biggest danger today is not from a lack of energy independence. The biggest danger is the harm to the economy that anti-energy policies engender.

Endnotes

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9. Max Schulz, *Energy & Environment: Myths & Facts*, p. 34 (http://www.manhattan-institute.org/pdf/Energy_and_Environment_Myths.pdf.
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11. For example, in 1973 on average each person consumed 358 million btus during the year. In 2005, each person consumed 337. Energy Information Administration, *Table 1.5 Energy Consumption, Expenditures, and Emissions Indicators, 1949-2005*, http://www.eia.doe.gov/emeu/aer/txt/ptb0105.html.
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Do the Climate Models Project a Useful Picture of Regional Climate?

Testimony of Dr. Patrick J. Michaels
Virginia State Climatologist and Professor at the Department of Environmental Sciences, University of Virginia
July 25, 2002

Editor's Note: What follows is testimony delivered before the House Committee on Energy and Commerce, Subcommittee on Oversight and Investigations.

Summary of Major Points

- The two climate models that serve as the basis for the U.S. National Climate Change Assessment were not representative of the consensus of climate models but rather represent extreme predictions for temperature and precipitation changes over the United States.
- The two climate models that serve as the basis for this assessment performed worse than a table of random numbers when asked to simulate U.S. temperature changes as the atmosphere has changed. Under the ethics of science, they should have then been abandoned or modified, rather than used as input to a document with substantial policy implications.
- The current U.S. National Climate Change Assessment should be redacted from the public record.
- Another Assessment should be undertaken, this time with a much more diverse synthesis team selected by a more diverse political process.
- Professional interpreters of climate information, who will be called upon to explain or defend any future Assessment, such as the state climatologists, should provide strong input to any new report.
- Any new assessment must be based only upon hypotheses that can be verified by observed data.

Testimony

This testimony makes no official representation for the University of Virginia or the Commonwealth of Virginia and is tendered under the traditional protections of academic freedom.

Effects have causes. Confronting our society today is a potentially serious effect, climate change, caused by human influence on our global atmosphere.

The quantitative tools of mathematics and science are what we use to inform rational analysis of cause and effect. Science, in particular, obeys a rigid standard: that the tools we use must be realistic and must conform to observed reality. If they do not, we modify or abandon them in search of other analytical methods. Whenever the federal government releases a comprehensive science report, the public naturally assumes that it has passed these tests. The documents we will discuss today failed those tests. This failure was ignored in the public review process. There is no doubt that the issue of climate change rightly provokes private citizens and our government to ask what its potential effects might be on the United States. That was the purpose of the recent report *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change.*

This document is often called the "U.S. National Assessment" (USNA) of climate change. This report forms much of the basis for Chapter 6 of the *U.S. Climate Action Report—2002,* a chapter on "Impacts and Adaptation" to climate change.

The USNA began with a communication from President Clinton's National Science and Technology Council (NSTC), which was established in 1993. According to the USNA, "This cabinet-level council is the principal means for the president to coordinate science, space and technology policies across the federal government." "Membership consists of Vice President [Al Gore], the assistant to the president for science and technology, cabinet secretaries and agency heads …" The council is clearly a political body ("coordinating … policies") rather than a scientific one.

This NSTC was, in turn, composed of several committees, including the Committee on Environment and Natural Resources, chaired in 1998 by two political appointees, D. James Baker, and Rosina Bierbaum. Baker developed a further subcommittee of his committee, the Subcommittee on Global Change Research, to "provide for the development … of a comprehensive and integrated … program which will assist the Nation and the world to understand, assess, *predict* [emphasis added], and respond to human-induced and natural processes of global change." Ultimately, this resulted in the selection of the National Assessment Synthesis Team (NAST).

NAST was confronted with a daunting task, detailed in the schematic below. The chain of cause and effect begins with industrial activity and the combustion of compounds that alter the atmosphere's radiative balance. These are then distributed through the atmosphere. These affect the climate of the United States. Then, those changes in climate are input to a subsidiary series of computer models for forest growth, agriculture, etc.

An understanding of the effects of climate change on the United States requires that there be no substantially weak links in this catena. As an example of a relatively strong link, I would estimate that we understand about 70 percent of the changes in atmospheric carbon dioxide that result from human activity. The reason this number is not 100 percent largely stems from the fact that the current concentration of carbon dioxide seems low, given the amount emitted and assumptions about how it distributes through the atmosphere and the biosphere, and how it eventually returns to the soil and the ocean bottom.

There are two main ways to assess the most important of these linkages, which is between "Atmospheric Changes" and "Climate Changes in the United States." One involves the use of computer simulations, known as General Circulation Models (GCMs) to estimate how climate changes as a result of atmospheric alterations. An alternative method for assessment is described on page 10 of this testimony.

There are literally dozens of GCMs currently available, and the USNA considered a subgroup of these models. Eventually, they selected two, the Canadian Climate Centre model, acronymed CGCM1, and another from the United Kingdom Meteorological Office, known as HadCM2.[1] The

prime outputs of these models that are important for the assessment of climate change are temperature and precipitation.

In using GCMs to project future climate at regional scales, the USNA clearly placed itself squarely against the consensus of world climate science. In 2001, the United Nations' Intergovernmental Panel on Climate Change (IPCC) compendium on climate change, the *Third Assessment Report*, states:

> *Despite recent improvements and developments … a coherent picture of regional climate change … cannot yet be drawn. More co-ordinated efforts are thus necessary to improve the integrated hierarchy of models … and apply these methods to climate change research in a comprehensive strategy.*

In other words, even three years after the Assessment team began its report relying on GCMs, the consensus of world climate science was that they were inappropriate for regional estimates, such as those required for the United States.

Choice of Extreme Models

As shown in the IPCC's *Third Assessment Report* of climate change, the average behavior of GCMs is to produce a linear (constant) rate of warming over the projectable future. In other words, once warming begins from human influence, it takes place at a constant, rather than an exponentially increasing rate.

However, the CGCM1 is an outlier among the consensus of models, producing a warming that increases as a substantial exponent. This behavior can be seen in Figure 1a, taken directly from the USNA, in which the CGCM1 clearly projects more warming than the others illustrated in the USNA.

The USNA also illustrates a similarly disturbing behavior for precipitation. Figure 1b, again taken directly from the USNA, shows that the other model employed, HadCM2, predicts larger precipitation changes than the others that are illustrated in the USNA.

A close inspection of Figure 1a reveals that CGCM1 predicts that the temperatures in the United States at the end of the 20th century should be about 2.7°F warmer than they were at the beginning, but the observed warming during this time, according to the most recent analysis from the National Climatic Data Center, is 0.9°F. CGCM1 is making a 300 percent error in its estimation of U.S. temperature changes in the last 100 years.

My colleague Thomas Karl, director of the National Climatic Data Center and co-chair of the USNA synthesis, explained that the reason CGCM1 was chosen was because it was one of only two models (the other was HadCM2) that produced daily temperature output and that this was required to drive some of the subsidiary models, such as those for forest impacts.

Michael MacCracken, executive director of the National Assessment Coordination Office, told me otherwise. He said that the two models were selected because they gave extreme results and that this was a useful exercise. How the explanations of the co-chair and the executive director could be so different is still troubling to me.

The Failure of the Models

GCMs are nothing more than hypotheses about the behavior of the atmosphere. The basic rule of science is that hypotheses do not graduate into facts unless they can be tested and validated against real data. As part of my review of the USNA in August 2000, I performed such a test. The results were very disappointing. Both CGCM1 and HadCM2 were incapable of simulating the evolution of ten-year averaged temperature changes (1991-2000, 1990-1999, 1989-1998, etc … back to 1900-1909) over the United States better than a table of random numbers. In fact, the spurious 300-percent warming error in CGCM1 actually made it *worse* than random numbers, a dubious scientific achievement, to say the least.

I wrote in my review:

> The essential problem with the USNA is that it is based largely on two climate models, neither one of which, when compared to the 10-year smoothed behavior of the lower 48 states, reduces the residual variance below the raw variance of the data [this means that they did not perform any better than a model that simply assumed a constant temperature]. The one that generates the most lurid warming scenarios—the…CGCM1 Model—also has a clear warm bias … All implied effects, including the large temperature rise, are therefore based upon a multiple scientific failure [of both models]. The USNA's continued use of those models and that approach is a willful choice to disregard the most fundamental of scientific rules … For that reason alone, the USNA should be withdrawn from the public sphere until it becomes scientifically based.

The synthesis team was required to respond to such criticism. Publicly, they deflected this comment by stating that both U.S. temperatures and model temperatures rose in the 20th century, so use of the models was appropriate!

This was a wildly unscientific response in the face of a clear, quantitative analysis. The real reason for the models' failure can be found in the USNA itself (Figure 11 in Chapter 1 of the USNA Foundation document). It is reproduced here as our Figure 2. The discrepancies occur because:

1) U.S. temperatures rose rapidly, approximately 1.2°F, from about 1910 to 1930. The GCMs, which base their predictions largely on changes in atmospheric carbon dioxide, miss this warming, as by far the largest amounts of emissions were after 1930;
2) U.S. temperatures fell, about 1.0°F, from 1930 to 1975. This is the period in which the GCMs begin to ramp up their U.S. warming, and
3) U.S. temperatures rose again, about 1.0°F, from 1975 to 2000, recovering their decline between 1930 and 1975.

It is eminently clear that much of the warming in the U.S. record took place before most of the greenhouse gas changes and that nearly one-half of the "greenhouse era," the 20th century, was accompanied by falling temperatures over the U.S. *These models were simply too immature to reproduce this behavior because of their crude inputs.*

Despite their remarkably unprofessional public dismissal of a rigorous test of the USNA's core models, the synthesis team indeed was gravely concerned about the criticism. So much so, in fact, that they replicated my test, not just at 10 year intervals, but at scales ranging from one to 25 years.

At the larger time scales, they found the models applicable to global temperatures. But over the U.S., not surprisingly, they found exactly what I had. The models were worse than random numbers.

It is difficult for me to invoke any explanation other than political pressure that would be so compelling as to allow the USNA to continue largely unaltered in this environment. And so the USNA was rushed to publication, ten days before Election Day 2000.

Given the failure of the models when directly applied to U.S. temperatures, there were other methods available to the USNA team. One would involve scaling various global GCMs to observed temperature changes and then scaling the prospective global warming to U.S. temperatures. The first part of this exercise has been performed independently by many scientists in recent years and published in many books and scientific journals. It yields a global warming in the next 100 years of around 2.9°F, which is at the lowest limit of the range projected by the IPCC in its *Third Assessment Report.*

If applied to the United States this would similarly project a much more modest warming than appears in the USNA. Perhaps that is the reason such an obviously logical methodology was not employed after the failure of the models was discovered by a reviewer and then independently replicated by the USNA itself.

Effect of the USNA

This discussion would be largely academic if the USNA were an inconsequential document. But, as noted above, it served largely as the basis for Chapter 6 of the *U.S. Climate Action Report—2002.* Further, it served as the basis for legislative findings for S. 556, a comprehensive proposal with extensive global warming-related provisions, and it was clearly part of the findings for legislation restricting carbon dioxide emissions recently passed by the California Legislature. Hardly a week goes by without some press reference to regional alterations cited by the USNA. Would the USNA have such credibility if it were generally known that the driver models had failed?

Solving the Structural Problems with the USNA

The USNA synthesis team contains only two individuals who can logically claim, in my opinion, to be climatologists. Of the entire 14-member panel, there is not one person who has expressed considerable public skepticism about processes that were creating increasingly lurid scenarios for climate change with little basis in fact. As noted above, the administrative structure that selected the synthesis team was clearly directed by political appointees, which no doubt contributed to this imbalance.

In my August 2000 review, I wrote:

> Finally, we come to the subject of bias in selection of USNA participants. There are plenty of knowledgeable climatologists, including or excluding this reviewer, who have scientific records that equal or exceed those of many of USNA's participants up the model problem [that extreme versions were selected, and that they could not simulate U.S. temperatures] at an early point and would not have tried to sweep it under the rug. Where is Bob Balling? Where is Dick Lindzen? Where are [Roger] Pielke Sr., [a participant in this hearing], [Gerd] Weber or [Roy] Spencer?

My review was tendered shortly after attending the annual meeting of the American Association of State Climatologists (AASC) in Logan, Utah, in August 2000. The AASC is the only professional organization in the U.S. devoted exclusively to climatology. Membership consists largely of senior scientists who are tasked by their states, usually through the state's major universities, to bring climate information and services to the public. Until 1972, the state climatologists were employees of the U.S. Department of Commerce.

In my review of the USNA I further noted that:

Figure 1a: U.S. Mean Temperature Anomalies

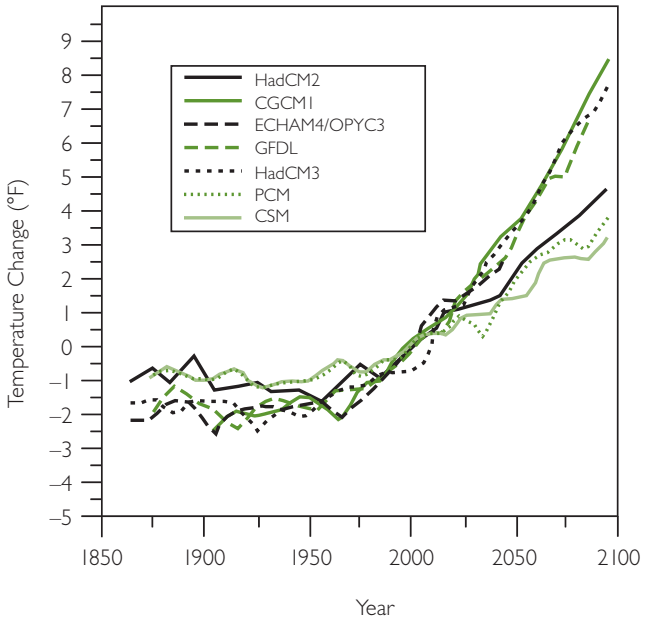

Figure 1b: U.S. Precipitation Anomalies

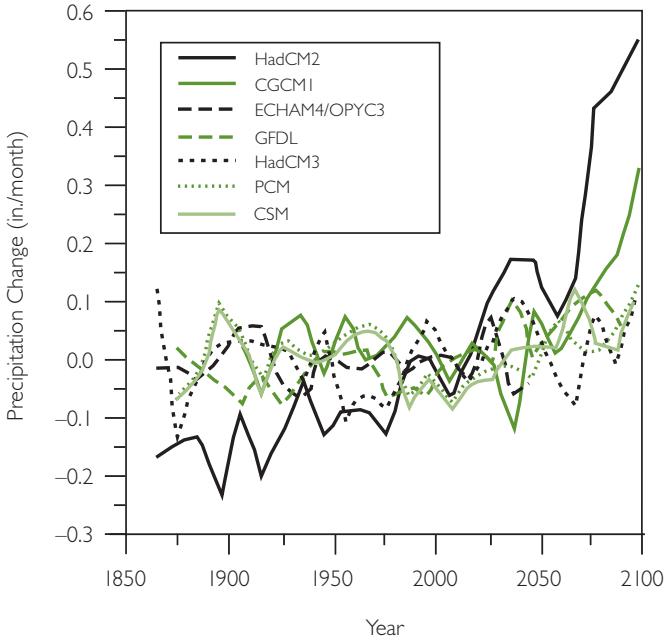

Figure 1a. (top) Future temperature changes for the United States projected by models considered for inclusion in the U.S. National Assessment.

Figure 1b. (bottom) Future precipitation change for the United States projected by models considered for inclusion in the U.S. National Assessment. (Source: U.S. National Assessment, Foundation Document)

Figure 2

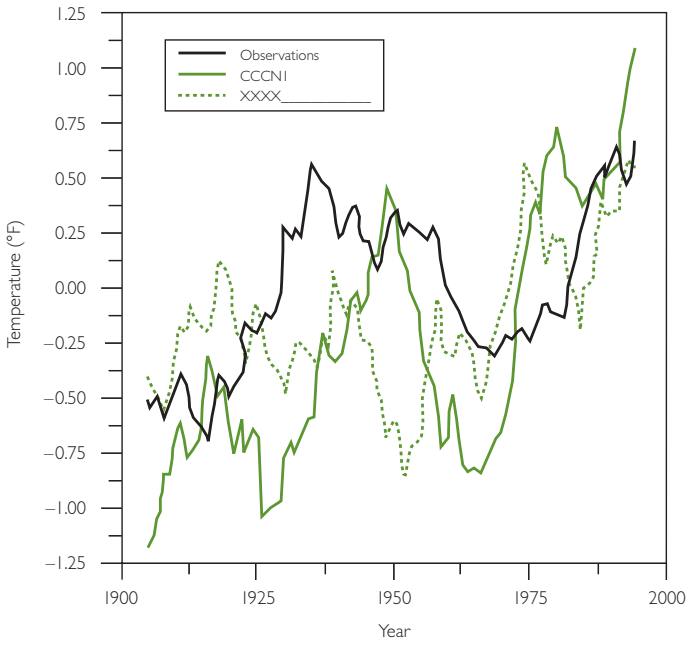

Figure 2. Time histories of the changes in annual temperature for the United States during the 20th century based on observations and on simulations from the Canadian and Hadley models, calculated as 10-year running means from 1900 to 2000. (Source: U.S. National Assessment, Foundation Document).

> Yesterday…I returned from the annual meeting of the American Association of State Climatologists (I am a past president of AASC.) There were roughly 100 scientists present. I can honestly state that not one positive comment was tendered to me about the USNA, out of literally dozens made. If the report is published in anything like its current form, I predict it will provoke a public examination of how and why the federal science establishment [could have produced such a document].

That prediction has come true. It is why we are here today. Besides being research scientists, the State Climatologists are interpretive professionals who deal with the climate-related problems of their states on a day-to-day basis. It's hard to imagine a better-suited team of professionals to provide a significant leadership role in any new assessment.

Recommendations

1. The current USNA should be redacted from the public record.
2. Another *Assessment* should be undertaken, this time with a much more diverse synthesis team selected by a more diverse political process.
3. Professional interpreters of climate information, who will be called upon to explain or defend any future *Assessment*, such as the State Climatologists, should provide strong input to any new report.
4. Any new *Assessment* must be based only upon hypotheses that can be verified by observed data.

Conclusion

The 2000 document, *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change*, which served as the basis for an important chapter in the new *Climate Action Report—2002*, was based on two computer models which were extreme versions of the suite of available models. The two selected models themselves performed no better than a table of random numbers when applied to U.S. temperatures during the time when humans began to subtly change the composition of the earth's atmosphere. As a result, both reports are grounded in extremism and scientific failure. They must be removed from the public record.

This scientific debacle resulted largely from a blatant intrusion of a multifaceted political process into the selection process for those involved in producing the *U.S. National Assessment*. The clear lesson is that increased professional diversity, especially intermingling state-based scientists with the federal climatologists, would have likely prevented this tragedy from ever occurring. ■

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Endnotes

1. In 1998, the National Research Council report Capacity of U.S. Climate Modeling to Support Climate Change Assessment Activities strongly remonstrated against the use of foreign models to assess U.S. climate. According to the NRC, "…it is inappropriate for the United States to rely heavily upon foreign centers to provide high-end modeling capabilities. There are a number of reasons for this including…[the fact that] decisions that might substantially affect the U.S. economy might be based upon

considerations of simulations…produced by countries with different priorities than those of the United States."

Celebrate Earth Day Every Day

By Jonathan A. Shore

Environmentalists join together each Earth Day and warn the nation that we are facing imminent environmental catastrophes. When Earth Day was conceived in 1970, America was significantly more polluted than it is today. The Cuyahoga River burned, and the air was dirtier. Since then, Americans have developed technology which has dramatically cleaned up our environment. But despite past improvements, every Earth Day—and Arbor Day for that matter—environmental groups will be out in full force with their fear tactics to remind us about our past, scold us about current conditions, and warn us of some new impending catastrophe.

Don't listen to them.

Instead of focusing on doomsday scenarios, Americans should commemorate the continuous environmental progress made over the last century. According to the Environmental Protection Agency's Clean Air Update,[1] we have made serious progress cleaning the air since 1970:

- aggregate emissions of the six principal pollutants have declined by 54 percent;
- carbon monoxide emissions fell by 56 percent;
- nitrogen oxides fell by 30 percent;
- particulate matter (dust) fell by 80 percent;
- sulfur dioxide fell by 51 percent;
- volatile organic compounds fell by 55 percent; and
- lead fell by 99 percent.

While our air is becoming cleaner, our gross domestic product has increased by 187 percent, vehicle miles traveled by 171 percent, energy consumption by 47 percent, and population by 40 percent.[2]

Through improved technology, community involvement, and stewardship programs, rivers like the Cuyahoga are gradually becoming cleaner. The Cuyahoga, which at one time stretched for miles and miles without any fish life, is now home to over 70 species of fish. Even birdlife that was in decline not too long ago is now thriving.[3] While the quality of data on water trends is poor and nowhere near as complete as data on air quality, visible progress has certainly been made.

If we believe the majority of environmentalist rhetoric, one would think we were losing forests in the US. But forests are a renewable resource that were flourishing long before Earth Day came into being. In fact, we have more forest in America today than when Columbus landed in 1492. Most of the deforestation in America took place between 1850 and 1900 to clear land for farming. Forest land has not only remained stable, it has experienced a slight increase in the last decade, yet we are constantly being told that our forests are in danger. In 2002, the continental United States had 622 million acres of forestland, which accounts for about 32 percent of its land area. Although the US is much larger than the European Union, forestland in America is proportionally growing 4 times as fast as in the EU.[4]

Earth Day should be a day of celebration, not penance. And we should keep the two primary lessons of Earth Day with us throughout the year—First, the earth is resilient, and second, human ingenuity helped clean up our pollutant ways of the past, and it will allow us to live in an even cleaner future. The earth endured decades of abuse and neglect, but coupled with technological advances and increased public awareness, the planet's ability to rebound is astounding. We should come together and rejoice in the progress we have made in such a short time period while rallying around our common commitment to looking past the alarmists and towards the challenges that lie ahead. ■

Jonathan Shore was a Legislative Assistant to the Natural Resources Task Force at the American Legislative Exchange Council.

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Fishy Advice—Risk-Free at What Cost?

By Sandy Szwarc
April 26, 2004

Remember when women were encouraged to simply enjoy two or three servings of a wide variety of fish each week to ensure a healthy baby? Our babies aren't in any more danger today, what has changed is our fear.

When the FDA repeatedly issues health advisories spelling out dangers in increasing detail, as it's done the past few years, it is natural to assume the risks of eating fish must be pretty significant. The FDA's latest advisory states that some fish and shellfish contain high levels of mercury that may harm an unborn baby or young child's developing nervous system. The risks, however, depend on the amount of fish and shellfish eaten and the levels of mercury in the fish and shellfish.[1,2,3]

But not a single mother in America has ever eaten so much fish that she put her baby anywhere near harm's way.[4] Yet, the terminology being used by the government and the media certainly leads us to think that.

"We should be honest and truthful about how we are presenting the information to ... the public," said Lawrence J. Fischer, Ph.D. at the FDA's Food Advisory Committee scientific meetings on methylmercury in 2002.[5] In the new pursuit of zero risks, actual risk parameters based on evidence and reason have been replaced by extreme and arbitrary safety cushions.

Dr. James Heimbach, former associate administrator of the Human Nutrition Information Services, reminded the FDA Committee that fish is not simply a carrier for methylmercury or whatever we may be concerned about at the moment. It is a food. It is a food that is a very important part of a healthy diet. Both the American Heart Association and the American Dietetic Association, representing also the dieticians of Canada, have actually been recommending increasing the consumption of fish.

Instead of promoting health and safety, the FDA's advisories may have had negative consequences. John Middaugh, State Epidemiologist with the Alaska Division of Public Health told the FDA Committee: "Advisories based upon risk assessment without consideration of well-established public health benefits of fish consumption have great potential to harm public health if reductions in fish consumption occur." He described how they've seen an abandonment of traditional fish diets among Alaskan communities since the FDA's 2001 mercury advisory, with subsequent major increases in diabetes, heart disease, and vitamin A and D deficiencies.[6]

Yet the FDA's 2001 advisory, like those in 2002 and 2003, was mild compared to the report issued early on in 2004.[7] It began by suggesting women of childbearing age avoid shark, swordfish, king mackerel, or tilefish (from the Gulf of Mexico, not the Atlantic where they are low in methylmercury).[8] Then, unlike previous advisories that simply suggested women eat 12 ounces each week of a variety of types of fish, the latest proceeded with a complicated list of 5 varieties of fish low in methylmercury—shrimp, canned light tuna, salmon, Pollock, and catfish (although it's a mystery why they arbitrarily chose those when hundreds of other varieties are equally low in methylmercury); offered descriptions and explanations of different tunas; and advised women that if they're eating 6 ounces of albacore tuna to then eat no more than 6 ounces of another fish that week.[9]

This author became confused midway through the fish lists and threw up her hands. For many consumers, fish sounds too scary to even bother to eat at all anymore. Understandably, pregnant women are especially alert to health advice. And they've been unnecessarily alarmed by these mercury warnings and deterred from eating fish or serving it to their children. A Harvard study released last August in *The Journal of Obstetrics & Gynecology* found that after the FDA's 2001 advisory, pregnant women dramatically reduced their consumption of fish and declines were ongoing.[10]

This concerns the American College of Obstetricians and Gynecologists, which has been urging women to eat fish for its abundant health benefits for over ten years, according to Charles Lockwood, MD, former ACOG chairman. Greater fish consumption has been shown to improve pregnancy health outcomes and fetal growth and reduce the risk of preeclampsia and premature labor, Lockwood testified before the FDA Committee. Certain fish are also the richest sources of the omega-3 fatty acid, DHA, critical in the diets of pregnant women and nursing babies to ensure vision, behavioral and cognitive development.[11]

Incredibly, the FDA ignored these concerns and the weak evidence of actual risk and continued to sound the alarm.

Public Pressure Trumps Science

Several weeks before the latest FDA advisory, the Mercury Project of environmental groups at The Tides Center (National Environmental Trust, Waterkeeper Alliance, Consumers Union, Physicians for Social Responsibility, Natural Resources Defense Council (NRDC), National Wildlife Federation, Sierra Club and others) wrote public letters to the FDA urging stricter and more detailed advisories, especially targeting canned white tuna.[12] For years, prior to each of their other mercury advisories the FDA and HHS Secretaries had been sent similar letters by these same groups and the Center for Science in the Public Interest.[13,14,15] Also corresponding to the FDA's advisories, the Environmental Working Group (EWG),[16] a special interest lobbying group, filed legal challenges against the FDA to block them from issuing weak mercury advisories.[17]

These groups have also used fears to apply public pressure. That legendary "60,000 babies annually are born at risk" tale has grown over the years. Last month, estimates of infants at risk had reached 630,000 and saturated media headlines.[18,19,20] *The New York Times* even proclaimed that "More than one child in six born in the United States could be at risk for developmental disorders because of mercury exposure in the mother's womb."[21]

Jane Houlihan, with EWG and the Consumers Union, told the FDA Committee how the EWG arrived at these estimates. They took the highest methylmercury levels from the CDC's 1999 National Health and Nutrition Examination Survey and added what would happen if women just ate fish with the highest limits of mercury.[22] That, of course, completely disregards that FDA advisories emphasized women enjoy a *variety* of different types of fish. But scientists at the FDA methylmercury meetings were unable to reproduce the EWG's astounding results and pointed out multiple errors in their calculations. Margaret McBride, M.D., a pediatric neurologist from Rochester, New York, noted that the EWG ignored the fact that a good number of women at the high end of mercury levels were already eating a

lot of high-mercury fish. Some women with the highest mercury levels were found to have elevated levels due to sources other than fish. Alex Acholonu, Ph.D., a biologist at Alcorn State University in Mississippi, pointed out the EWG also failed to consider the half-life of methylmercury in their calculations, as mercury clears from the human body in about 70 days. As Heimbach noted, the EWG's figures went beyond biological plausibility.

It's Not Really About Fish At All

But creating concerns about mercury in fish helps fuel the efforts of environmental groups surrounding the emissions regulations under the Clean Air Act. The FDA's mercury warnings are being used as proof of a health threat. "If mercury is so dangerous that pregnant women are urged not to eat much fish, then it's time to get tough on polluters," noted a January 4, 2004 *Baltimore Sun* editorial.

Tuna fish sandwiches are their newest symbols of toxicity. You may have seen the TV ads depicting a poison symbol morphing into a happy face on a child's lunchbox. They're part of the national ad campaign launched by Fenton Communications on March 26th for the EWG, NRDC, and MoveOn.org in their opposition to "[President] Bush's proposed 10-year mercury cleanup delay."[23] These groups have also pursued state-level legislation and reported last month they had helped introduce over 90 bills in 30 states.[24] The legislation includes limits on the sale of mercury-containing products, labeling requirements, and tougher rules for mercury emissions.[25]

Trouble is, many of the claims about mercury in fish and air emissions don't stand up to the evidence.

Where Does Mercury Come From?

Mercury is a naturally-occurring metal found in several forms: elemental, inorganic, and organic. While environmental groups lead everyone to believe nasty American coal-burning power plants are to blame, most mercury actually comes from Mother Nature herself. Up to 6,000 tons are released each year from natural degassing of the Earths oceans and crusts—volcanoes and forest fires. Methylmercury is one of the organic mercury compounds created with aquatic bacteria and is higher in freshwater than saltwater.[26,27] Not all mercury compounds are alike, though, and they have different degrees of toxicity depending upon the molecules the mercury is bound to. Some research, such as that from biophysicist Graham Georges published in the August 2004 issue of *Science,* suggests that the methylmercury in fish may not be as toxic as once thought because it's in a form less likely to be metabolized and cross cell membranes.[28]

Methylmercury has probably been in fish as long as fish have been on this planet, said Tom Clarkson, a toxicologist at the University of Rochester.[29] But most levels are exceedingly low.[30,31,32] The higher up the aquatic food chain—as little fish get eaten by bigger fish—the higher the methylmercury levels. So large ocean fish and freshwater bass, pike and walleye, at the top of their respective food chains, have higher levels than their smaller counterparts and can sometimes reach the FDA's safe limit for fish sold for human consumption. For recreationally-caught fish, the EPA monitors and issues local fishing advisories when high levels are found.[33,34] Farm-raised fish contain especially low levels because of the mercury-free diet they are fed.[35,36]

Environmental mercury is undeniably a global issue. U.S. power plants contribute less than 1% of the global atmospheric mercury. Forty-two percent comes from man-made sources outside the U.S.—Asia accounts for half, with China's power plants alone representing about 22%.[37] U.S. industrial use of mercury has dropped more than 50% since 1991. Yet while emissions from our incinerators and other sources have decreased the past decade and continue to do so, mercury deposits in most areas of our country have remained fairly constant. That's because there's a global cycling of mercury in its various forms through the environment's waters, soils, and air.[38] Conversely, while global mercury emissions increased, methylmercury concentrations in marine fish have not. French scientists found methylmercury levels in Yellowfin tuna caught off Hawaii in 1998 measured the same as in 1971, despite their predictions of a 9 to 26% increase.[39]

Emissions and Politics

A review of the scientific evidence led the Annapolis Center for Science-Based Public Policy to conclude that further drastic reductions in U.S. emissions won't appreciably affect methylmercury levels in fish.[40] This gives sound cause to weigh the negligible public health and environmental benefits of the Administrations Clear Skies Initiative—as well as the even steeper reductions in power plant emissions environmental groups are demanding—against any likely harm.

In a recent White Paper, the Center for Science & Public Policy found the attenuation of safe and reliable energy sources being prescribed would drive energy costs so high as to fatally endanger especially the lives and livelihoods of minorities, the poor and elderly—as well as our national economy.[41] The facts point to conclusions far different from the Administration's claims that 14,000 lives will be saved under Clear Skies as well as the environmentalists accusations that it will put an entire generation at risk.[42]

The truth is, the fear mongering from all sides is most harming the very people they're purporting to be protecting—women and babies. ■

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Section IV
Our Energy Future

America's Energy Outlook

By Robert L. Bradley, Jr.
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Energy outlooks published by national and international organizations present a wealth of statistics to estimate supply and demand out five, ten, and even twenty years. The Department of Energy's Energy Information Administration has such a forecast showing *growing energy demand* and *increasing reliance on hydrocarbon-based energy*. But for state legislators, context and understanding are as important as the numbers.

The simplest energy outlook for the U.S. can be summarized as: *affordable, plentiful supply to meet increasing demand.* This forecast is backed by two interrelated insights. First, human ingenuity will continue to overcome the challenges posed by depletion, pollution, and reliability. Second, consumers-qua-voters expect improvement in energy as they do in other areas of their lives, which points policymakers toward *sustainable, market-oriented energy policies.* The corollary is that public policies that make energy less affordable and less plentiful will be reversed. Such counterproductive policies are, in short, *unsustainable.*

At any given time, temporary instabilities can cause prices to spike for a particular energy commodity. But market processes still play a vital role by *rationing demand* in the short run and *increasing supply* over the longer term to restore balance. "Acts of God" such as extreme weather bring challenges—economic, political, and educational—but price and allocation controls by government only make things worse by blocking the signals of underlying scarcity.

Growing Demand

Rising energy consumption in both the industrialized and developing world is virtually a given. The U.S. Energy Information Administration predicts that global energy demand will increase by 60 percent, or 2.2 percent annually, between now and 2020. Electricity in the forecast grows at a higher rate of 2.7 percent annually, an overall increase of 75 percent. This growth assumes a reduction in energy intensity (i.e., energy use per unit of economic output) of 1.3 percent annually.

In the United States, total annual average energy growth is estimated to be 1.4 percent by 2020, or 32 percent, with electricity growth at 1.8 percent per annum (43 percent total). This is *after* an average improvement in energy efficiency per year of 1.5 percent. Increasing total energy use and increasing energy efficiency are not mutually exclusive.

Growing Hydrocarbon Reliance

The U.S. Energy Information Administration predicts that the global market share of oil, natural gas, and coal will increase from around 85 percent to 87 percent in the next 20 years, while the market share of renewables will fall slightly. The International Energy Agency projects that the global share of hydrocarbons in the commercial energy mix will increase even more—from 85 percent to 90 percent—by 2020. The shares of both nuclear power and renewables fall behind in the same period.

The increasing supply of "depletable" hydrocarbons relative to "non-depletable" renewables may seem counterintuitive, but on closer inspection the reasons emerge. Hydrocarbon reserves are expanding because the technology and capital required to locate and produce supplies are rapidly increasing. Renewables are constrained by their inherent characteristic of *intermittency* (the sun does not always shine, the wind blow, nor rivers flow to generate electricity). In addition, large capital-intensive renewable projects raise not only economic but also *siting* issues. Local environmentalists are often opposed to new hydroelectric dams or offshore wind farms, for example.

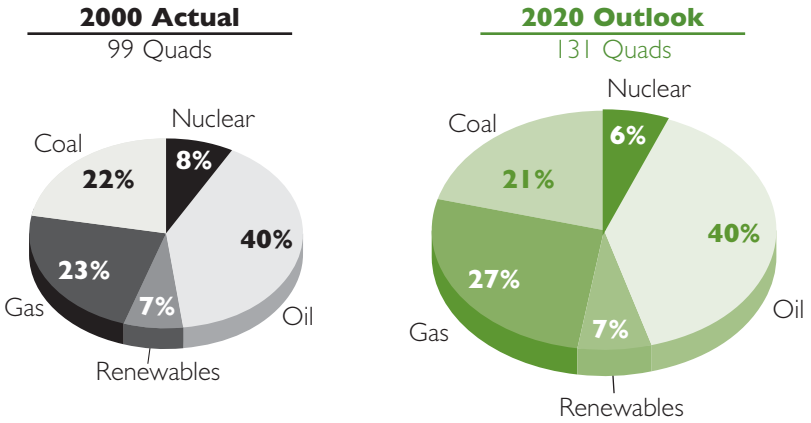
The use of oil, natural gas, and coal resources is expected to increase at a faster rate than overall energy demand in the U.S. over the next two decades (see **Figure 1**). Natural gas is projected to gain market share, while nuclear energy will lose market share. The market share of renewables is stagnant despite mandates in a number of states requiring a certain percentage of new capacity to be renewable. In addition, government subsidies are necessary to lower generation costs. This suggests that a removal of such mandates and subsidies could cause the renewables boom to crash.

Oil-based gasoline and diesel will continue to dominate the transportation market well into the future. But just as electric generation is turning toward cleaner fuels, so is the motor vehicle market. Gasoline and diesel are not yesterday's gasoline and diesel. They are environmentally designed products that meet or exceed the strict specifications mandated by state and federal clean air laws. This is a major reason why urban air emissions have declined by approximately 25 percent since 1970.

False Alarmism

Energy Malthusians have long predicted shortages, worsening pollution, and other

Figure 1: Forecast of U.S. Energy Demand



Quadrillion Btu	2000	2020	Change	Growth	Growth/yr
Coal	22	27	5	22%	1.0%
Gas	23	35	12	48%	2.0%
Nuclear	8	8	0	–5%	–.3%
Renewable	7	9	2	31%	1.5%
Oil	39	52	13	35%	1.5%
Total	**99**	**131**	**32**	**32%**	**1.4%**

crises from society's reliance on hydrocarbon energy. Yet the facts contradict the doomsayers. Energy has grown *more abundant and affordable*, *less polluting* (air, land, and water), *more efficient*, and *more reliable* in market settings around the world, especially in the U.S. The services provided by energy have remarkably improved as more and more necessities and conveniences are provided by a flip of the switch.

Despite such well-documented improvement, some critics have concluded that the U.S. and world economies should move from hydrocarbons to "save the planet" or at least promote ecosystem health. This view fails to correlate energy abundance to human progress and environmental stewardship. Rich societies take care of the great outdoors much better than do poor societies because they have the resources to do so. And as nature would have it, the release of carbon dioxide (CO_2) from hydrocarbon usage has distinct benefits. Climate economists are impressed by the ecological and social benefits of a moderately warmer and wetter world, natural or manmade, coupled with longer growing seasons, and CO_2 fertilization of agricultural crops and other plant life.

There continues to be substantial and well documented gaps in climate science, including the extent to which human activity contributes to a warming effect. However, there is little argument that successful development and deployment of innovative, commercially viable energy technologies are necessary to promote increasing global prosperity.

The hyperbole about a post-hydrocarbon energy world does not represent "a new energy future." It is really more about the energy past. History reveals the primary energy role of solar, wood, waste, water, and wind in centuries past (see **Figure 2**); the invention of the fuel cell in 1839; the dominance of the electric car before Henry Ford's internal combustion engine entered mass production; and the favored role of ethanol as a transportation fuel a century ago. As for the future, the *enhanced* hydrocarbon era will come of age when technologies allow the different hydrocarbons to become virtually perfect substitutes for each other and associated pollution drops even more.

Unconventional sources of energy such as solar, wind, and fuel cells serve niche markets that cannot economically support conventional energy infrastructure. Space vehicles and offshore drilling platforms are examples. Isolated, developing areas may use such distributed power as their first modern form of energy, but over time the costly energy sources will likely yield to larger scale, cheaper conventional energy sources.

Public Policy

The positive energy outlook for the United States in the next years and decades is threatened only by public policies that systemically hamper the market process of improvement. It has happened before and can happen again. Gasoline price spikes in the Midwest several years ago resulted from poorly designed environmental requirements on gasoline. The "boutique fuel" problem should not be repeated. The electricity shortage in California in 2000–2001 had the same cause as gasoline lines during the 1970s—price controls. Regulators should learn a lesson here as well.

Perhaps the greatest energy challenge for policy makers going forward is the push by some states to regulate CO_2 in the quixotic quest to "stabilize climate." Carbon dioxide is not a pollutant or otherwise a threat to human health. Since carbon emissions are an integral part of conventional energy use, any mandated carbon reductions below natural market levels will increase energy costs and prices. This will occur whether the policy is a direct tax on carbon emissions or a cap-and-trade program setting a ceiling on carbon emissions from which a trading market can develop.

Public policy in the name of stabilizing climate, not climate change itself, is the leading threat to energy sustainability. Legislators can avoid the problem by avoiding even small beginning steps of an open-ended regulatory future and insist that public policy not interfere with energy availability or affordability. Elitist-class energy fads will come and go, but consumers will always be voters. ■

Robert L. Bradley Jr. is president of the Institute for Energy Research in Houston and author of Julian Simon and the Triumph of Energy Sustainability *(Washington: American Legislative Exchange Council, 2000).*

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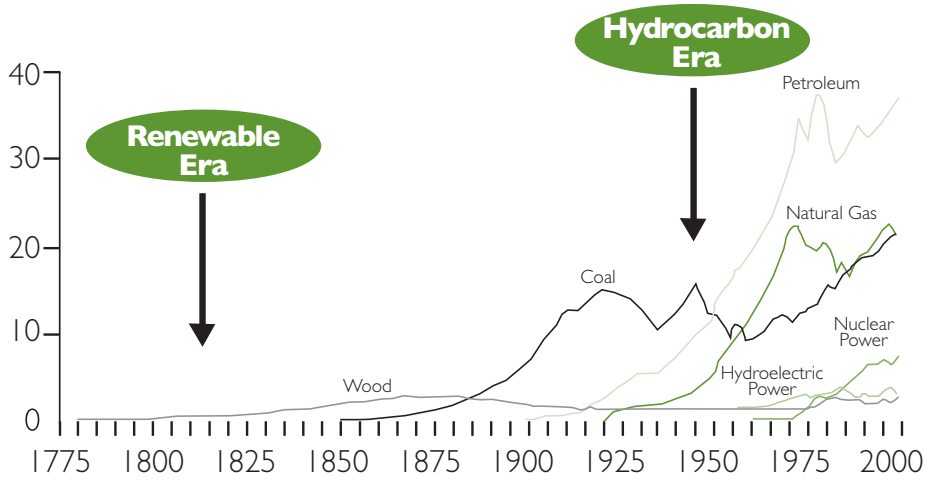
Figure 2: U.S. Energy Consumption: 1775–2000



The High Cost of a Limited Domestic Energy Supply

By Jonathan A. Shore

The high energy prices of 2005 were the result of high worldwide demand for oil coupled with the domestic energy production and distribution problems caused by Hurricanes Katrina and Rita. The sustained high prices sent a message to the American consumer that low energy prices are a thing of the past. In February 2006, the federal Energy Information Administration (EIA) released its *Annual Energy Outlook 2006* (AEO2006),[1] which further drives home the point that bargain basement energy prices are not in the immediate or distant future.

For the first time, EIA extended its reference case to forecast the energy situation in the United States out to the year 2030. Since 2000, world oil prices have sharply increased as demand from developing countries has expanded and supplies have tightened. EIA's predictions for the future try to take into account a number of variables including "energy prices, U.S. economic growth, advances in technology, changes in weather patterns, and future public policy decisions."

Petroleum

In the past five years, the global supply of oil has tightened, driving up crude oil prices. Coupled with the ever-growing demand of the Chinese, high prices can also be attributed to supply limitations as a result of insufficient investment needed to expand domestic capabilities to meet demand growth.

World crude prices are expected to rise through 2006 and then decline to $46.90 per barrel in 2014 (2004 dollars). EIA assumes that after 2014, oil prices will increase because of the increasing costs of developing non-OPEC oil resources. EIA estimates that oil prices will increase to $56.97 a barrel in 2030. However, whenever making any assumption that includes OPEC, it has to be understood already uncertain OPEC policies can be further confused by individual members states and their unique production policies. The reference case assumes that while it may be more expensive, consumers will slowly wean themselves off foreign oil and create a larger, less volatile domestic fuel infrastructure.

Natural Gas

Natural gas prices are above historic levels and will likely remain above historic levels. Total natural gas consumption is projected to increase from 22.4 trillion cubic feet in 2004 to 26.0 trillion cubic feet in 2030. One reason EIA predicts that there will not be an even greater increase is because high natural gas prices will moderate natural gas consumption. With new supplies coming online and new imports becoming available, most of the increase will occur before 2017.

Currently natural gas prices are at nearly $7.00 per thousand cubic feet. Average prices are projected to fall to $4.46 per thousand cubic feet in 2017 (2004 dollars) and then start to gradually rise again to $5.92 in 2030. EIA predicts that natural gas demand increases and resource depletion will not be sufficiently offset by liquefied natural gas imports, Alaskan natural gas production, or production from unconventional sources, and gas will become more difficult to extract and therefore less economically sound in the lower 48 states. Interestingly, EIA predicts that unconventional natural gas (which is to say natural gas from coalbed methane, tight sandstones, and gas shales) will become the largest source of U.S. gas supply.

Coal

For the past ten years, the U.S. has produced about 1.1 billion tons of coal a year. EIA projects for coal production to increase to nearly 1.8 billion tons a year by 2030. Most of this increase in production will come from the Powder River Basin in Wyoming and other areas in the West. EIA projects that prices will remain relatively stable between $20 to $22 a ton.

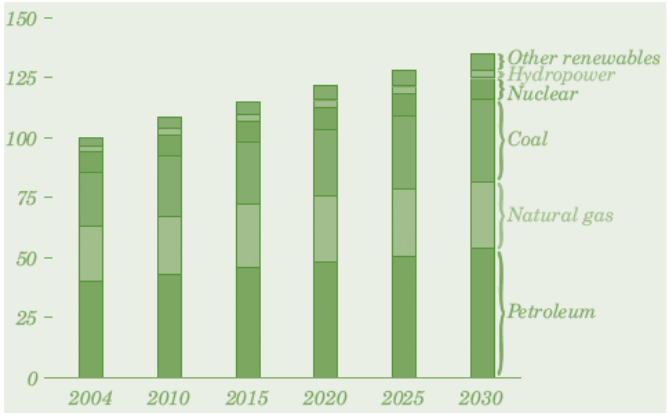
Because natural gas prices are likely to rise, more coal will be needed for baseload electrical generation capacity. This need will lead to the construction of new coal-fired power plants. The *Annual Energy Outlook 2005* projected that coal prices of $18.64 per ton ($0.93 per million Btu) in 2025, but the 2006 report estimates that coal prices will be $20.63 per ton ($1.03 per million Btu). As a result of the projected hike in fuel costs for natural gas and coal fired electric power plants in the long term, electricity prices will increase 14.9 cents per kilowatt hour in 2030.

Electricity

The EIA projects that total electricity sales are going to increase by 50 percent in the next 25 years. Seventy-five percent of this increase should come from the commercial sector, 47 percent from the residential sectors, and 24 percent from the industrial sector. While overall electricity demand should increase, EIA projects that efficiency should increase as well due to the Energy Policy Act of 2005 (EPACT2005).

Because electricity demand and electricity prices continue to rise, the AEO2006 reference case stresses the fact that new electricity capacity needs to come online in the near future. It estimates that 347 gigawatts will be needed by 2030. About 50 percent of this new capacity should come from coal-fired power plants, about 40 percent from gas-fired power plants, eight percent from renewable energy sources, and two percent from nuclear power sources. Natural gas power plants are generally cheaper to construct though burdened by relatively high fuel costs. For example, currently natural gas costs about $7.00 per million

Primary energy use by fuel, 2004-2030 (quadrillion Btu)



Energy Information Administration http://www.eia.doe.gov/oiaf/aeo/pdf/trend_2.pdf

Btu, while coal costs about $1.00. Coal, nuclear, and renewable energy plants are more expensive to build but have relatively low operating costs. In addition, coal, nuclear, and renewable energy sources have will receive tax credits under EPACT2005.

In some regions, new geothermal and biomass plants may become competitive with new coal-fired plants in the distant future. This is based upon the assumption that their availability will not be limited and biomass fuels price remains low.

Although the overall AEO2006 reference case says that prices are gradually rising and will continue to do so, there is a silver lining: the U.S. can solve the majority of its energy problems. The answer lies in energy diversity. By constructing newer, cleaner, cost-effective power plants or even expanding, modernizing refineries, and exploring and tapping new energy caches, consumers can squelch their dependence on imports and increase our domestic energy autonomy. ■

Jonathan Shore was a Legislative Assistant to the Natural Resources Task Force at the American Legislative Exchange Council.

Endnote

1. *Annual Energy Outlook 2006*, Energy Information Administration of the U.S. Department of Energy. Report can be found at: http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2006).pdf.

Motor Fuel and Natural Disasters: Don't Regulate

By Robert L. Bradley Jr. and Thomas Tanton
Institute for Energy Research
October 24, 2005

Executive Summary

Economics and history teach that free markets are the best means for allocating resources, in emergencies as well as in normal times. Unregulated prices ration supply to the most urgent demands, which is particularly important when supply is unusually scarce or demand unusually high. The situation in the U.S. petroleum industry this year, after two major hurricanes hit the Gulf Coast, offers a case study that illustrates the point. Despite standby price controls in Louisiana and Texas, debilitating shortages were for the most part averted, and oil product prices are now returning to pre-hurricane levels as infrastructure comes back on stream.

Policy reform for the next hurricane season—or other emergencies—should include repealing or amending "price gouging" laws so that economic markets better reflect economic reality. That will allow market forces to instruct consumers to conserve and tell producers to direct supply to the most needed areas.

Introduction

Crude oil and gasoline supplies were already tight before Hurricane Katrina hit. Industry infrastructure was running at full tilt with the peak driving season just ahead. Katrina physically damaged oil production, refining, pipeline, and distribution capacity in the Louisiana-Texas energy corridor, onshore and offshore, and Hurricane Rita added significantly to infrastructure outages. At the Labor Day driving peak, Katrina had knocked Gulf Coast gasoline production down to 2.9 million barrels per day, 24 percent less than usual. Additional damage from Rita reduced such production to 2.1 million barrels per day, 45 percent less than usual.[1]

Three weeks after the second hurricane (Rita), four percent of U.S. refining capacity and nine percent of crude-oil production were still sidelined. The good news is that high gasoline prices in the region attracted new gasoline supplies, from both domestic and foreign sources. Local infrastructure was immobilized, but gasoline tankers rushed to the Gulf Coast to take advantage of higher prices. According to the U.S. Energy Information Administration, gasoline imports to the Gulf Coast more than doubled after Katrina, from about 54 thousand to 114 thousand barrels per day. This lifeline reached 500 thousand barrels per day the week of Oct. 14, 2005.[2] The cause was not charity but hard economics. Adam Smith's invisible hand was in action.

Standby Price Controls

Obviously, physical causes created the principal supply problems for gasoline and diesel fuel during the hurricanes. Mother Nature was to blame. But Father Government added difficulties. State laws in the Gulf Coast energy belt and elsewhere, however well intentioned, attempted to override the immutable laws of economics.

Twenty-seven states have standby anti-price gouging laws that can be invoked in an emergency.[3] These laws and their enforcement became a *political* hurricane after average and localized fuel prices increased sharply in the wake of Katrina and Rita. Prosecutions and threats to sellers of gasoline and diesel escalated from New Jersey to California—far beyond the reach of the storms themselves. State and federal agencies received thousands of consumer complaints, some at the urging of the American Petroleum Institute. A federal anti-gouging law for motor fuels (H.R. 3893) has passed the House and awaits Senate action.

What is "price gouging"? No definition exists in economics textbooks because in fact there is no precise definition. It is an emotional concept and a politically charged legal term. Often the definition is simply in the eye of the prosecutor. Of the 27 state statutes:

- 17 laws, including those of Texas and Louisiana, are based on vague prohibitions of "unconscionable" or "unreasonable" prices (designated 'A' in Table 1);
- 5 laws (including the District of Columbia's) prohibit more than a specific percentage increase (10 percent and in one case 25 percent, designated 'B' in Table 1); and
- 5 laws prohibit any price increase during emergencies (designated 'C' in Table 1).

Table 1 Categorization of State Anti-Gouging Laws

Alabama-A	Arkansas-B	Calif.-B	Connecticut-A	D.C.-B
Florida-A	Georgia-C	Hawaii-C	Idaho-A	Indiana-C
Iowa-A	Kansas-C	Kentucky-A	Louisiana-C	Maine-A
Mass.-A	Michigan-A	Miss.-A	Missouri-A	New Jersey-A
New York-A	N. Carolina-A	Oklahoma-B	S. Carolina-A	Tenn.-A
Texas-A	W. Virginia-B			

Price Regulation Reconsidered

At first blush, setting or somehow controlling prices for critical needs may seem like sensible behavior in an emergency, but the lessons of history say otherwise. Price controls have been imposed by governments for centuries. Uniformly, the results have been to discourage supply and cause shortages and other inconvenience for consumers. When shortages arise, typically, governments intervene to allocate supply, a spiraling effect whereby each government intervention creates more and yet more intervention.

The United States has imposed price controls on oil and oil products and predictably experienced shortages in wartime (World War I, World War II) and peacetime (the 1970s). Indeed, petroleum price controls from 1971 through 1980 were an unmitigated disaster, resulting in less domestic supply, more imports, higher prices, and shortages—plus violent quarrels at the pump.

The underlying problem is simple. What regulators have tried to do by mandating "normal" or "fair" prices is to create an alternative reality, and that is what some want to do now. But legislation cannot repeal the economic law of supply and demand. Prices are either allowed to clear

the market—by reaching the point where demand is naturally rationed to available supply—or motorists wait in line for gas, perhaps even do without. *Do consumers benefit from a lower price if they have to queue up at the service station, burning their time and fuel?* An hour in line adds about $1.00 per gallon to the pump price for the average American worker. When time is of critical importance during an emergency, the cost of waiting is very high indeed. In such cases, government intervention is what "gouges" consumers.

Anti-price gouging laws, to the extent that they result in pricing that is below market-clearing levels, cause distortions. Specifically, they:

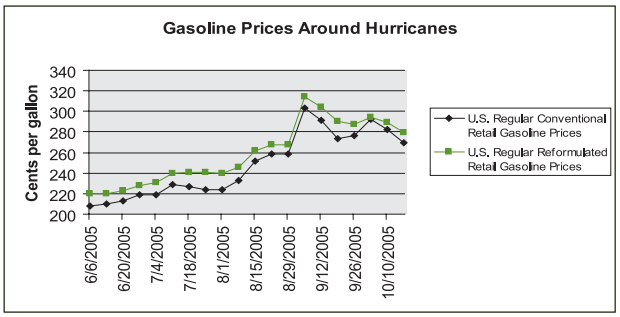
- Trigger shortages;
- Create lines at gas stations so that motorists can buy fuel only after long waits (or reach the pump only to find they cannot purchase gasoline at all);
- Discourage movement of fuel into the emergency area due to legal uncertainties and better economic incentives elsewhere;
- Encourage panic buying (such as tank topping) by motorists, further adding to the shortage;
- Encourage superfluous entrepreneurship, such as hoarding, haphazard reselling, and other unnecessary behaviors;[4] and
- Provoke civil unrest.

Overcoming a Worst-Case Scenario

On August 1, 2005–four weeks prior to Katrina—the price of crude oil stood at $61.55 per barrel, while wholesale gasoline prices averaged $1.75 per gallon in the U.S. The national average retail gasoline price at the time was just about $2.29 per gallon. During normal conditions, the price of crude is the predominant factor in the price of gasoline. As the evidence of Katrina's destruction mounted, gasoline prices rose sharply, reaching $2.61 on August 31, 2005, despite a crude price that has increased to just $64.50. The sharp increase in gasoline prices relative to crude was caused by the outages of refinery capacity that moderated price increases in crude oil, by reducing refinery demand, and increased prices of refined products, by reducing refinery capacity.

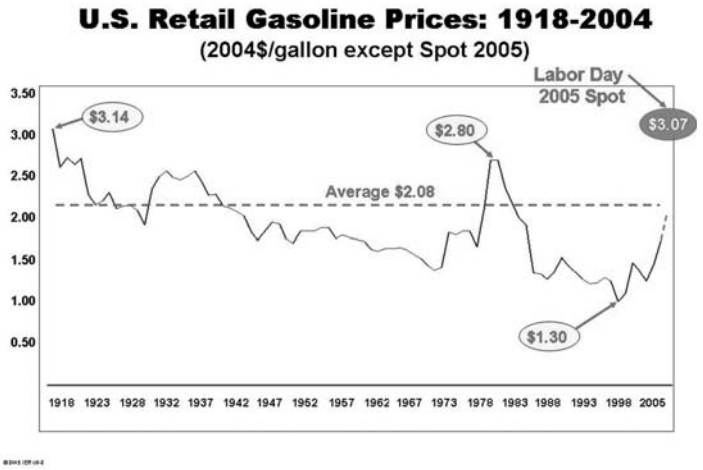
Refinery production in the effected region dropped after Katrina, rebounded nicely, and then fell to a new low after Rita—56 percent of its normal capacity. As the industry began to recover, Gulf Coast gasoline production climbed to 3.5 million barrels per day during the week of September 12–16, 2005. Meanwhile, after Katrina wholesale gasoline prices had fallen sharply—to $1.78 by September 16. As reports of Rita's ferocity circulated, wholesale gasoline markets again rose steadily in anticipation of the potential destruction. Meanwhile, crude oil prices showed little movement. It is surprising that gasoline prices did not go even higher because Rita resulted in an even larger dislocation of refining capacity than Katrina.

Figure 1: Retail Gasoline Prices around Hurricanes Katrina and Rita[5]



Many refineries have come back on stream in the weeks after the hurricanes, and overall prices have come down to near pre-emergency levels. But what is most interesting of all: *Even in the face of two of the nation's worst natural disasters, landing right in the Gulf Coast energy belt, gasoline prices did not exceed historical highs.* Post-Katrina crude-oil prices around $65 per barrel were 11 percent below the all-time spot-price high (March 1981) of $72 per barrel adjusted for inflation, although well above the 1913-2004 average for crude oil of $21 per barrel. Gasoline prices tested the all-time high during Labor Day 2005 before falling to the current national retail price of $2.72 as shown in Figure 2.

Figure 2: Historical Retail Prices: Gasoline



Today, gasoline markets and prices are behaving exactly as one would expect. Prices are falling as supplies and refining capacity come back on stream. This is hardly the picture of a market failure—rather it is the picture of a market success in a worst-case scenario.

Looking Ahead

Invoking anti-gouging laws during the next emergency will result only in under pricing and shortages—because such laws send the wrong signals. They tell consumers that supply is more available than it really is. They tell producers that additional supply is not needed when and where it really is. Gasoline importers are told not to redirect their tankers to the afflicted regions. Fortunately, Gulf Coast prices did go up, creating the highest prices and the most lucrative market in the world for motor fuels. The price signals heard around the world sent incremental gasoline supplies to where it was most needed. This important safety valve for the next afflicted region should not be threatened by price-control regulation.

There were many factors leading to the chaos during the evacuation in the face of Rita. Many single passenger cars were on the road, as people tried to save their vehicles from flooding. The automotive infrastructure (from highways to service stations) was inadequate for the 'peak load' of everybody moving at once in the same direction. To this, anti-gouging laws added several negative effects; most noticeably, it led to under pricing that resulted in too little conservation. That, in turn, left some motorists stranded on highways because hoarding by other motorists (induced by low prices) had left less gas for them. And much of the congestion on evacuation routes in the Gulf area was made worse by motorists who ran out of fuel in traffic because they could not find a station with gasoline.[6,7]

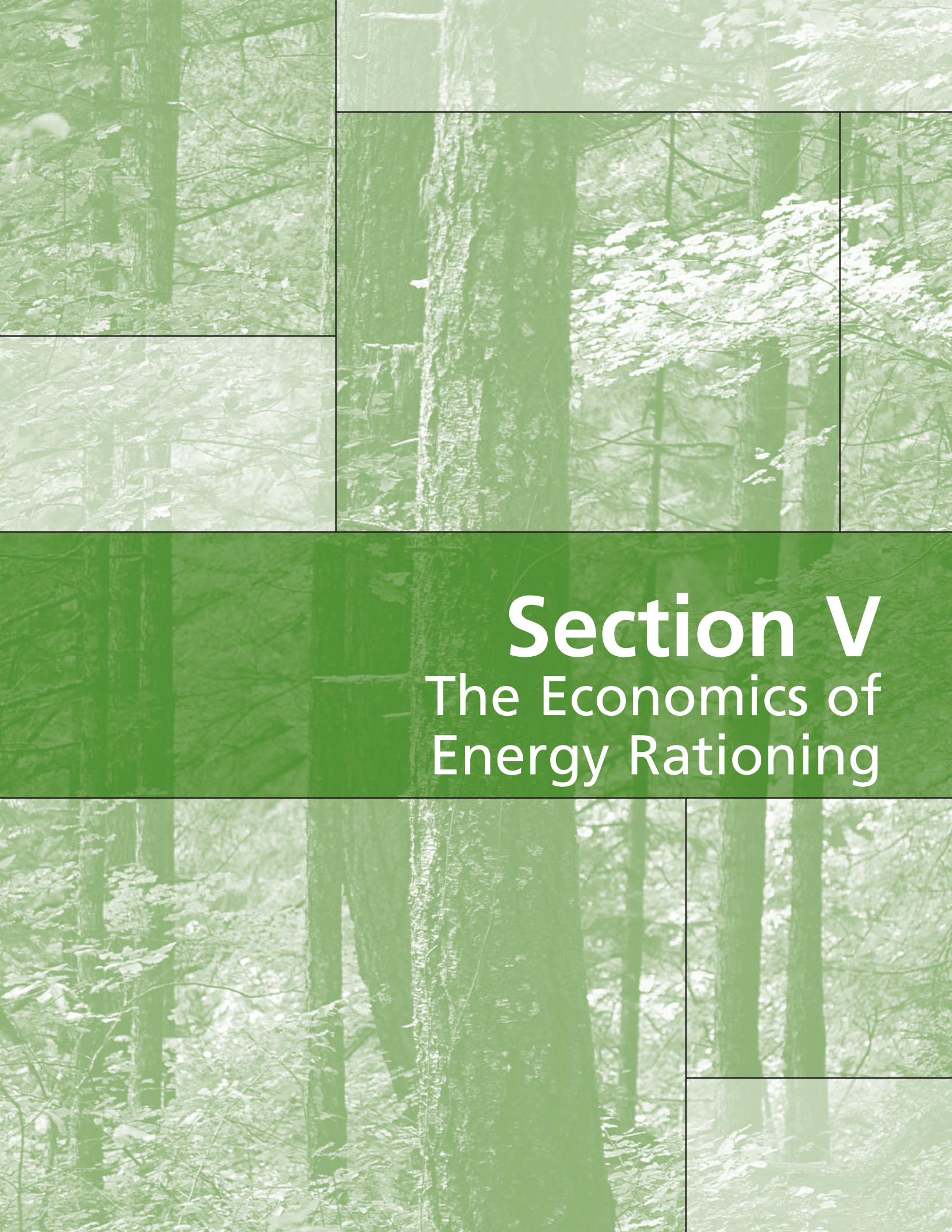
The lessons from Katrina and Rita should encourage lawmakers to revisit their "price gouging" laws. Price increases at some or many stations may have violated those laws, but to the extent they did, motorists benefited by having more gasoline and diesel fuel than they otherwise would have had.

Lawmakers in 27 states should repeal standby price controls, joining the 23 states that do not have such regulation. Short of repeal, the statutes should at least be amended to allow for pricing that avoids fuel shortages. For example, a statute might have a proviso, "provided, that such pricing will not cause the seller to run out of fuel and close during normal business hours." It is elementary that consumers are helped by having the *option* to buy gasoline at some price rather than face an immediate fuel-less future.

The current energy emergency fell short of being an energy crisis such as occurred in many areas of the U.S. during the heavily regulated 1970s. For this we can be grateful. But if state legislators can learn one thing from the hurricanes of 2005 that will better prepare them for the inevitable next time, it is that motor fuel prices must be permitted to expeditiously reflect new, current realities. Such a free market pricing policy allows impersonal economic forces to send supply where the demand is. Political attempts to override free-market pricing in the name of fairness only creates a chaos of quotas, mandates, inefficiencies, shortages, wasted time, frustration, and even violence, so that, in the end, price-regulated gasoline always turns out to be the most expensive. ■

Endnotes

1. U.S. Dept. of Energy; Energy Information Administration, http://tonto.eia.doe.gov/oog/info/twip/twip.asp
2. Ibid.
3. National Council of State Legislators. http://www.ncsl.org/programs/energy/lawsgouging.htm
4. Safety issues also arise. The sight of some motorists filling up ice chests with gasoline should have made most safety conscience folks cringe.
5. U.S. DOE, Energy Information Administration, at http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_history.html
6. http://www.chron.com/cs/CDA/printstory.mpl/special/05/rita/3366196 10/16/2005 1:09:50 AM
7. Gabby Martinez. "Experts disagree on the cause of gasoline shortages; State's refineries at 75 percent Capacity" *The Daily Reveille*, September 07, 2005



Section V
The Economics of Energy Rationing

Climate Change Policy: A Cost-Effective Strategy for the U.S. and for Oregon

By Margo Thorning, Ph.D.
Senior Vice President and Chief Economist
American Council for Capital Formation

Executive Summary

Cost-Benefit Analysis: Scholars have made much progress over the past thirty years in understanding the economic impact of social regulation. In no small part, that progress is due to efforts to systematize knowledge, including the use of cost-benefit analysis.

First, these tools illustrate that the cost-effectiveness of government regulations can vary substantially. Second, they show that government regulation is often inefficient in the sense that it is possible to get more for less, most notably in areas of environmental quality and life-saving investments. Third, they demonstrate that a significant fraction of regulations are likely to fail a cost-benefit test based on the government's numbers and a significant fraction are likely to pass. All proposed regulation should be subjected to cost-benefit analysis.

Impact of Carbon Reductions on the U.S. Economy: The reason the Bush Administration rejected the Kyoto Protocol approach to addressing climate change was because they had analyzed the costs of sharp, near-term emission reductions and found that the economic costs were significant. A range of credible macroeconomic models showed that reducing U.S. CO_2 emissions to the Kyoto Protocol level (7% below 1990 levels by 2010) would reduce U.S. GDP by 2% to almost 4% annually.

Impact of McCain/Lieberman and Tighter Carbon Caps on Oregon: An economic analysis prepared by CRA International, an internationally recognized energy modeling firm, modeled the impact on Oregon if the U.S. adopted the McCain/Lieberman proposal and the tighter targets for the post 2020 period under consideration by the Governor's Advisory Group on Global Warming and by other states. The study shows that by 2020, Oregon would have 16,000 fewer jobs, Gross State Product would be 0.6% smaller, and natural gas prices would be 56% higher.

Impact of Restricting Energy Supplies on Oregon: A second study, prepared by Global Insight, an energy modeling and economic forecasting firm with offices around the globe, compared the impact of policies that restrict the growth in energy supplies in the U.S. with those that enhance energy supplies. The report shows if the U.S. adopts policies that promote energy supplies, Oregon's economy will expand by 42% over the 2010-2020 period. In contrast, policies that restrict energy supplies (including caps on carbon emissions) will reduce Oregon's Gross State Product by 2.7% and employment by 23,100 in 2020.

A Better Path Forward: Transferring technology to the developing world, where most of the growth in emissions will occur over this century, can play a major role in emission reductions. Promoting economic freedom and economic growth in the developing world can have a strong impact on reducing greenhouse gases. As countries become wealthier, their energy use becomes more efficient and they have more resources to address issues like climate change.

Conclusions: The Kyoto Protocol will inevitably be replaced by a new framework for addressing climate change: one that encourages economic freedom and economic growth that will lead to gradually reducing carbon intensity per unit of output and overall carbon emissions. This approach is likely to be much more productive than having individual states like Oregon sacrifice their economic well-being and job growth to make emission reductions that are too small to affect global concentrations of GHGs or the temperature. ■

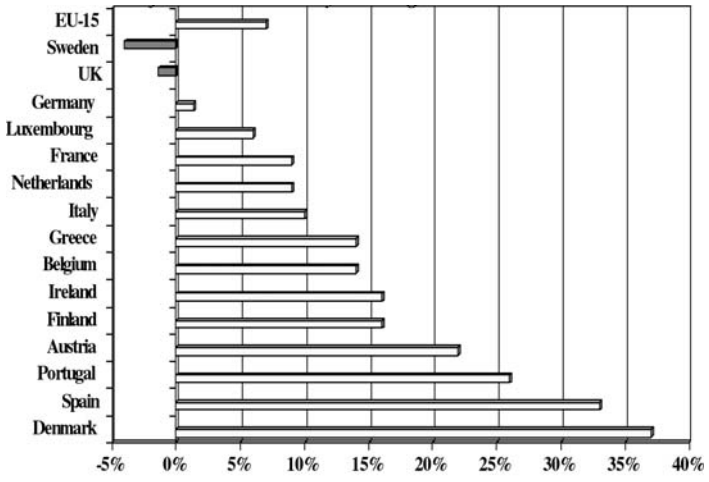
A Global Perspective on Climate Change Policy

As U.S. policymakers consider climate policy proposals, they need to consider that many experts from around the world are realizing that the "targets and timetable" approach in the Kyoto Protocol is not working. Participants at COP 10, the U.N. Framework Convention on Climate Change Policy meeting held this past December in Buenos Aires, sensed the need for a change in strategy. The approach to emissions reductions embodied in the Kyoto Protocol has failed to make much of a dent in emissions growth but has the potential to make a significant impact on the economies of countries trying to meet their targets.

First, the latest data from the European Environmental Agency shows that the "EU 15" (the original 15 EU countries prior to the expansion to 25 countries in 2004) are expected to be 7 percent above their emissions target in 2010 instead of 8 percent below 1990 levels as required under the Kyoto Protocol. (**See Figure 1.**) The UK, the strongest proponent of the "targets and timetables" approach to reducing greenhouse gases (GHGs), just released data showing its carbon emissions are rising again.

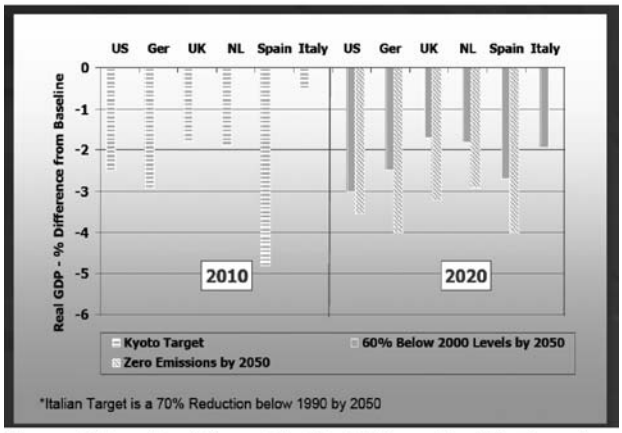
Second, credible macroeconomic models have demonstrated the high economic cost to EU countries of the "targets and timetable" approach to GHG reduction. (**See Figure 2.**)

Figure 1: GHG Emissions in the European Union Projected to Exceed Kyoto Targets in 2010



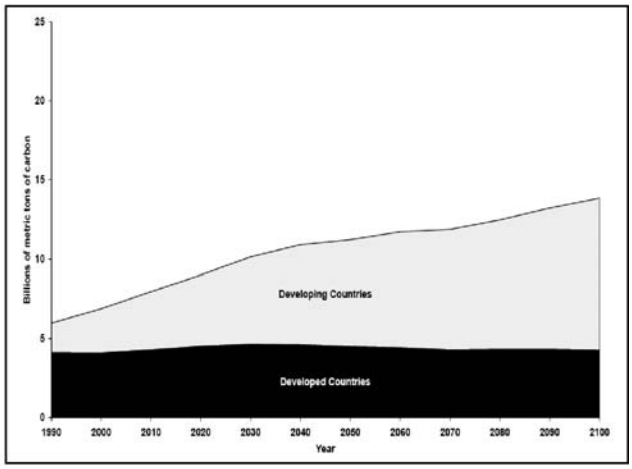
Source: European Environmental Agency, November 30, 2004

Figure 2: Impact of Purchasing Carbon Emission Permits on GDP Levels Under the Kyoto Protocol and Under More Stringent Targets on Major Industrial Economics



Source: International Council for Capital Formation "The Impact Of EU Climate Change Policy On Economic Competitiveness" For presentation at a forum sponsored by Instituto Bruno Leoni, Milan, Italy November 29, 2003, Revised November 2004. (www.iccfglobal.org)

Figure 3: Developed and Developing Countries Carbon Emissions Projections



Source: David W. Montgomery and Roger Bate, Charles River Associates, Inc, American Enterprise Institute for Public Policy Research, Environmental Policy Outlook-July-August 2004

Third, China announced at the COP 10 meeting that it would never be party to a treaty that would place restraints on its growth. India has expressed similar views. (China may soon be the world's largest emitter of GHGs, followed closely by India.) (**See Figure 3.**)

Fourth, a sign of growing disenchantment with current EU climate change policies is the Italian Environment Minister Corrado Clini's statement that Italy will not take on fixed emission targets in the post-2012 period but instead favors a target based on reducing emissions intensity (the amount of energy used to produce a dollar of output).

In addition, high-level Brussels environmental officials are now discussing the use of emissions intensity targets, energy efficiency, and adaptation to climate change in the post-2012 period. The gap between the EU and the U.S. on climate change policy is beginning to narrow.

Evaluating the Economic Impact of Policies To Address Climate Change

Cost-Benefit Analysis as a Tool for Policymakers

Some policymakers at the congressional and the state levels are moving forward with plans to address climate change policy through mandatory carbon emissions reductions, mandatory emission trading regimes, renewable portfolio requirements for electricity generation, mandatory standards for auto emissions, and requirements that appliances be more energy efficient. Other policymakers, including the Bush Administration and Senator Chuck Hagel (R-NE), advocate an alternative approach based on technology development, transfer of technology to developing nations, and incentives for reductions in energy intensity.

Given the importance of climate change policy and its potential economic impact, it may be useful to examine the costs, relative to the benefits, of these policy initiatives. The use of cost-benefit analysis as a tool for evaluating proposed regulations is becoming more prevalent at the federal level. For example, Dr. John Graham, now Administrator of the Office of Information and Regulatory Affairs with the U.S. Office of Management and Budget and formerly with the Harvard Center for Risk Analysis, has made extensive use of this type of analysis. As Robert W. Hahn, executive director of the AEI-Brookings Joint Center for Regulatory Studies, points out in a recent report, the main reason most policymakers are turning to cost-benefit analysis is the growing cost of regulation, particularly in the area of environmental, health, and safety regulation.[1] According to government estimates, the costs associated with these regulations are substantial—on the order of $200 billion annually for all social regulation and $40 billion for major federal regulations alone. The benefits, which are harder to pin down, may be even larger. Thus, making small or large changes in the regulatory apparatus could have significant implications for the public's health, welfare, and prosperity.

One approach scholars have used to gain insight into the general impact of regulation is scorecards. These scorecards typically attempt to summarize the impact of different regulations based on a number of indicators, including costs, benefits, cost savings, lives or life-years saved, cost-effectiveness, and net benefits. In an important early article applying economic principles to regulatory analysis, John Morrall, an economist with the Office of Management and Budget, suggested that the cost effectiveness of regulation—measured by the cost per life saved—varied over several orders of magnitude, ranging from $100,000 per life saved for steering column protection regulation to $72 billion per life saved for formaldehyde regulation.

As Hahn notes, the range of cost-effectiveness across different investments in environmental and health and safety regulations has important implications for public policy. Because such investments are frequently expensive, and resources are limited, regulations must be prioritized, Hahn concludes.

Because of the potential economic impact of policies to address climate change on the economy and on employment, it is useful first to review studies of the costs of climate change policies for the U.S.

An Evaluation of the Cost versus Benefits of the "Targets and Timetables" Approach to GHG Reduction

According to scholars such as Brookings Institution economist Dr. Robert Crandall, setting targets and timetables for U.S. greenhouse gas emissions is premature. He bases this conclusion on:

- The uncertainty about whether or the extent to which global warming is occurring; new data from climatologist and U.N. Intergovernmental Panel on Climate Change (IPCC) author Professor John Christy of the University of Alabama demonstrates that while surface-based measures show warming, satellite data shows little warming;
- The uncertainty about the influence of man-made anthropogenic greenhouse gas emissions to the observed rise in surface temperatures. Both IPCC and the National Academy of Sciences highlight that human activities have had an influence on the climate system, although science cannot adequately distinguish natural variability from human influence; and
- The high cost of foregone investment and research if the United States sacrifices badly needed economic growth to accomplish short-term emissions reductions.

In a 1999 report, Dr. Crandall observed that the economic estimates of the costs and benefits of reducing emissions to 1990 levels that are in the literature are not particularly supportive of going ahead immediately with any policy of abatement. For example, as an analysis by Brookings Institution Fellows Drs. Warwick McKibben and Peter Wilcoxen points out, the estimates of the costs of capping emissions at 1990 levels generally range from 1 to 2 percent of GDP per year, while the potential benefits, estimated at most to be 1/3 percent of GDP, will not arise for at least 30 to 50 years. Dr. Crandall notes that "Every dollar dedicated to greenhouse gas abatement today could be invested to grow into $117 in the next 50 years at a 10 percent social rate of return, even at a puny 5 percent annual return, each dollar would grow into $12 in 50 years. Therefore, we need to be sure that the prospective benefits, when realized, are at least 12 to 117 times the current cost of securing them. Otherwise, we should simply not act, but use our scarce resources in other ways." Moreover, the climate models generally forecast that it would require far greater reductions than a return to 1990 emissions to stabilize the climate. Dr. Crandall concludes, "We cannot justify a return to 1990 emissions based on the average estimates in the literature, no matter how efficiently it is done." This conclusion is even more important in the face of the reality of the agenda of those who support Kyoto: the required emissions reductions are 60% to 80% below 1990 levels. Clearly if returning to 1990 levels is questionable, the "beyond Kyoto" targets are even more untenable.

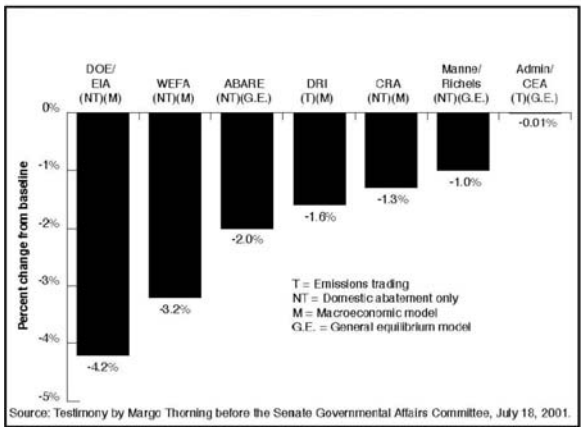
Dr. Crandall also notes that it is clear the marginal costs of abatement in low-income societies such as China and India are substantially below those in developing countries. However, taking advantage of this difference is remarkably difficult. For example, some economists envision a global marketable permits program in which every country has an emissions cap. In this situation, the United States, France, Japan, and Germany would buy permits from China, India, or Bangladesh—in effect paying the developing countries to undertake low-cost emission reduction actions. However, developing countries repeatedly have refused to accept emission caps as their population and economies grow.

Yale University Professor William D. Nordhaus has also analyzed the cost and benefits of CO_2 emissions limits. Dr. Nordhaus' research shows the costs of even an efficiently designed emissions reduction program exceed the value of environmental benefits by a ratio of 7 to 1, and the United States would bear almost two-thirds of the global cost.

The Costs of Carbon Emissions Reductions to the U.S. Economy

The reason the Bush Administration rejected the Kyoto Protocol approach to addressing climate change was that the Administration had analyzed the costs of sharp, near-term emissions reductions and found that the economic costs were significant, in part because of a growing U.S. population. In contrast, the EU-15 countries have little population growth. And the benefits of limiting carbon dioxide emissions (in terms of reduced global concentrations of CO_2) were negligible because most of the growth in emissions is coming from developing countries. (**See Figure 3.**) A range of credible macroeconomic models showed that reducing U.S. CO_2 emissions to the Kyoto Protocol level (7 percent below 1990 levels by 2010) would reduce U.S. GDP by 2 to almost 4 percent annually. (**See Figure 4.**)

Figure 4: Annual GDP Impact of Reducing Carbon Emissions to the Kyoto Target in 2008-2012



The models on which the Bush Administration relied showed that as carbon emissions are capped or constrained, economic growth slows due to lost output as new energy taxes (or tradable permits) are imposed, and prices rise for carbon-intensive goods, which must be produced using less carbon and more expensive production processes. In addition, the capital stock accumulates more slowly, reflecting the premature scrapping of capital equipment due to the sharp energy price increases required to meet a target of reducing emissions to 93 percent of 1990 levels by 2010.

For developed countries, not only are the costs of meeting the emission reductions required under the Kyoto Protocol quite large, but achieving them would have almost no impact on global temperatures. Danish Professor Bjorn Lomborg points out in *The Skeptical Environmentalist* that the Kyoto Protocol will cause a surprisingly small reduction in temperature (0.03C) in 2100, partly because the developing countries will increase their CO_2 emissions.

Given the quality and quantity of empirical research demonstrating that near-term targets and timetables for CO_2 emissions reductions for the U.S. as a whole would cost the U.S. jobs, economic growth and competitiveness and have no material impact on global concentrations of GHGs in the atmosphere, the Administration has wisely chosen another path.

Maine Policymakers Vote for Cost-Benefit Analysis

A sign of the growing recognition of the valuable role of cost-benefit analysis for state as well as federal policymakers is the enactment in Maine of L.D. 72 on May 23, 2005. Maine's new law requires its Department of the Environment to include in its biennial climate change evaluation a review of the cost-effectiveness of actions taken toward meeting greenhouse gas emissions reductions. The Maine legislators' decision is in part based on the credible economic analysis, which showed high costs to Maine in terms of lost jobs and slower economic growth from curbing energy use. (See www.accf.org for analyses of the impact of carbon emission reductions on Maine and other states.)

Impact of Carbon Caps on Oregon's Economy and on Employment

The Governor's Advisory Group on Global Warming released the "Oregon Strategy for Greenhouse Gas Reductions" on December 17, 2004. The report calls for stopping the growth of CO_2 by 2010, reducing carbon dioxide emissions to 1990 levels by 2020, and then cutting emission to at least 75 percent below 1990 levels by 2050. (The Advisory Group notes that in 2000, Oregon's CO_2 emissions were already 18% above 1990 levels.) The emission reduction goals proposed by Oregon's Advisory Group are quite similar to those of the New England Governor/East Canadian Premiers' agreement, which caps greenhouse gas emissions at 1990 levels by 2010, reduces the cap to 10% below 1990 levels by 2020, and then reduces emissions to between 75% to 85% below 2000 levels by about 2050. (See www.accf.org for an analysis of the impact of the non-governmental New England governors' agreement on nine northeastern states.)

Two recent economic analyses of the economic consequences for Oregon of adopting policies that restrict energy use demonstrate a significant negative impact on employment, income levels, and state budget receipts due to the higher energy prices required to suppress CO_2 emissions by all sectors of the economy. The first report, prepared by CRA International, analyzed the impact on Oregon of adopting the newly proposed McCain/Lieberman bill, which requires that greenhouse gas emissions be reduced to 2000 levels by 2010, and then in 2020 follows state proposals to reduce emissions to 80% below 1990 levels by 2050. (The full CRA International report, which also discusses the National Commission on Energy Policy proposal to reduce emissions, is available at www.accf.org.)

The CRA International Analysis

The CRA International general equilibrium model of the U.S. economy (MRN) assumes that carbon sequestration technology could sequester carbon at $300/tonne of carbon in 2010, and this cost would decline to about $75/tonne of carbon by 2050 and that purchasing credits to emit CO_2 is relatively expensive.[2] In addition, banking of carbon permits is allowed. These assumptions of limits on the cost of reducing carbon emissions could be based on other long-term future technologies utilizing carbon-free sources of energy, but in light of current assessments carbon sequestration seems the most likely possibility.

These may be optimistic assumptions, given the current unproven status of sequestration technology and lack of agreement on how carbon dioxide can be stored safely and permanently. Therefore, costs could exceed those estimated in this study, especially in later years with particularly severe caps.

Impact on Energy Prices, Economic Growth, and Employment

If Oregon (and the rest of the U.S.) adopt the McCain/Lieberman proposal and tighter targets after 2020, there are significant economic losses. A carbon-trading program (in effect a tax) ensures that the marginal cost of abatement would be $75 to $210 per metric ton of carbon by 2010 and would increase through at least 2025. Consumers in Oregon would pay 19% more for gasoline in 2010 and 29% more in 2020 compared to the baseline forecast due to the requirement that businesses must buy the right to emit carbon. Industry would pay about 56% more for natural gas in 2020. (**See Table 1.**) Oregon's household annual consumption falls by $405 in 2010 and by $483 in 2020. Gross state product declines by 0.1% in 2010 and by 0.6% in 2020. Energy intensive industries (e.g. machinery and fabricated metals) would shrink by 7.3% by 2020 and manufacturing by 2.0% by 2020. The threat of emission caps will have a chilling effect on new investment. Employment in Oregon falls by 13,000 jobs in 2010 and 16,000 jobs in 2020. (**See Table 1.**)

Table 1 Oregon: Economic Impacts of GHG Emission Reduction Targets in 2010 and 2020 (compared to baseline forecast)

Impacts on Oregon	CCAP	
	2010	2020
Gross State Product (%)	-0.1%	-0.6%
Household Consumption ($/HH)	-$405	-$483
Employment (# of Jobs)	-13,000	-16,000
Natural Gas Prices (%)	+35%	+56%
Gasoline Prices (%)*	+19.0%	+29.0%

Source: CRA International, June 2005.

Impact on the Poor and Elderly

The poor and elderly bear much harsher burdens under the McCain/Lieberman and Oregon Advisory Boards GHG emission reduction policies than do higher-income and younger households. Those with income of $15,400 or less will bear a 22% larger burden from energy cost increases than the highest income households because they spend more of their budgets on energy. The elderly will face a burden 2% greater than the population under 65.

Impact on State Tax Receipts

The State of Oregon can expect to lose revenue from many sources; lower wages and lower employment will reduce income and spending, causing state sales and income tax revenues to fall. For example, losses in federal highway trust fund grants will lead to a loss in state revenues of about $170 million dollars in 2010. These outlays and lost revenues will require the state to choose between cutting programs or raising taxes or some combination of both.

The Global Insight Analysis

A second study of the impact on alternative energy policy choices for the U.S. and Oregon was recently released by the American Council for Capital Formation and the National Association of Manufacturers. The report by Global Insight Inc., an international energy-modeling firm, used their macroeconomic model to compare the economic impact on Oregon of several policies that promote energy with those that reduce energy use.[3] The Global Insight report notes that there are policy options to improve economic performance for the U.S. by ensuring adequate supplies of energy at globally competitive prices as well as improving air quality. Likewise, there are policies that would restrict energy supplies and lead to lower economic performance and loss of jobs without notable environmental benefits. Two scenarios (promoting energy supplies and restricting energy supplies) are modeled in the Global Insight report. The results of these two simulations demonstrate the impact of various policy options on U.S. economic performance, as well as that of Oregon.

Scenario Descriptions

Promoting Energy Supplies

Under the promoting energy supplies scenario, policies are formulated that encourage domestic production of natural gas offshore by the removal of restrictions and moratoriums; encourage domestic production of natural gas onshore by increasing access and reducing permitting costs and delays; encourage the building of a pipeline to bring Alaskan natural gas to the lower 48 states; encourage the development of much needed liquid natural gas (LNG) terminals; encourage the building of new nuclear capacity; limit the control of mercury emissions to levels that can be achieved with co-benefits from the control of NO_X and SO_2 emissions; and mandate a reduction in mercury emissions that can be achieved at a marginal cost that does not create an economic barrier to the continued use of all domestic coals for the long-term.

Restricting Energy Supplies

Under the restricting energy supplies scenario, policies are formulated to enact both phases of the McCain/Lieberman bill (S. 139) to limit carbon dioxide emissions (with carbon permit fees of $135 per ton of carbon by 2015); impede the development of natural gas supplies by restricting leasing in offshore areas; raise the barriers to access new gas producing areas onshore; impede the development of the Alaskan natural gas pipeline; restrict the development of new LNG terminals; discourage nuclear capacity expansion; and implement tight mercury emission limits before control technologies are commercially available.

Economic Impact on Oregon

If the U.S. chooses policies that enhance energy supplies, the Oregon economy would expand by 42% from 2010 to 2020 (at a rate of 3.5% per year) under policies that increase access to domestic energy resources. In contrast, policies that restrict energy supplies would reduce Oregon's Gross State Product by 2.7% in 2020 (**see Figure 5 and Table 2**). Jobs are a critical issue for Oregon's prosperity.

Policies promoting energy supplies would result in 162,000 new jobs in the next decade.

In contrast, under restrictive energy policies, Oregon would have 23,100 fewer jobs by 2020, and hourly wages would be lower (**see Figure 6 and Table 2**).

Figure 5: Impact of Restricting Energy on Oregon Gross State Product

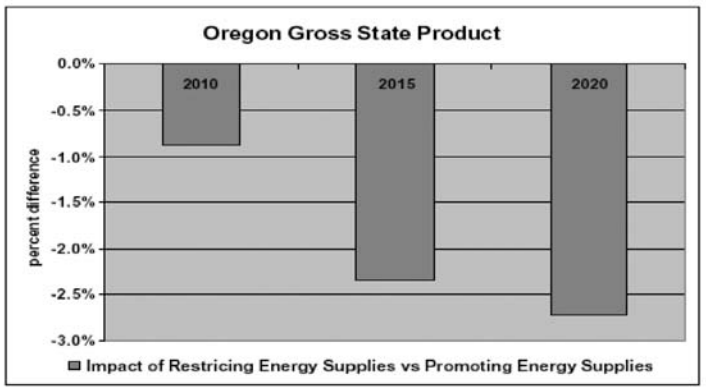


Figure 6: Impact of Restricting Energy on Oregon Jobs

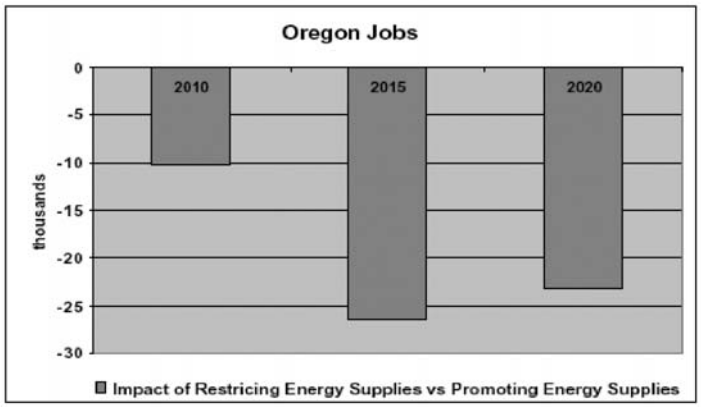


Table 2: Stronger Economic Outlook for Oregon under the Promoting Energy Supply Scenario

Oregon	2010			2015			2020		
	PES	RES	%diff.	PES	RES	%diff.	PES	RES	%diff.
Gross State Product (million 2000$)	155339	153972	-0.9%	186743	182366	-2.3%	219940	213965	-2.7%
Manufacturing Output (mil. 2000$)	32057	31585	-1.5%	39515	37799	-4.3%	47351	44497	-6.0%
Manufacturing, Durables	27427	27035	-1.4%	34003	32535	-4.3%	40871	38419	-6.0%
Manufacturing, Nondurables	4630	4550	-1.7%	5512	5264	-4.5%	6480	6078	-6.2%
Non-Manufacturing Output (mil. 2000$)	123281	122388	-0.7%	147228	144567	-1.8%	172589	169468	-1.8%
Government	15456	15494	0.2%	16683	16683	0.1%	17692	17797	0.6%
Agriculture, Forestry, & Fishing	4867	4823	-0.9%	6437	6279	-2.5%	8329	8088	-2.9%
Construction	6437	6305	-2.0%	7758	7206	-7.1%	9257	8394	-9.3%
Mining	96	93	-3.1%	103	98	-4.7%	110	94	-14.1%
Educational & Health Services	11196	11175	-0.2%	13052	12949	-0.8%	15059	15003	-0.4%
Financial Activities	27761	27592	-0.6%	32752	32448	-0.9%	37660	37424	-0.6%
Information	6034	6040	0.1%	7997	7949	-0.6%	10325	10208	-1.1%
Leisure & Hospitality	4811	4795	-0.3%	5660	5584	-1.3%	6516	6454	-0.9%
Professional & Business Services	16173	15959	-1.3%	20251	20056	-1.0%	24584	24787	0.8%
Trade & Transportation	25766	25523	-0.9%	31446	30552	-2.8%	37567	36458	-3.0%
Utilities	2090	1970	-5.8%	2392	1981	-17.2%	2689	1884	-29.9%
Other Services	2595	2619	0.9%	2716	2781	2.4%	2803	2876	2.6%
Employment (thousands)									
Total Nonfarm	1732	1722	-0.6%	1809	1782	-1.5%	1894	1871	-1.2%
Manufacturing									
Manufacturing, Durables	156	154	-1.2%	158	150	-5.1%	160	147	-7.8%
Manufacturing, Nondurables	52	52	-0.7%	52	51	-1.6%	53	53	-0.9%
Non-Manufacturing									
Government	285	286	0.3%	297	298	0.5%	309	313	1.2%
Construction, Natural Rsrcs, Mining	100	98	-2.0%	109	101	-6.7%	121	111	-8.8%
Educational & Health Svcs	206	206	-0.1%	211	210	-0.4%	219	219	0.2%
Financial Activities	104	103	-0.6%	107	106	-0.5%	109	109	0.0%
Information	36	36	0.2%	38	38	-0.2%	41	40	-0.5%
Leisure & Hospitality	170	170	-0.3%	168	167	-0.9%	167	166	-0.3%
Professional & Business Svcs	219	216	-1.3%	258	256	-0.6%	293	297	1.4%
Trade & Transportation	336	333	-0.9%	342	334	-2.4%	351	343	-2.4%
Utilities	5	5	-2.6%	5	5	-11.0%	5	4	-19.0%
Other Services	62	63	1.0%	64	66	2.8%	66	68	3.2%
Wages (2000$)									
Avg. Hourly Earnings, Manufacturing	17.41	17.25	-0.9%	19.76	19.39	-1.9%	22.55	21.83	-3.2%
Income (Millions, 2000$)									
Personal Income	120093	118728	-1.1%	140493	137258	-2.3%	162598	158267	-2.7%
Disp. Personal Income	104690	103627	-1.0%	121546	119198	-1.9%	140842	137686	-2.2%
Population (Thousands)	3857	3857		4061	4061		4265	4265	

Source: Global Insight, Inc.
Note: The Promoting Energy Supply Case is denoted by PES, Restricting Energy Supply Case is RES.

As both CRA International and Global Insight analyses demonstrate, policies to cap U.S. carbon emissions will reduce Oregon's economic growth, employment levels, and raise energy prices compared to the baseline forecast. The Global Insight report shows larger economic effects than does CRA; this result stems from the fact that the Global Insight compares a package of policy options to either encourage or restrict energy supplies rather than simply capping carbon emissions.

A Better Path Forward on Climate Change Policy

Energy Intensity Reduction Is a Cost-Effective Approach to Reducing GHGs

Countries must balance the competing demands of society, including strong economic growth to ensure rising living standards and higher quality of life in the context of increasing population as well as more access to healthcare and a secure retirement for our aging society. Reducing the amount of energy used per dollar of output is a cost effective way to slow the growth of GHGs. That approach, combined with strong industry, academic, and government research on programs to develop new technologies that have lower GHG emissions such as alternative fuels and carbon sequestration, is a practical strategy to deal with GHG emissions reductions.

In contrast to the EU "targets and timetables" approach to climate change, the U.S. has chosen a different path, one based on gradually reducing energy intensity. The reason the Bush Administration rejected the Kyoto Protocol approach was they had analyzed the costs of sharp, near-term emission reductions while the population continues to grow and found that the economic costs were significant and the benefits (in terms of reduced global concentration of CO_2) were negligible.

In fact, the U.S. government's voluntary approach to emissions reduction shows more promise than the targets and timetables approach in the 1997 Kyoto Protocol. According to data from the U.S. Department of Energy's Energy Information Administration, the U.S., using a voluntary approach, has cut its energy intensity (or the amount of energy required to produce a dollar of GDP) by a significantly larger percentage than has the European Union. The EU, which ratified the Kyoto Protocol and thus faces mandatory emissions reductions, has reduced energy intensity by only 9.3% compared to the 16.9% reduction achieved by the U.S. over the 1992-2002 period. (**See Figure 7.**)

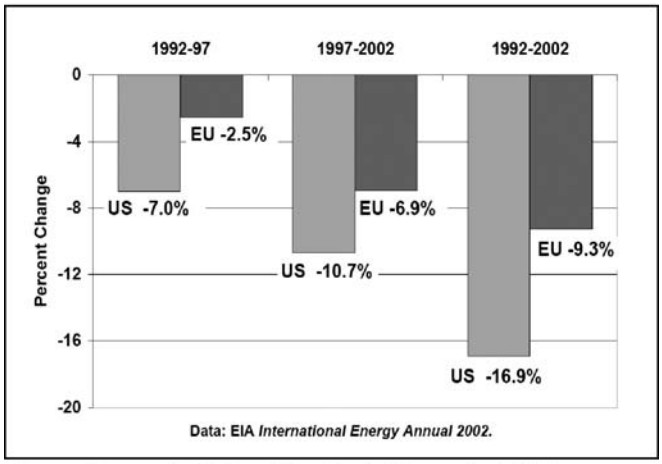
By adopting a voluntary approach to emissions reductions, the Bush Administration balances multiple policy objectives, including maintaining strong economic growth to support a growing population and enhanced environmental quality. In contrast, EU economic growth is weak (1% or less per year) with no population growth and high unemployment (about 10% in recent years).

Role of Technology in Climate Change Policy

Limitations of Current Technology

Renewables and other technologies may well have a role to play in the goal of reducing GHGs. However, as a November 2002 article in *Science Magazine* points out, developing renewables and other technologies requires a major commitment to a long-term Research & Development (R&D) program for alternative energy sources for electricity and transportation. Other candidates include solar, wind, biomass, nuclear fission, fusion, and fossil fuels from which carbon has been sequestered. Efficiency improvements, hydrogen production, super-conducting global electric grids, and geo-engineering also hold great promise for reducing

Figure 7: Comparison of EU and US Energy Intensity Reduction 1992-2001



Source: International Council for Capital Formation "The Impact Of EU Climate Change Policy On Economic Competitiveness" For presentation at a forum sponsored by Istituto Bruno Leoni, Milan, Italy November 29, 2003, Revised November 2004. (www.iccfglobal.org)

the growth of CO_2 during the 21st Century. Commercially viable technologies capable of fundamental reductions in carbon dioxide emissions while providing energy for growing economies are still a long way off. Achieving major advances in energy technology will require both serious government and private sector investment in R&D.

Public and Private Technology Programs

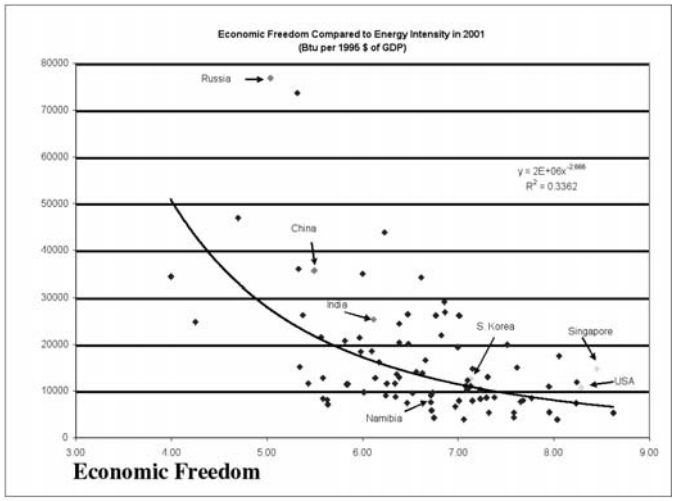
Serious efforts to develop new, less emitting energy technologies are being undertaken by industry in the U.S. and abroad. For example, Chevron-Texaco, a multinational oil and gas company, has a project to increase the efficiency and reduce the cost and complexity of hydrogen generation for distributed energy stations. Another example of a major new effort to find alternative energy sources and less emitting technologies sponsored by ExxonMobil, General Electric, Schlumberger, and Toyota is the Global Climate and Energy Project at Stanford University. (**See http://gcep.stanford.edu.**) This $225 million, ten-year project is designed to identify promising research opportunities for low-emissions, high-efficiency energy technologies, identify barriers to the large-scale application of new technologies, conduct fundamental research into technologies that will help to overcome these barriers and provide the basis for large-scale application, and finally, share the research with the scientific and engineering community, the media, business, governments, and potential end-users. While these projects are impressive examples of private sector initiative, the scale of the challenge is great.

Technology Transfer to the Developing World

Transferring technology to the developing world, where most of the growth in emissions will occur over this century, can play a major role in slowing the growth of emissions and reducing emissions intensity. It is essential to continue transferring existing technologies and programs, such as clean coal, combined heat and power, methane-to-market, and others that will enable those countries to "grow" their economies without similarly growing their emissions. It would be a positive step if developed countries could accelerate efforts to alleviate global poverty and increase

the developing world's access to cleaner energy sources. In addition, barriers to the adoption of new energy technologies in the developing world must be removed so these countries can enjoy higher living standards while helping to reduce global emissions growth. Promoting economic freedom and economic growth in the developing world can have a strong impact on reducing greenhouse gases, according to research by David Montgomery of Charles River Associates and Roger Bate of the American Enterprise Institute in a July 2004 report. Simply put, as countries get wealthier, their energy use becomes more efficient, and they have more resources to address issues like climate change. Economic freedom—specifically meaning removing trade barriers and subsidies from state-run enterprises and promotion of intellectual property rights protection and free trade—will lead to growth and cleaner environments in the developing world. (**See Figure 8.**)

Figure 8: Lack of Economic Freedom Explains Differences In Energy Intensity



Source: W. David Montgomery, Charles River Associates, Inc, unpublished report, 2005

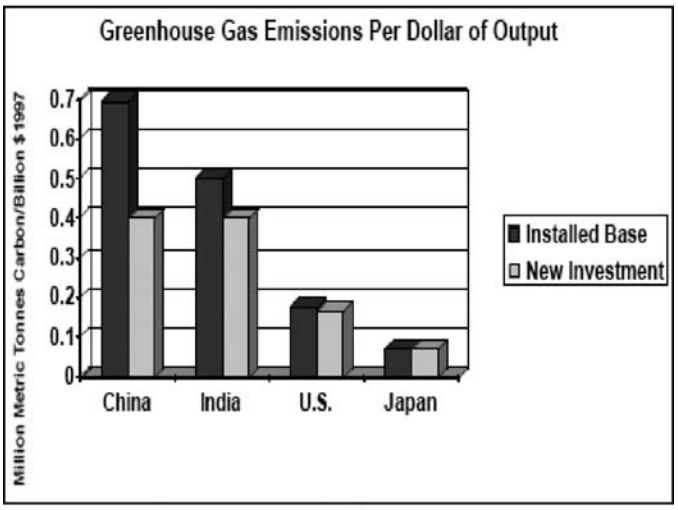
For instance, if new investments in countries like China and India were as energy efficient as that of Japan or the U.S., we would see substantial declines in carbon emissions growth in developing countries where most of the future growth in emissions will occur. (**See Figure 9.**) Of course, we need continued research and development on new technologies that promote efficiency and reduction in emissions of carbon dioxide.

Reduce Capital Costs for New Energy Investment

Energy use is a key component of strong productivity growth in industrialized countries, a new article by Dr. Luis Murillo-Zamorano demonstrates.[4] In his analysis of productivity growth from 1970 to 1992 in the European Union, the United States, Australia, Canada, and Japan, he finds there is a clear relationship between energy and productivity as well as between energy and both technological progress and productive efficiency.

Targets and timetables for emissions reductions would tend to discourage businesses and households from investing now in new equipment and processes that would reduce greenhouse gas emissions as well as increase energy supplies. This unfortunate result stems from the fact that tax depreciation schedules for many types of energy investments that could

Figure 9: Impact of New Technologies on Carbon Emissions (Greenhouse Gas Emissions Per Dollar Output)



Source: David Montgomery, Charles River Associates, Inc, unpublished report, 2005

Table 3: International Comparison of Nominal Capital Costs Recovered After Five Years for Energy Investments and Pollution Control Equipment

Percent of total investment expenditure

	Electric Gas[1]	Generating Coal	Plants Nuclear	Electric Transmission & Distribution Lines	Combined Heat & Power Generation Facilities Using Conventional Fuel (assumes power for sale)	Distribution of Industrial Steam & Electricity Generated for Self-Use	Pollution Control Equipment2 Input Modification (e.g. scrubbers)	Pollution Control Equipment2 Discharge Modification (e.g. thermal discharge control)
United States	37.7%	29.1%	37.7%	29.1%	29.1%	37.7%	65.8%	65.8%
Brazil	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Canada	31.2%	31.2%	31.2%	16.8%	31.2%	16.8%	35.5%	35.5%
China	52.4%	52.4%	52.4%	104.7%	104.7%	104.7%	104.7%	104.7%
Colombia	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	100.0%	100.0%
Germany	41.0%	41.0%	34.1%	34.1%	51.1%	41.0%	56.6%	56.6%
Japan	48.4%	48.4%	48.4%	31.9%	52.7%	88.3%	80.1%	80.1%
Korea	26.0%	26.0%	26.0%	73.8%	73.8%	73.8%	44.5%	44.5%
Malaysia	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	100.0%	100.0%
Mexico	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	100.0%	100.0%
Singapore[3]	45.0%	DNA	DNA	45.0%	45.0%	45.0%	70.0%	70.0%
Thailand	91.0%	91.0%	91.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Taiwan	24.4%	24.4%	24.4%	34.3%	25.7%	34.3%	100.0%	100.0%

Notes:
The data above shows the cumulative amount of capital cost recovery deductions from taxable allowed under each country's tax code after five years.
1) The United States depreciation for electric generating plants is for gas turbine facilities, However gas turbines operated in a combined cycle with a conventional steam unit are depreciated like coal facilities
2) The United States number for pollution control equipment is for pollution control equipment placed in service on July 1 of a year at a coal or combined heat and power facility placed in service before January 1, 1976. The percentage for pollution control placed in service on July 1 of a year at a gas or nuclear facility placed in service before January 1, 1976 is 78.2d%. Pollution control facilities at facilities placed in service on January 1, 1976 or later are depreciated on the same basis as the rest of the facility.
3) There are no coal or nuclear power plants operating in

reduce CO_2 emissions growth are very slow. Slow capital cost recovery means that investments that are deemed "risky" because of possible future emissions caps face a much higher hurdle rate to gain acceptance than would an investment whose cost could be recouped immediately through expensing (or immediate write-off). The prospect of emissions constraints in the future will tend to retard the very type of capital expenditures that many believe would facilitate emissions reductions without curtailing economic growth. The U.S. capital cost recovery system needs to be improved to allow faster write-off of this type of investment. (**See Table 3.**) For example, United States investors installing a combined heat and power facility recover only $0.29 after five years for each dollar of investment, compared to $0.50 in Brazil, $0.90 in Thailand and $1.04 in China. Faster capital cost recovery for investment in the U.S. would facilitate reduction in the growth of GHGs by pulling through the capital stock (and new technology) more quickly.

Avoid Tradable Credits

Establishing a system of voluntary tradable credits in the United States will increase pressure for a "cap and trade" program for mandatory reductions in carbon emissions. The reason is that once a voluntary system is set up, companies that have made prior emission reductions in the normal course of business due to fuel switching or cutbacks in production will try to "monetize" their past emission cuts. These companies will press for mandatory emission reductions so that growing companies or new firms will have to buy "credits" from them for the right to emit carbon. In effect, creating tradable credits is a futile attempt to bind future Congresses to certain forms of future regulation of carbon dioxide – one that rewards those with credits, not necessarily one that is the most effective future climate policy for our country.

A system of tradable credits will send exactly the wrong signals to investors because it will create uncertainty about the return on new investment. If investors fear the imposition of carbon caps in the future, the hurdle rate, which new investments must meet, will be higher (thus less investment will occur), and they will be less willing to invest in the U.S. Now is the time to provide incentives for companies to voluntarily undertake additional carbon dioxide intensity reducing investments, not promote a system that raises the risk of any investment in our economy. Setting up a transferable credit system in the U.S. will push us toward the Emission Trading System (ETS) system, which the European Union is trying (without much success) to implement. The EU's slow economic growth rate (about 1% annually) and high unemployment (about 10%) will only be exacerbated by their ETS.

Conclusions

There are many urgent global problems such as lack of food, sanitation, and potable water, which are daily imposing hardship and death on the world's least fortunate citizens. Energy use and economic growth go hand in hand, thus helping the developing world improve their access to cleaner, more abundant energy should be our focus. Near-term GHG emission reductions in the developed countries should not take priority over maintaining the strong economic growth necessary to keeping the U.S. one of the key engines for global economic growth. Establishing a new national emissions registry and tradable credit system for GHG emissions would impede, not promote, U.S. progress in reducing emissions intensity. U.S. climate change policies should continue to strive to reduce energy intensity as the capital stock is replaced over the business cycle and to develop new cost-effective technologies for alternative energy production and conservation and encouraging the spread of economic freedom in the developing world. This approach is likely to be much more productive than having individual states like Oregon sacrifice their economic well-being and job growth to make emission reductions too small to affect global concentrations of GHGs. ■

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Endnotes

1. Robert W. Hahn, "The Economic Analysis of Regulation: A Response to the Critics," working paper 04-03, January 2004, AEI-Brookings Joint Center for Regulatory Studies.
2. In the MRN model, the existence of a backstop technology is reflected as an exogenously specified price per tonne (denoted in $/tonne of carbon) at which CO_2 can be sequestered. This technology can be deployed in any sector that emits carbon dioxide, and for simplicity, we assume a uniform price across all sectors. Realistically, it will be much less costly to develop technology to sequester CO_2 emissions from large point sources and therefore, the cost is likely to vary greatly across sectors. To be conservative, cost estimates were derived from estimates of carbon capture technologies combined with integrated gasification combined cycle power generation.
3. For the full report as well as individual reports on Oregon and other states, see "The Impact of Energy and Environmental Policy Choices on U.S. Manufacturing, U.S. Economic Growth and Energy Markets, at www.accf.org.
4. Luis R. Murillo-Zamorano, "The Role of Energy in Productivity Growth: A Controversial Issue?" *The Energy Journal*, Volume 26, No. 2.

Climate Change Policy Could Create the Mother of All Cartels

By Brian Mannix
The Mercatus Center at George Mason University
June 2001

In the years ahead, President George W. Bush faces an army more menacing than Saddam Hussein's, which threatened to sweep down on all the oil fields in Arabia. By saying no to carbon dioxide caps, Bush has stood in the way of an army of diplomats and lobbyists whose ambition is to create a "carbon cartel," one that seeks to control all the carbon-based fuel—coal, oil, and gas—on the planet.

They do not call themselves a cartel, of course. They advocate some variant of the Kyoto global warming protocol and claim they are trying to influence the climate and thereby save the planet. But the chance their proposals would have any measurable effect on climate is near zero. The driving force behind this movement is not any theoretical harm associated with carbon dioxide; it is the very real economic value associated with carbon-containing fuels.

While it has support from some industries, the carbon cartel is not, and never could be, an industry cartel. To operate on a global scale and enforce its restrictions on producers and consumers, such a cartel must be sponsored by governments, cooperating in an international forum like the United Nations. And it cannot succeed without the participation of the U.S. government.

Winners and Losers Abound

The profits potentially available to the carbon cartel are measured in tens of trillions of dollars. Those profits would take a variety of forms around the world: tax revenues to governments; bribes to government officials; valuable carbon "credits" and "allowances" that governments allocate to favored parties; and many, many jobs for diplomats, politicians, regulators, tax collectors, lawyers, and lobbyists. Other winners would include the industries that compete with carbon-based fuels: hydropower (mostly government owned), nuclear (still a long-shot in the U.S.), and such "alternative" energy sources as windmills and solar.

The carbon cartel's organizers face a key challenge: how to allocate the spoils in a way that produces a winning and sustainable coalition. Right now the Kyoto formula favors Europe over the U.S.; we can expect to see concessions designed to bring the U.S. on board. These are likely to be designed specifically to influence U.S. politics: some additional share of the booty will be made available to U.S. companies with perceived political influence, or to labor unions—perhaps the coal miners. Further concessions will be needed to bring countries like China and India on board. This is what is being negotiated in all those international meetings—not the world's climate, but the division of the carbon cartel's plunder.

The big losers, of course, will be consumers everywhere. The carbon cartel is counting on the fact that the world's consumers are poorly informed and poorly organized. Right now Bush is their champion and protector, though few of them realize it, and he may not fully appreciate it himself.

If the carbon cartel succeeds, it will cause direct economic damage on an unprecedented scale. More frightening, however, is the collateral damage it would inflict on our political institutions. It would corrupt the world's governments, set them in opposition to consumers and to free trade, seduce them into converting market economies into planned economies, and divert vast resources from productive uses to political ones.

History is not over. Despite its diplomatic demeanor and green garb, the carbon cartel is perhaps the greatest threat to freedom and prosperity that looms in the 21st century. In resisting it, President Bush has taken the high ground. Everyone who cares about the fate of the planet should help him hold it.

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A Mountain of Money

By Brian Mannix
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October 9, 2003

From 1974 until 1984 the federal government kept 4.8 billion gasoline rationing coupons locked away in a hollow mountain near Pueblo, Colorado. Printed at President Nixon's order during the Arab oil embargo, these coupons were never usable; for one thing, the Treasury Department designed and printed them in a hurry, using a familiar off-the-shelf portrait of George Washington . . . yes, that portrait. As a result, if you put one of these coupons in a dollar-bill change machine, you got four quarters back. Of course, had the government actually imposed gasoline rationing, the exchange rate for coupons might have risen to considerably more than a dollar per gallon. And the ensuing fight over who was entitled to receive all those pictures of our first president would have been contentious indeed.

Yet that mountain of money is but a molehill compared to the fortune that will be up for grabs if the government ever imposes carbon rationing. The Kyoto protocol and its progeny—including the McCain-Lieberman bill (S.139) [from the 108th Congress] and various "micro-Kyoto" bills circulating in state legislatures—would cap, or ration, not only gasoline, but most other carbon-based fuels as well, including diesel fuel, jet fuel, natural gas, and coal. While none of the proposed programs use paper coupons, the cost of the carbon allowances, or "C-rations," would be built into the price of fuels and into the price of electricity and all the other products and services that use them. With a cap for U.S. carbon emissions of about 1.5 billion tons (carbon-equivalent) per year and a market price anywhere from $20 to $200 per ton (depending on how binding the cap is), the value of C-rations distributed by the government would be in the range of $30 to $300 billion dollars per year.

The cost of all those C-rations will be passed on to U.S. consumers—a fact that advocates of carbon rationing typically neglect to mention. Most "Cost of Kyoto" estimates look only at the real-resource cost (reduced GNP) of carbon rationing, yet this represents only about 10 percent of the total cost to consumers. The other 90 percent is the price consumers pay to holders of the coveted C-rations. In that sense carbon rationing is like a tax—it produces revenue—but the revenues from carbon rationing will not go to reduce the budget deficit. Instead, the C-rations will be allocated to industries and organizations that find favor with the government.

We have a good idea of what that process will look like. From 1974 to 1981 the Federal Energy Administration and the Department of Energy allocated "oil entitlements" to determine who would get the benefit of access to price-controlled domestic crude oil; at its peak, the value of these oil entitlements reached about $15 billion per year. As would be the case with C-rations, the allocation of oil entitlements did not physically move fuel around the country; it really just re-allocated money. And the monthly "entitlements list" quickly became an off-budget slush fund for every special interest that could afford a lobbyist. Small refiners got money for being small; Caribbean refiners got money by electing to be "domestic" only when it paid off; New England got an extra allowance for using residual oil; Michigan got moved to New England because . . . well, because high-powered Congressman John Dingell is from Michigan. A Director of Hearings and Appeals got to hand out *ad hoc* entitlements as he saw fit—and got to dine at Washington's finest restaurants. Mark Rich, the fugitive who was famously pardoned on President Clinton's last day in office, made his fortune in the chaos of trading entitlement-controlled oil. And consumers, who paid for all this, got to wait in line at gas stations.

Will carbon rationing be any different? The McCain-Lieberman bill would put the allocation process in the hands of the Environmental Protection Agency and the Commerce Department, plus a special "Climate Change Credit Corporation." But before any such process even exists, the contest for C-rations is well underway. The government keeps an inventory of CO2 emissions, which will be the starting point for allocating C-rations. Companies who reduce emissions voluntarily (i.e., for whatever reason) strive for official recognition of the reduction so that in the future they can claim extra C-rations. On September 30, 2003 the Chicago Climate Exchange conducted the first voluntary auction of carbon allowances; yet the only reason someone would pay money now for such allowances is that they might one day be converted into mandatory C-rations.

Once rationing is imposed and the price of energy goes up, there will be many more claimants getting in line. Can the government refuse to give C-rations to schools? To hospitals? To the armed forces? To local police departments? To mass transit? To manufacturers facing foreign competition? The average consumer will have no place in this contest, except as a victim.

The politics of carbon rationing cannot be understood by looking just at theories of climate change or at the serious economic losses that rationing would cause. Rationing will extract tens to hundreds of billions of dollars of revenue *per year* from consumers, and the fate of that revenue is what will drive political decisions. Advocates of rationing argue that we should start a program with modest goals. But once a feeding frenzy for C-rations begins, modesty, and restraint will be very scarce indeed.

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Section VI
Policy Tools

ALEC Energy Principles

Mission: To define a comprehensive strategy for energy security, production and distribution in the states consistent with Jeffersonian principles of free markets and federalism.

Introduction: A National Energy Strategy

Over the past twenty years, energy consumption in the United States has grown 26 percent from 78 to over 98 quadrillion Btu,[1] and the nation's energy infrastructure now strains to meet the needs of its customers. For instance, while the nation's demand for electricity has grown 31 percent from 1989 to 2000,[2] net summer capability to generate electricity has increased only 13 percent during that same period.[3] Additionally, 165 petroleum refineries (51 percent) have closed since 1981, and the nation's refining capacity has been reduced by close to 2.4 million barrels per day.[4]

Long-term projections point toward a series of significant energy policy-related challenges. The Department of Energy's Energy Information Administration (EIA) forecasts total energy consumption to increase another 32 percent to 130.9 quadrillion Btu by the year 2020. EIA projects demand for electricity will increase 43 percent, coal by 22 percent, natural gas 48 percent, and petroleum 35 percent. Over the same period of time, the EIA further envisages an 6.7 percent decline in nuclear energy, a 3.3 percent reduction in domestic crude oil production, combined with a 24 percent increase in crude oil imports, and a 168 percent increase in imports of refined petroleum products.[5]

Simply stated, if economic growth is to continue, the diversification, expansion and protection of our energy infrastructure must be a state and national priority. The United States must reinvigorate its ability to produce and transport/transmit energy related resources and products.

ALEC Energy Principles

1. Energy Security

Fuel Diversity: Energy security requires a diversity of fuels and a diversity of fuel supplies. The U.S. must develop fossil fuels (oil, gas and coal), nuclear, renewable (hydro, wind and solar) and alternative (bio-mass, fuel cell and other) resources.

Access: It is critical that access to North America's fossil fuels be expanded. Coastal resources must be explored and barriers limiting multiple use of, and access to, interior public lands must be removed.

Protection & Safety: North America's energy infrastructure must be protected from terrorist disruption. Nuclear waste storage must be finalized.

Environmental Protection: Modern fossil fuel development successfully utilizes responsible environmental practices. Streamlining of regulations, however, is vital.

Conservation: Conservation is an important component of a sound U.S. energy security policy, but conservation alone will not meet the nation's energy needs.

2. Energy Efficiency

Energy efficiency is enhanced most effectively through free market forces. State policies must allow free and competitive markets regarding pricing, technology deployment, energy efficiency, and selection of fuels and suppliers.

State governments can conduct audits of their own energy usage and make appropriate market and cost-based adjustments to enhance efficiency in government owned facilities.

3. Energy Infrastructure

Reliable electricity supply depends upon significant improvement of the transmission grid, particularly in the West. Interstate and intrastate transmission siting authority and procedures must be addressed to facilitate the construction of needed new infrastructure.

New and modified refineries and electric generation and transmission facilities require streamlining of siting and permitting processes.

4. Energy Trade and Development

State and federal government initiatives must promote free trade and encourage investment in energy production. Open political, institutional, legal and private sector structures must be encouraged in developing countries.

5. Energy Technology and Long-Range Research & Development Initiatives

The free market should be the principal determinant of which products reach the marketplace. Government programs intended to encourage and advance energy and environmental technologies should scientifically measure performance, but should not mandate the use of any specific technology option.

6. Energy Regulatory Predictability and Investment Certainty

State and national legislation and regulation should result in predictability of process and enforcement resulting in the facilitation of investment certainty. The regulatory process should enhance, encourage, and expand energy production, transmission, and distribution. Multiple and duplicative regulatory processes should be streamlined.

Endnotes

1. Energy Information Administration Website, "Energy Consumption by Source, 1949-2000," Table 1.3.
2. Energy Information Administration Website, "Electricity Consumption (Retail Sales), 1949-current," Table 8.12.
3. Energy Information Administration Website, "Electric Utility Net Summer Capability, 1949-current," Table 8.6.
4. From 1981-1999. Energy Information Administration Website, "Refinery Capacity and Utilization 1949-2000," Table 5.9.
5. Energy estimates are from the year 2000 to 2020. Source: Energy Information Administration Website, Report#:DOE/EIA-0383(2002), "Annual Energy Outlook 2002 with Projections to 2020," December 21, 2001. Table A-2; Table A-8; and Table A-1.

Approved by the ALEC National Board, January 2002

Policy Tools for Energy Sustainability: What Works and What Doesn't

Recommendations for Innovative Energy Policy

Energy security requires consumers to have access to a diversity of fuel supplies at the lowest cost and utilize the latest technologies to enhance environmental protection and energy sustainability. Environmental stewardship is encouraged by those policies that promote free trade and open markets to advance economic progress. Markets generate the wealth that gives us the means to maintain healthier environments by scrubbing out air pollutants from power plants, minimizing the footprint of resource extraction operations, and creating more energy efficient technology.

Markets are also the best mechanism to ensure that energy supplies continue to meet consumer demand in the future. Policy decisions should be based on sound scientific and economic analyses that address costs and benefits of a particular policy. Public advocacy reports can be counterintuitive to the critical decision-making in allocating resources. Scientific and economic analyses allow lawmakers to prioritize risks and minimize the economic impacts of a particular policy.

In the state budget appropriation process, spending money for one program often means taking money from another. Furthermore, regulations and taxes are not made in a vacuum; there is always an economic impact to the private sector and revenue base. Within every business is an employee whose livelihood depends on the well being of that business. Behind every industry is a customer who depends on vigorous competition to provide them with the highest quality product for the lowest price. State legislators must use a risk management process to prioritize because there is not an infinite amount of money to completely eliminate all environmental risks.

Sound science requires policy makers and the public to have access to peer-reviewed research. Policy should be conducted in an open manner with public input and full access to the underlying data used to create policies. State governments should encourage research initiatives but not mandate any specific technology option. Finally, regulatory flexibility allows legislators to adjust policies as advances are made in science and technology.

Removing tax barriers to capital investment will increase investment in energy infrastructure. Expensing (accelerated capital cost recovery) would help companies reduce emissions without picking corporate winners and losers, setting the stage for emissions cap-and-trade programs, or building political support for energy rationing. By reducing the tax penalty on capital investment, expensing would speed up turnover of plant and equipment. In general, state-of-the-art facilities are cleaner and more productive than older units, delivering more energy per unit of input. Expensing would thus accelerate carbon intensity decline while increasing productivity and boosting wages.

Streamlining and accelerating procedures for siting of new energy facilities would also encourage investment in energy projects. For investors, the regulatory uncertainty and long time horizons involved in just getting the permits to build has become a major impediment to obtaining adequate financing. Energy security and market competition will be enhanced by both increasing the number and/or upgrading existing power lines and pipelines, power plants, and energy extraction sites. Free markets already lead to "de-carbonization" of the economy without crippling regulation.

The world's carbon intensity has been declining sharply over the last 150 years—without government intervention. The world is moving steadily away from high carbon/low energy resources like wood and coal, to fuels higher in hydrogen and energy such as natural gas and nuclear power. As our economy grows, our ability to do work with less energy increases. Regarding climate change, even though the science is still very unsettled, there are things government can do to help people adapt to whatever the weather may throw at them.

Simple but effective responses include updating emergency preparedness plans and improving communications and response time among disaster agencies, police forces, hospital workers, and local, state, and federal agencies. Finally, by fostering economic freedom that encourages economic growth in general, and technology research and development in particular, people will have the resources to respond to whatever the future may bring.

The Energy Efficiency Puzzle

Energy efficiency is often touted as the best solution for meeting the world's future energy needs. However, the counter-intuitive outcome of energy efficiency is increased energy consumption.[1] For example, as air conditioners become more efficient, consumers save money on their electric bill and either turn up the air conditioner or buy other electric products. This so-called "rebound effect" lowers predicted reductions in electricity demand anywhere from 10 to 40 percent.[2] The result is that efficiency will not and cannot eliminate the need for new energy supplies.

Combustion engines have been made increasingly efficient since James Watt launched the industrial age 250 years ago. "The best external combustion engines were about 20 percent efficient at the beginning of the 20th century. By mid-century they were hitting 40 percent. Today's best exceed 50 percent … Collectively, combustion engines burn about 80 percent of all the thermal energy we use in the U.S. But the total amount of fuel they burn has risen right alongside their efficiency." The U.S. today consumes 100 quadrillion Btu (quads) of thermal energy a year, up from 35 quads in 1950 and 7 quads in 1910.[3]

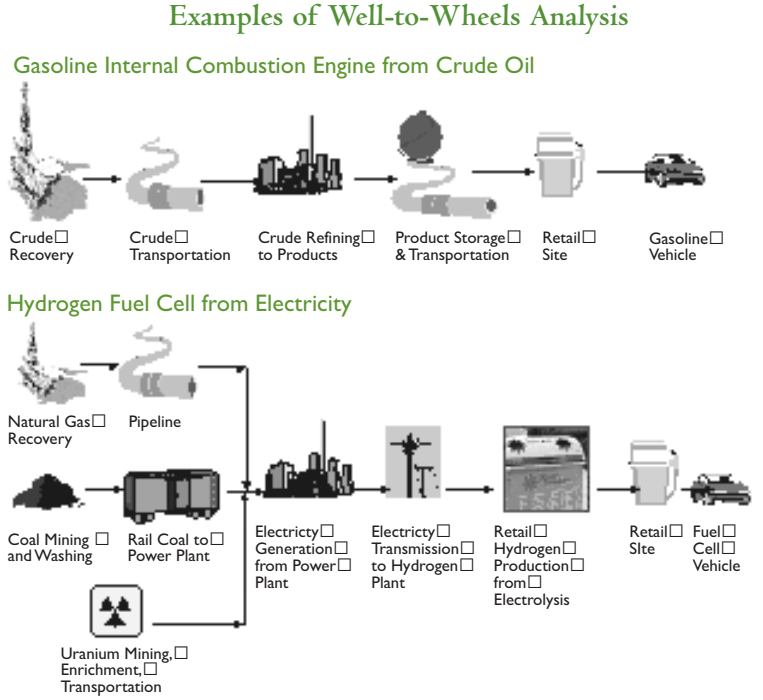
The market has provided the impetus behind these enormous increases in energy efficiency. According to the U.S. Energy Information Administration, from 1970 to 1996, Americans reduced energy consumption per unit of GDP by 42 percent, and energy consumption per person is lower now than in 1973.[4] But our demand for energy is greater than ever before.

The Future of Fuel Cells

The first fuel cell was introduced in 1839 and then quickly forgotten with the development of the cheaper and more efficient internal combustion engine. However, fuel cells have re-emerged in the last few decades and are being plugged as the new, emission-less fuel of the future.

In evaluating the validity of this sentiment, it is important to understand exactly what a fuel cell is. It is neither a battery nor a fuel source. Fuel cells convert hydrogen and oxygen inputs into electricity and water outputs through a chemical reaction. The crux of the problem is where to obtain the hydrogen input. Hydrogen can be cracked from a water molecule, but because of the laws of thermodynamics, this requires more energy than returned from use of the fuel cell. The other source of

Figure 1: Fuel cells must use electricity to crack hydrogen from water molecules.



Energy consumed & emissions from every step are incorporated in a Well-to-Wheels analysis.

hydrogen is hydrocarbons—otherwise known as fossil fuels.[5] The following graphs show a well–to–wheels analysis detailing the steps necessary to create energy to power our cars (Figure 1), and a comparison of the cost and emissions from conventional vehicles vs. fuel cell cars (Figures 2 and 3).

In reality, fuel cell technology is still in its infancy. The most advanced fuel cells are prohibitively expensive and produce as much or more emissions than the internal combustion engine. A meeting of the joint government and industry initiative called "Freedom Car Project," revealed that America is not even close to a practical, affordable fuel cell for vehicles. The project determined that a fuel cell must continuously produce 30 kilowatts for normal driving with a cost of no more than $12 per kilowatt hour and last for 5,000 hours. Our most efficient fuel cells generate electricity at a cost between $800 and $1,000 per kilowatt hour and have a lifetime of only 1,000 hours of usage.[6]

Chrysler Group Vice President for Technical Affairs Thomas Moore, an attendee of the meeting, was quoted in Automotive News as observing, "I believe we can meet the technical issues. The hard part is the cost target. I don't think they can be met."[7]

The Prospects for a Renewable Energy Future

An increasing number of states have instituted "renewable portfolio standards" (RPS) for power plants in their states. The standards require a specified percentage of electricity to be produced from renewable energy sources. RPS standards raise prices for consumers because they are more expensive than traditional energy sources. They also set a dangerous precedent where the government controls the fundamental resource of energy production. Solar, wind, geothermal, and biomass energy currently make up 2 percent of the U.S.'s total energy supply. Even though the U.S. government has spent more than $11 billion since 1978 to subsidize renewable sources, this figure is not expected to change much in the next 20 years.[8]

The physical laws of energy make the prospects for renewable energy dim. Renewable energy is intermittent and dilute, making it difficult to harness for human purposes. The wind does not always blow, nor does the sun always shine. There is also no way to turn up the power during peak demand times. Capturing this energy requires an incredibly large environmental footprint—a fact which has finally been recognized by local environmental groups who are protesting wind and solar projects in their neighborhoods.

For example, to supply enough solar energy for Pennsylvania's 12 million people, it would require about 1,100 square miles of solar panels. This is about 1/8th of the size of Vermont.[9] Collecting wind energy comes with similar enormous need for land. "Depending on the local wind conditions and the type of wind towers, by 2020 the U.S. would need approximately 50,000 to 100,000 towers, sitting on about 7,500 to 10,000 square miles, in order to produce just 5% of its electricity by wind. That's an area roughly the size of Vermont." A proposed wind station off Cape Cod would occupy approximately 25 square miles, with 170 towers, each 426 feet tall, blade diameter 328 feet long (the Statue of Liberty is only 305 feet high), and lit by a total of 680 navigation lights. No wonder the local residents of Cape Cod, Martha's Vineyard, and Nantucket protested.[10]

Renewable energy is also expensive. The least expensive photovoltaic solar system averages about 25 to 50 cents per kilowatt hour. Conventional power from the grid costs between 4 and 8 cents/kWhr.[11] Figure 4 compares the cost of electricity from various generation sources. Renewable energy sources must compete with natural gas to be viable, and as can be seen in Figure 4, it has a long way to go. Some argue that the cost of fossil fuels would increase if it were priced to reflect its true pollution costs. However, "reducing emissions of nitrogen oxides and sulfur dioxide by 75% below 1997 levels would increase electricity prices by only about 1 percent, too little to trigger a shift from coal or natural gas to renewable energy."[12] The General Accounting Office agreed with this sentiment. They reported: "The consideration of externalities in the planning process for electricity has generally had no effect on the selection or acquisition of renewable energy sources [because] electricity from renewable energy usually costs so much more than electricity from fossil fuels that externality considerations do not overcome the difference."[13]

The Trouble With "Transferable Credits"

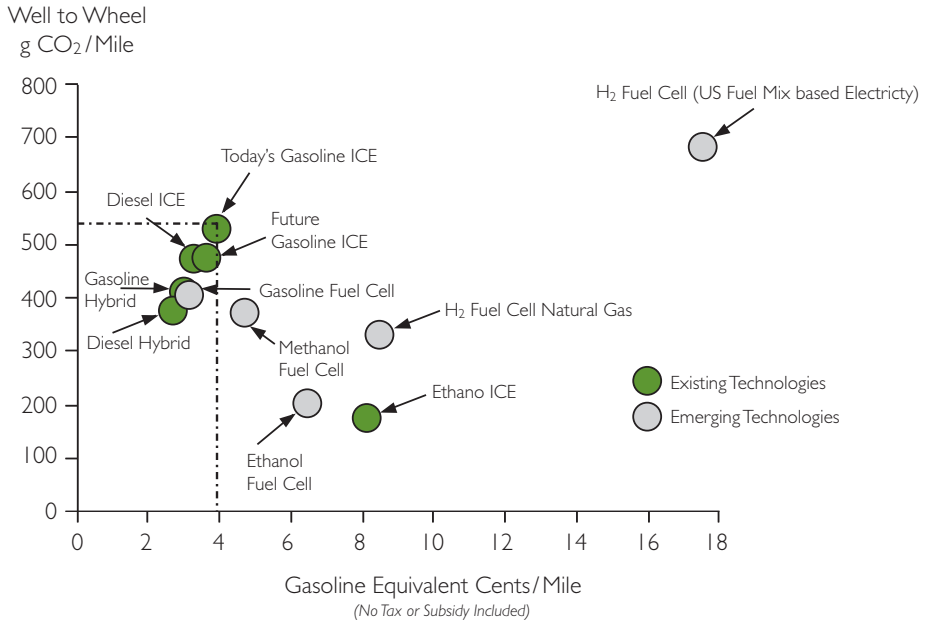
Proponents of a carbon dioxide cap and trade system claim that early-action and transferable credits is a market based mechanism that will enhance air quality while reducing greenhouse gases. Corporations interested in this approach have a short term view of gaining a competitive edge in the market place, usually because they either have old coal plants that are due to be taken offline and they would like to get credit for reducing carbon dioxide emissions, or they do not emit carbon dioxide (e.g., nuclear, hydro, or wind generators). Policy experts like to use the term "anyway credits" to describe issuing credits for reductions that would be made anyway.

Other industries that have a lower carbon component percentage in their fossil fuel than coal such as natural gas, or renewable energy generators

Figure 2: Engine Technology

Advanced Gasoline ICE (Internal Combustion Engine)	Represents the next generation of gasoline internal combustion engine (ICE), e.g. variable valve timing, cylinder deactivation, and other advanced technologies.
Hybrid Electric	Uses a drive train that combines an internal combustion engine and electric propulsion to increase overall efficiency. Energy from braking that is normally wasted is recovered to help recharge batteries.
Gasoline Fuel Cell	Uses gasoline as feed to an onboard converter called a reformer producing hydrogen, which is used to fuel the chemical reactions in a fuel cell.
Hydrogen Fuel Cell	Uses hydrogen that is produced off the vehicle by technologies such as natural gas reforming or electrolysis. The hydrogen is stored on the vehicle as a compress natural gas or liquid and used to fuel the chemical reactions in a fuel cell.
Ethanol ICE	Uses a mixture of ethanol and gasoline, typically in an 85% / 15% blend (E85) in an internal combustion engine.
Ethanol Fuel Cell	Uses a mixture of ethanol and gasoline, typically in an 85% / 15% blend (E85) in an internal combustion engine.

Figure 3: Comparison of Cost and Emissions for Different Engine Types



like biomass power plants, and would like to take advantage of their current position in the marketplace. However, they run the risk of having the regulatory knot tightened in this type of system as regulators simply ratchet down the carbon requirements over time once the cap and trade system is firmly in place.

Provisions to establish "transferable credits" for "verified greenhouse gas reductions" spell disaster for affordable energy and are counterproductive to energy diversity.

Transferable greenhouse gas credits will:

1) provide an incentive to fuel switch from coal to natural gas and drive up prices;
2) grow the "greenhouse lobby" of Enron-like companies seeking to profit from energy rationing schemes; and
3) create the institutional framework for a future Kyoto-style emissions cap-and-trade program.

Transferable credits will limit energy diversity. Utilities and investors will interpret credits as a political signal that coal's days as a fuel source for electric power generation are numbered. Companies will thus fuel switch from coal to natural gas, further aggravating the existing natural gas supply crisis of having more demand than supply, causing significant price spikes that have already cost consumers billions of dollars.

Transferable greenhouse gas credits mobilize lobbying for energy rationing and cap-and-trade schemes. Credits do not attain full market value ***unless*** a carbon dioxide cap and energy rationing are imposed. In effect, credits are Kyoto stock that bears dividends if, but only if, Kyoto or equivalent regulation is adopted. In other words, the only way this will occur is if government assigns the value or, in essence, sets the price. In other words, the Chicago Climate Exchange that has been established to trade credits cannot succeed unless the federal and/or state governments impose a carbon dioxide cap in legislation or regulation.

Although touted as "voluntary" and "win-win," transferable credits create a coercive system in which one company's gain is another's loss. For every company that gains a credit in the pre-regulatory period, there must be another that loses a credit in the mandatory period (or else the emissions "cap" will be broken). Consequently, companies that do not "volunteer" will be penalized—forced in the mandatory period to make deeper emission reductions than the cap itself would require or pay higher credit prices than would otherwise prevail. Companies that are "volunteering" are making investments now to take advantage of the marketplace in the future when their competitors are forced out of business in the mandatory period.

Transferable credits corrupt the politics of U.S. energy policy. Since the scheme penalizes non-participants, many businesses will "volunteer" just to avoid getting shoved to the shallow end of the credit pool later on. Many companies will end up holding energy rationing coupons that mature only under Kyoto or comparable regulation. Credits will swell the ranks of companies lobbying for anti-consumer, anti-energy policies. Mark ups and discounts are established by regulation.

Transferable credits empower politicians to game the system. Consider US Senator James Jeffords' "Clean Power Act" of 2002, which would impose Kyoto-like carbon dioxide controls on power plants. Up to 99 percent of the carbon dioxide credits would go to persons and entities that produce little or no electric power.

Transferable credits increase the risk of future Enron-type scandals. Firms might "earn" credits by not producing goods or electricity, outsourcing production, shifting facilities overseas, or "avoiding" hypothetical future emissions. A market in such dubious commodities will be fertile soil for asset manipulation. That's a tip-off that many companies view crediting as an opportunity for creative accounting. More importantly, domestic jobs will be lost.

Transferable credits will thwart efforts to replace Kyoto's mandatory tonnage targets with a voluntary intensity goal. A carbon intensity goal approach, which recognizes the imperatives of population increases and economic growth, would be completely undermined by a transferable credit program that steadily builds a lobby force for "absolute" reductions as used in the Kyoto Protocol targets.

Transferable credits have no environmental value. As a study in the November 1, 2002 issue of *Science* magazine explains, world energy demand could triple by 2050, yet "energy sources that can produce 100 to 300 percent of present world power consumption without greenhouse emissions do not exist operationally or as pilot plants." Hence, any serious attempt to stabilize carbon dioxide levels via regulation would be both futile and economically devastating. No good purpose is served by creating a pre-regulatory ramp-up to unsustainable regulatory policies.

We would like to thank Marlo Lewis of the Competitive Enterprise Institute for his ideas pertaining to this section on transferable credits.

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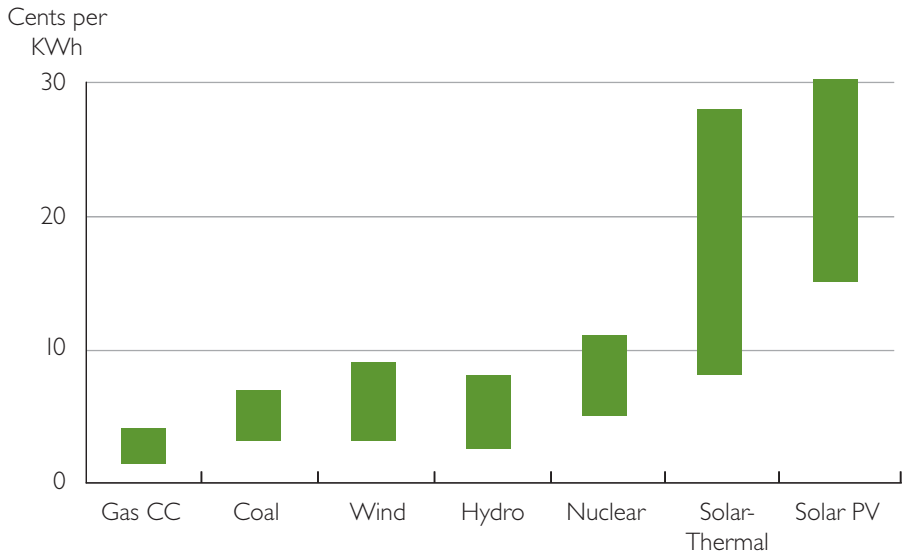
Figure 4: Cost Comparison of Various Energy Sources



* Gas will continue to be low-cost alternative for new capacity

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ExxonMobil. *Long-Term Economic and Energy Outlook 2002.*

How Good is the Science?

Assessing the Credibility, Reliability and Relevance of Technical Information in Making Legislative Decisions

> "There is an *unrealistic expectation* on the part of the public that the most recent study demolishes all previous findings and is the current standard of truth."

by Harvy Fineberg, MD, PhD, MPH
Provost of Harvard University, former Dean, School of Public Health[1]

Many legislative "solutions" to complex public policy issues are predicated on theories that are in turn based on—or alleged to incorporate the results of—research, scientific studies, or other technical information. However, unless the decision-maker has a technical background in the subject matter at issue, the decision-maker is challenged to determine how credible, reliable, and relevant the information is that purports to support a given position. Often this challenge is compounded by competing theories and technical information presented on any number of sides of the issue. How does the decision-maker distinguish *facts* from *factoids*?

The framework presented is predicated on the notion that a theory offered in support of legislation is more credible and reliable if the research on which it is based is: 1) conducted by qualified personnel; 2) follows established and widely accepted procedures for collecting and analyzing data; 3) discusses the uncertainties or limitations in the study, and 4) is tested and reviewed by other credible technical experts in the field. Most advocates offering testimony on a proposed bill or regulation are seldom familiar with the precise details of a particular study or technical report. In such cases, it is the responsibility of the decision-maker to ferret out the fact from the fiction—the wheat from the chaff. In the end, the decision-maker is left to weigh the information presented, perhaps after applying the framework below. In the process, he/she must assign weight to the information presented as he/she feels appropriate and must also determine which science is more "sound" on which to make a reasoned decision.

What follows is a basic, ten-point framework of questions to help the decision-maker determine if a theory and/or the "science" being offered to support it is: reliable, credible, and relevant to the proposed legislation at issue.

Top 10 Questions to Ask Scientific Experts

1. **Clarify the research or study in question.**
   - Stated simply, what does the research tell us?
   - Why is the information relevant to the issue under discussion?

2. **Establish the timeliness of the research or study.**
   - Over how many years were the studies conducted?
   - When did the research start and end?

3. **Identify the amount of research the expert has conducted to support his claim.**
   - How many studies or how much research are we discussing?
   - Could other researchers reproduce the study?
   - If YES, did they come to the same conclusions?
   - If NO, can the differences be explained?

4. **Clarify the relationship between the scientific findings of the advocate's research and the majority of research on this topic.**
   - What is the current weight of scientific evidence on the position advocated?
   - How does the scientific evidence challenge or change previous theories on the subject?
   - Has a literature review been completed on the subject? What did it conclude?

5. **Consider how the scientific community reacted to the research/study/data.**
   - Was the research, report, or technical information "peer reviewed"? – If YES, how recently?
   - What did the peer reviewers discover?
   - Were the peer reviewers balanced and reflective of the broad scientific community?

6. **Explore what the research/study/data does not explain.**
   - What are the shortcomings or limitations of the study on which the theory is based?
     (Science and research seldom provide clear, concise answers. Science cannot explain our world with 100% certainty. Credible scientists, and advocates using those results, work to explain what the research or theories do not mean, where the uncertainty lies, etc.)
   - Does the advocate acknowledge the shortcoming or limitations of the study?

7. **Explore the possible sources of bias or conflict in the study.**
   - How was the study performed?
   - What was the sample size?
   - How was the sample collected?
   - What was the original research question? In other words, what exactly was the study attempting to prove or understand?
   - Who funded the study?
     (It is important to note the funding source. However, it is unfair, and perhaps shortsighted, to simply negate the results solely on that basis. A critical evaluation of the research on its own merits is the best way to assess its validity and importance. If a study is good, its results will stand up to any scrutiny, regardless of who supported the research.)

8. **Identify possible "decision gaps" (i.e., is there a leap between the study conclusion and the action requested).**
   - Does the research indicate a cause-and-effect relationship, or simply a correlation, between two factors or variables?
   - How many leaps is the decision-maker asked to make to get from the premise, to the action requested, to the proposed "solution"?
     (For example: A study finds there is an increased incidence of wildlife infertility in an area after a certain pesticide is used. Faulty conclusion: ban all pesticides.)
   - Does the gap call into question the relevance of the study to the issue?

9. **Facts or interpretation.**
   - Is the "solution" being proposed based on the weight of scientific evidence, or on editorials and commentaries written about a study or the issue?
   - Are the facts really "facts" or "factoids"?

10. **What is the likelihood of success if the proposed "solution" is adopted?**
    - How can we measure whether the proposed "solution" works?
    - What examples of success exist in other, similar situations?
    - What benchmarks exist to confirm long-term success of adopting a policy based on this research?

Endnote

1. Fineberg, Harvey. "*New Guidelines Recognize the Context as Key to Public Understanding.*" Food Insight. March/April 1998. Harvard School of Public Health & the International Food Information Council Foundation

Getting a Healthy Environment Without Paying Kyoto Prices

January 25, 2005

The Kyoto Protocol finally went into effect February 16, 2005, twelve long years after the first global warming discussions in Rio de Janeiro. On this momentous day, the United States and Australia stood together as two industrialized nations that have utterly failed to see what the fuss is all about.

After studying the climate models, running the economic numbers, and analyzing the politics behind Kyoto, the United States has reached the conclusion that while global warming is scientifically uncertain, economic harm from Kyoto is guaranteed. The upshot is that even if all the worst-case global warming scenarios come true, Kyoto will do nothing to stop it.

As an environmental treaty, Kyoto is laughable. It requires the industrialized nations to endure deep economic cuts, depleting the amount of resources they could devote to solving real environmental and social problems. It curtails economic growth in those nations best poised to invest in clean, affordable, and reliable technologies that improve environmental health. Kyoto also subverts the best-known method for achieving a healthy environment: a healthy economy. While it may be counterintuitive to some, to many Americans it is a self-evident truth. The luxury of environmental protection depends on having the monetary resources to pay for it.

Time and time again, we are reminded by the media of the destruction of the rainforests in developing countries, overpopulation in famine stricken nations, and islands decimated by hurricanes that sweep thousands out to sea. Why do people fail to conserve their natural resources? Why are they so vulnerable to every natural disaster that strikes? The answer is wealth—or rather the lack of it.

Not to imply the United States has never been hit by a natural disaster, or an American company has never engaged in some unsustainable practices, but rather, that as a country we have the resources to anticipate the future, to adapt to change, and to rebuild or replace when necessary. Case in point: in September 2004, Hurricane Jeanne crashed into Haiti, killing 3,000 people and leaving over 200,000 others homeless. Haiti was doomed by inadequate housing and infrastructure, which could not survive the force of the storm. Denuded hills led to mud slides that took hundreds of lives. In contrast, when Jeanne hit Florida, only three people were killed.

Poverty has a sobering effect on people's outlook for the future. They cannot see or plan for tomorrow if they are preoccupied with surviving today. Cutting down all the trees on a Haitian hillside may be a good idea in the short term when one needs firewood to sterilize water for drinking. Lifting people out of poverty requires stable economic growth, which can be achieved through capital investment and technology transfers from the industrialized nations. Open markets are the principle mechanism through which this process is already occurring.

Kyoto in contrast, operates in a vastly different world of centralized planning and economic control. Paper pushers have hopelessly strangulated the one provision of Kyoto that has any chance of actually making a difference—the Clean Development Mechanism (CDM). Originally conceived as a way to transfer clean, energy efficient technologies to the developing world, the CDM Committee has only approved two projects out of hundreds submitted since 1997. Anything that is remotely economically feasible is rejected—including wind power projects. It seems that no energy technologies can pass muster. Promoting clean development can only be accomplished if the CDM Committee operates in a manner consistent with the way businesses and markets work, and on timelines that fit into a business plan. Otherwise, it will continue to be a promising notion that never got off the ground.

The United States has been heavily advocating technology development as an alternative to Kyoto. Americans believe the best defense against climate change is a good offense. Technology research and development is the only "no regrets" policy that can simultaneously meet future energy demand, promote economic development, and reduce pollution. It has the added bonus of helping people anticipate and adapt to whatever the climate may throw at them.

In the U.S., technology and free markets have allowed us to produce more with less money, less waste, and fewer resources. From 1990 to 2003, our greenhouse gas emission intensity (emissions/dollar of GDP) declined by 22.3 percent.[1] Since 1990, U.S. emissions have increased more slowly than the average annual growth in population (1.2 percent), primary energy consumption (1.2 percent), electric power generation (1.9 percent), or gross domestic product (3.0 percent).[2]

Technology and a healthy economy have also allowed the United States to achieve impressive environmental gains. Continuing with business as usual, the U.S. has cut toxic chemical releases by 55 percent since 1988, even while total output of the affected industries has increased 40 percent.[3] Average vehicle pollutant emissions drop about 10 percent per year as the fleet turns over to inherently cleaner cars. Finally, air quality has improved by leaps and bounds in the United States.[4] Since 1970:

- sulfur dioxide emissions have declined by 52 percent;
- nitrogen oxides emissions by 29 percent;
- lead emissions by 99 percent;
- carbon monoxide emissions by 55 percent; and
- volatile organic compounds by 53 percent.[5]

These achievements are phenomenal considering our GDP increased by 195 percent, and our population grew by 42 percent over the same period.[6]

Capitalizing upon the relationship between economic growth and environmental progress, the Bush Administration has expanded voluntary programs for greenhouse gas reduction, technology research and development initiatives, and jointly-funded projects aimed at improving energy efficiency and reducing the nation's greenhouse gas intensity. The White House has also challenged American industries to reduce their greenhouse gas emissions intensity another 18 percent by 2020.

It is imperative that the industrialized nations focus on exporting technology and encouraging sustainable economic growth in the developing world. By 2050, over 75 percent of global greenhouse gas emissions will come from countries like India and China, which are not covered by Kyoto. However, with clean, reliable energy technology, they can start improving both environmental health and alleviating poverty today. From this perspective, diverting economic resources into non-starter like Kyoto seems not to be worth the fuss.

This article was updated from its original publication in Energy, Environment, and Economics: A Guide for State Legislators, The Third Edition *(American Legislative Exchange Council, January 2005).*

Endnotes:

1. US Energy Information Administration. "*Emissions of Greenhouse Gases in the United States 2003*." Available online: http://www.eia.doe.gov/oiaf/1605/ggrpt/executive_summary.html.
2. *Ibid.*
3. Hayward, Steven. "*2004 index of Leading Environmental Indicators, 9th Edition*." Pacific Research Institute. Pg. 59.
4. Schwartz, Joel. "*2004 index of Leading Environmental Indicators, 9th Edition*." Pacific Research Institute. Pg. 29.
5. *See* Environmental Protection Agency, *Air Emissions Trends—Continued Progress Through 2005*, http://epa.gov/air/airtrends/2006/econ-emissions.html.
6. *Ibid.*

Section VII
ALEC Model Legislation

A General Resolution on Climate Change

Res. No. ___

[Insert appropriate state reference]

Purpose: Concerning legislative approval of proposals and regulations for controlling greenhouse gas emissions associated with global climate change.

A Concurrent Resolution

Whereas, the United States is a party to and has ratified the United Nations Framework Convention on Climate Change ("FCCC"), setting forth a framework for establishing global approaches to the control of carbon dioxide and other greenhouse gas emissions, including an intermediate nonbinding goal to reduce emissions from industrial nations to 1990 levels by 2000 and a long-term atmospheric concentration level;

Whereas, parties to the FCCC exceeded the intermediate goal by reducing greenhouse gas emissions from industrial nations 3 percent below 1990 levels by 2000, but have not been able to agree on a long-term atmospheric concentration level for such gases, and instead negotiated the Kyoto Protocol to the FCCC, calling for further emission reductions by industrial nations to be achieved during the period of 2008 to 2012;

Whereas, the United States has not ratified the Kyoto Protocol because it exempts developing nations from future emission control obligations, would impose significant economic costs on the U.S. economy, and would not meaningfully alter future global greenhouse gas concentrations;

Whereas, carbon dioxide and other greenhouse gases covered by the Kyoto Protocol are not regulated as criteria or hazardous air pollutants by the U.S. Environmental Protection Agency pursuant to the Clean Air Act, as amended,
42 U.S.C. 7401 *et seq.*, and have not been demonstrated to cause or contribute to adverse human health effects;

Whereas, greenhouse gas emission reductions undertaken solely by industrial nations, or by individual States or regions within the United States, would not have a significant impact on future global greenhouse gas concentrations due to the global nature of emissions contributing to such concentrations;

Whereas, reducing greenhouse gas emissions may entail costly regulatory control strategies directed at many sectors of economic activity, including electric power generation, industrial and manufacturing activities, automobile and truck transportation, forestry and agriculture, and construction activities;

Whereas, the imposition of greenhouse gas controls on a State or regional basis would raise electric power, natural gas and other energy and consumer costs, with detrimental competitive consequences for affected industries and increased energy bills for consumers, including State and local government entities, without demonstrable environmental benefits; and

Whereas, any strategies for the future management of greenhouse gas emissions should be determined at a national level by the United States Congress.

Now therefore, be it resolved, That, except as otherwise may be required by State or Federal law, no proposed or final regulation or other action of publicly-funded agencies of [State] government shall impose any new legally-enforceable requirements for the control of emissions of carbon dioxide or other greenhouse gases upon the citizens of or corporations doing business in [State] unless approved by the [General Assembly or Legislature] acting by bill.

Be it further resolved, That copies of this resolution be transmitted to Governor [State Governor], the Secretary of the [State DEP or EPA], the Members of the [State] [Public Utility Commission or similar agency], the Administrator and Regional Administrator of the U.S. Environmental Protection Agency, and each member of the United States Congress from [State].

Approved by ALEC's National Board, September 1, 2003

Offshore Energy Resources Act

§ 1 Offshore oil and natural gas resources.

A. The [insert appropriate state officials] shall work with the members of the State Congressional Delegation and federal executive agencies to develop, support, and enact federal legislation, and to take appropriate federal executive action, that will (i) provide an exemption to the moratorium that prevents until 2012 any surveying, exploration, development, or production of potential oil and natural gas deposits in areas offshore that are under federal jurisdiction, (ii) incorporate revenue sharing between the federal and state governments for leasing activity that potentially will provide the state with significant additional sources of revenue, and (iii) otherwise will enhance states' authority over coastal and offshore resources. The moratorium exemption to be sought by the [insert appropriate state officials] shall (i) permit surveying, mapping, exploration, development, and production of offshore deposits of oil and natural gas.

B. The [insert appropriate state officials] shall submit an annual report to the Governor and the chairs of the Senate Committee on Commerce and Labor and the House Committee on Commerce and Labor, no later than January 1 of each year, that summarizes the status of the moratorium on offshore oil and natural gas exploration, development, and production activities; efforts by Congress and executive agencies to provide an exemption to the moratorium as described in subsection A; and activities by the [insert appropriate state officials] in furtherance of this section.

§ 2. Offshore wind energy resources.

A. In addition to its responsibilities enumerated in § 1, the [insert appropriate state officials] shall work with the members of the State Congressional Delegation and federal executive agencies to develop, support, and enact federal legislation, and to take appropriate federal executive action, that will enable the state to exercise exclusive jurisdiction with respect to analyzing, developing, and harvesting offshore wind energy resources.

B. The [insert appropriate state officials] shall submit an annual report to the Governor and the chairs of the Senate Committee on Commerce and Labor and the House Committee on Commerce and Labor, no later than January 1 of each year, that summarizes the activities by the [insert appropriate state officials] in furtherance of this section.

§ 3. State Offshore Energy Revenue Fund.

A. There is hereby created in the state treasury a special nonreverting fund to be known as the State Offshore Energy Revenue Fund, hereafter referred to as the "Fund." The Fund shall be established on the books of the Comptroller and interest earned on moneys in the Fund shall remain in the Fund and be credited to it. Any moneys remaining in the Fund, including interest thereon, at the end of each fiscal year shall not revert to the general fund but shall remain in the Fund.

B. The Comptroller shall transfer to the Fund at the close of each fiscal year all license fees, lease payments, royalties, and similar moneys paid by the federal government to the state attributable to the development of energy resources in areas off the state's shore that are under federal jurisdiction.

C. For purposes of any appropriation act enacted by the General Assembly and for the purposes of the Comptroller's preliminary and final annual reports to the Governor, all deposits to and appropriations from the Fund shall be accounted for and considered to be a part of the general fund of the state treasury.

Approved by ALEC's National Board, May 23, 2006

State Data Access Act

AN ACT to ensure that study findings generated wholly or partially with funding from a State agency by a non-governmental entity and relied on by a State agency in proposing or promulgating a rule, regulation, guideline, or policy can be subjected to scrutiny for purposes of validation, correction, or rejection by making available to the public the study and the data underlying the study findings.

Be it enacted by _____ *of the* _____.

Sec. 1. Short Title.

This Act may be cited as the "Data Access Act."

Sec. 2. Purposes.

The purposes of this Act are to –

(a) Ensure and maximize the quality of rules, regulations, guidelines, and policies promulgated by State agencies which are supported by study findings generated wholly or partially with State funding by a non-governmental entity;

(b) allow such study findings to be subjected to public scrutiny for purposes of validation, correction, or rejection by making available to the public the study and the data underlying the study findings;

(c) ensure that such underlying data is made available while preserving existing rights to confidentiality and intellectual property.

Sec. 3. Agency Responsibilities

Each agency shall –

(a) When proposing or promulgating a rule, regulation, guideline, or policy which is supported by study findings generated by a non-governmental entity, provide in the rule, regulation, guideline, or policy statement an accurate reference to the study, identify the entity that generated the study, provide the study to members of the public on request at a reasonable cost, and make the study available for inspection and reproduction;

(b) make available the underlying data on which the study findings were based, either on request or by making it available at the same location as the study, subject to applicable limitations on release of all or some of such data based on the need to protect homeland security, or avoid an unwarranted invasion of privacy or a violation of other rights protected by law; provided, that the agency shall withhold only such data as is clearly subject to such limitations and shall provide or make available the remainder of the data after redacting those portions subject to the limitations, and if data are withheld based on such limitations, the agency shall specify the reasons for so withholding;

(c) identify a designee who shall receive and act on requests for, and make available, studies and data pursuant to subsections (a) and (b) of this section;

(d) require, in contracting with a non-governmental entity to conduct, or awarding funds wholly or partially in support of, a study, as a condition or term of such contract or award that the entity shall provide to the agency the study and, at the agency's request, any underlying data not subject to the limitations in subsection (b) of this section;

(e) issue, within one hundred and twenty days after enactment, guidelines for the public specifying how to submit requests for underlying data.

Sec. 4. Definitions

(a) "Non-governmental entity" means any person, institution, or other organization which is not an agency of this State and which has the power and authority to contract with, or accept awards from, an agency of this State to conduct studies.

(b) "Underlying data" means recorded factual data used to generate or support study findings, which may include preliminary analyses, drafts, plans for future research or study, peer review comments, communications with colleagues, and physical objects such as laboratory samples, but excluding any data subject to the limitations in subsection (b) of section 3.

Sec. 5. Effective Date.

This Act shall become effective one hundred and twenty days after enactment.

Approved by ALEC's National Board, April 2003

State Data Quality Act

AN ACT to ensure and maximize the quality, objectivity, utility, and integrity of information disseminated by state agencies to the public, and to the federal government in support of federal programs, and to provide the public with administrative mechanisms for requesting that such information be corrected or improved.

Be it enacted by _____ *of the* _____.

Sec. 1. Short Title.

This Act may be cited as the "Data Quality Act of 2003".

Sec. 2. Purposes.

The purposes of this Act are to—

(a) require that agencies of this State which disseminate information to the public that is likely to influence their decisions, choices, rights, or duties attempt to ensure and maximize, consistent with available resources and considering the costs and benefits involved, the quality, objectivity, utility, and integrity of such information;

(b) require that agencies of this State which provide information to the Federal Government in furtherance of Federal programs which are likely to impact the citizens of this State, or persons or entities which conduct business or other activities in this State, attempt to ensure and maximize, consistent with available resources and considering the costs and benefits involved, the quality, objectivity, utility, and integrity of such information;

(c) establish principles which agencies of this State must apply in developing guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of such information; and

(d) provide administrative mechanisms which can be utilized by citizens of this State, or persons or entities which conduct business or other activities in this State, who are affected, or are likely to be affected, by such information, to seek and obtain correction or improvement of information that does not comply with the principles set out in this Act or the guidelines issues by State agencies pursuant to this Act.

Sec. 3. Agency Responsibilities.

Each agency which disseminates information subject to this Act shall—

(a) develop and issue, no later than one year after enactment of this Act, with opportunity for public comment and in consultation with other State agencies, guidelines to implement the purposes, principles, and provisions of this Act.

(b) designate an official who shall be primarily responsible for developing and implementing the agency guidelines.

(c) report annually to the Governor and the Legislature on—

(1) the number and nature of petitions received pursuant to this Act and its guidelines;

(2) how such complaints were resolved by the agency; and

(3) any significant problems or issues experienced in implementing this Act and the agency guidelines.

Sec. 4. Governor Responsibilities.

The Governor, or a person delegated such responsibility, shall—

(a) coordinate development of guidelines among the State agencies to ensure that they are reasonably consistent with each other and that they are in compliance with the Act; and

(b) make recommendations to the Legislature as appropriate, based on the agencies' annual reports, for any changes viewed as needed to improve this legislation.

Sec. 5. Principles.

The guidelines shall be based on, reflect, and incorporate the following principles—

(a) All information disseminated by an agency shall be subject to standards of quality that are appropriate to its significance, type, and timeliness.

(b) All information and data collected should be subject to rigorous review for the purposes of quality control. In the case of scientific information, this might require external peer review with opportunity for public comment and/or legislative oversight.

(c) Information should provide sufficient supporting data and analytical methods to allow the information to be substantially reproducible by another party, within an appropriate margin of error.

(d) Where information, data, or methods developed by outside parties are relied on by an agency in developing the agency's information, the agency shall ensure that such information, data, or methods meets quality standards established under this act.

(e) When it comes to the attention of an agency, whether by an agency determination in response to a petition or otherwise, that information which it is disseminating is materially out of compliance with this Act or its guidelines, the agency shall cease disseminating such information or the portion of such information which has been found to be out of compliance or affected by such non-compliance.

Sec. 6. Petitions.

(a) The agency guidelines required by section 3 shall provide an administrative petition mechanism by which affected persons can seek and obtain correction or improvement of agency information which is not in compliance with this Act or the agency's guidelines.

(b) The administrative petition mechanism shall specify a reasonable and appropriate time period within which the agency must respond to the substance of a petition which is not trivial or frivolous.

(c) The petition mechanism will not apply to information which is not final and which is undergoing a public comment or peer review process, including development of agency response thereto, unless the petitioner can show that the interim information being disseminated is causing, or is likely to cause, significant adverse impact.

(d) If the agency guidelines place responsibility for responding to a petition in a portion of the agency which was significantly involved in developing the information which is the subject of the petition, the guidelines shall also provide for right of appeal from the initial response which shall be the responsibility of a portion of the agency which was not involved in developing the subject information.

(e) In responding to a petition, the agency shall inform the petitioner of the action which will be taken and attempt to specify when it will be taken.

(f) Agencies shall inform the public of their guidelines and petition procedures in a manner or manners designed to achieve the broadest possible dissemination, preferably through their Internet site.

Sec. 7. Confidentiality.

Nothing herein shall be construed to impinge on existing rights or legal obligations regarding privacy, trade secrets, intellectual property, or other confidentiality protections.

Sec. 8. Definitions.

(a) "Affected person" means an individual or other entity which can reasonably claim that it is adversely affected, or likely to be adversely affected, by, or which actively uses, the disseminated information which it claims is not in compliance with this Act or the agency guidelines.

(b) "Dissemination" means agency initiated or sponsored distribution to the public, either through actual distribution or by notice of general availability. It does not include a simple reference or link to information developed or disseminated by others.

(c) "Information" means any representation of knowledge, facts, estimates, or analytical results regardless of form or format.

(d) "Integrity" refers to securing information against unauthorized access or revision.

(e) "Objectivity" means that the information is accurate, reliable, clear, complete, up-to-date, and unbiased in both substance and presentation.

(f) "Quality" is a term encompassing "objectivity", "utility", and "integrity".

(g) "Substantially reproducible" means that the information as disseminated is capable of being tested to see whether application of the original and supporting data and materials and identical methods of analysis will generate similar results, within an appropriate margin of error.

(h) "Utility" means that the information clearly serves its intended purpose for its intended users.

Sec. 9. Effective Date.

The quality principles and standards of this Act, and the agency guidelines required by this Act, will take effect thirty days after an agency issues its guidelines, which must be no later than one year after the date of enactment.

Sec. 10. Reviewability.

This Act is not intended to provide any right of action or remedy not already provided for by law.

Approved by ALEC's National Board, April 2003

State Sovereignty for Air Quality and Visibility Act

Section 1. {Statement of Purpose}

As part of the State of {state}'s ongoing development and implementation of a long-term strategy in connection with visibility and air quality related values within class I areas, the Department_____ shall evaluate the extent to which the activities of the federal government are directly adversely impacting visibility and air quality related values within class I areas and make a determination whether such entities have taken or are taking all reasonable steps necessary to remedy that impact. At any time, the Department_____ may make, and a federal land manager shall respond to, reasonable requests for information necessary for the Department to perform such regulation.

Section 2.

For the purpose of addressing regional haze and visibility impairment in {state}'s mandatory class I federal areas;

(A) the federal land manager of each such area shall develop a plan for evaluating visibility in that area by visual observation or other appropriate monitoring technique approved by the federal Environmental Protection Agency and shall submit such plan for approval to the division for incorporation by the commission as part of the state implementation plan.

(B) Such submittal and compliance by the federal land managers shall be done in a manner and at a time so as to meet all present or future federal requirements for the protection of visibility in any mandatory class I federal area.

(C) Such plan shall only be approved by the commission if the expense of implementing such a plan is borne by the federal government.

Section 3. {Emission inventory}

(A) In addition to the plan submitted by each federal land manager pursuant to Section 2, the responsible federal land management agency shall provide an emission inventory to the commission of all federal land management activities in {state} or other states that result in the emission of criteria pollutants, including surrogates or precursors for such pollutants, that affect any mandatory class I federal area in {state} by reducing visibility in such an area. Such emission inventory shall be submitted to the commission no later than {effective date}, and no less frequently than every five years thereafter.

(B) The commission shall exempt from the inventory any sources or categories of sources that it determines to be of minor significance.

Section 4.

The commission shall adopt rules to fully implement the general assembly's intention to exercise state powers to the maximum extent allowed under Section 118 of the federal act in requiring each federal land management agency with any presence in the state of {state} to develop and submit to the division an inventory of emissions from lands, wherever situated, which could have any effect on visibility within mandatory class I federal areas located in {state}. The commission and the division shall use the information from these emission inventories:

(A) To develop control strategies for reducing emissions within the state of {state} as a primary component of the visibility long-term strategies for inclusion in the state implementation plan;

(B) In any environmental impact statement or environmental assessment required to be performed under the federal "National Environmental Policy Act of 1969," 42 U.S.C. secs. 4323 to 4347; and

(C) To exercise all powers and processes that exist to seek reduction in emissions outside the state of {state} that reduce visibility in the { State } mandatory class I federal areas.

Section 5. {Funding}

The cost of preparing and submitting inventories pursuant to Section 3 shall be borne by the federal government.

Section 6. {Sunset clause}

Section 7. {Repealer clause}

Section 8. {Effective date}

Approved by ALEC's National Board, September 2002

Resolution in Opposition of Carbon Dioxide Emission Standards

Whereas, fuel diversity is a key component of the national economy and enhances affordability of energy, is essential for energy security, and augments energy development, production and transmission reliability; and

Whereas, 85% of our national energy consumption is based upon fossil fuels; and

Whereas, carbon dioxide is a natural by-product of fossil fuel combustion; and

Whereas, carbon dioxide is not classified as an ambient air pollutant nor a hazardous air pollutant, but is a beneficial gas that contributes to the ecological health of all natural resources; and

Whereas, carbon dioxide is a non-toxic gas found naturally in the environment; and

Whereas, reducing power plant emissions of carbon dioxide to 1990 levels as proposed by pending federal legislation would increase the consumer electricity costs by 33 percent; and

Whereas, limits on carbon dioxide emissions will require energy rationing; and

Whereas, credits for 'voluntary' carbon dioxide reductions encourage support for energy rationing because the credits achieve full monetary value only under a Kyoto-like emissions cap-and-trade program; and

Whereas, the Energy Information Administration estimates that the Kyoto Protocol's carbon dioxide emission reduction targets could cost the United States up to $400 billion annually; and

Whereas, approximately 95% of the greenhouse gases emitted by motor vehicles are carbon dioxide; and

Whereas, USDOT is currently undertaking a Corporate Average Fuel Economy rulemaking process that addresses greenhouse gas emissions from automobiles in a manner that carefully weighs the technical, economic, safety, job, competitive industrial and consumer choice implications; and

Whereas, state regulations of carbon dioxide emission standards for motor vehicles is tantamount to a state version of federal fuel economy mandates that reduces consumer choice by restricting production of larger, heavier vehicles that provide more utility and passenger safety; and

Whereas, states can best encourage greater implementation of innovative technologies through market based consumer incentives and support public/private partnerships that promote the development of advanced technologies; and

Whereas, the President's Global Warming Initiative stresses the importance of science in guiding policy and actions that are consistent with the need to maintain healthy economic growth. It also places increased emphasis on improving the state of climate science, so that policy actions are consistent with our state of knowledge.

Be It Resolved, the American Legislative Exchange Council supports the free market principles contained within the President's initiative as a cost-effective and scientifically guided national program to address the climate change issue.

Be It Resolved, the American Legislative Exchange Council is opposed to mandatory or "voluntary" carbon dioxide emission standards and the use of greenhouse transferable credits as a tool for environmental policy or regulation.

Approved by the ALEC National Board, September 2002

Performance Based Permitting Act

SUMMARY: An act to establish performance based environmental permitting system, to include an environmental incentives program.

Be It Enacted by the State of _____:

Section 1. Short Title: This act shall be known as the "Performance Based Permitting Act."

Section 2. Purpose:

(a). Permit applicants with a history of compliance with environmental laws and regulations should be eligible for an expedited permit for extended periods of time, and automatic permit renewals.

(b). Permit applicants with a history of non-compliance with the environmental laws and regulations shall under the normal process of review and permit renewals can be denied for an appropriate period of time or until the violation in resolved.

(c). Permit decision-making that considers past compliance history and customizes the permit in recognition of that history:

1. Increases protection of the environment because it encourages compliance with environmental laws;
2. Improves cost benefit to the state by allowing state agencies to focus resources on the few in the regulated community with a record of poor performance;
3. Improves stewardship of natural resources because it allows permit applicants with a satisfactory record to focus their resources on site and situation improvements.

(d). In order to maximize the benefit of a permit decision-making process that recognizes an applicant's compliance history, the evaluation of that history should be done in a reliable and predictable manner.

It is therefore declared to be the purpose of this act to enhance the protection of the state's natural resources by establishing and making available to the regulated community incentives to encourage compliance and to reward those who meet or exceed requirements; provide the Department of _____ with clear and specific authority to consider the compliance history of permit applicants when implementing its permit program; promote statewide consistency and objectivity in the evaluation process by establishing measurable criteria for the review of compliance history and defining the permitting process for applicants with records of noncompliance.

Section 3. Performance-Based Permit Program

(1) **Definitions**. For purposes of this section, the following terms have the following meanings:

a. "Applicant" means the owner of operator of a facility or activity seeking an environmental permit, and the proposed permittee if different from the owner or operator of such facility or activity. If the applicant has not held a department permit during the five years preceding submittal of the permit application, the term also includes any person who has the legal or actual authority to control the owner, operator, or permittee. The term also includes any person requesting that a permit be transferred to them, and, if the transferee has not held a department permit during the five years preceding submittal of the request to transfer the permit, and person who has the legal or actual authority to control the proposed transferee.

b. "Department" means the Department of _____.

c. "Department statutes" means Chapter _____ of the Code of the State of _____.

d. "Site" means a single parcel or multiple contiguous or adjacent parcels of land on which the applicant proposes to construct or operate, or has constructed or operated, an installation, activity or facility for which a permit is required under department rules and regulations. A site is a "new site" if the applicant has not held a department permit for an installation, activity, or facility at that location during the five years preceding submission of an application.

(2) **Applicability**. In determining whether a permit applicant has provided reasonable assurance of compliance with applicable statutes and department rules, the department shall consider the compliance history of the applicant during the five years preceding submission of a complete application to the department as a part of its permit application review process.

a. If the application is for the renewal of a department permit, or for a new permit at any site where the applicant has held a department permit for at least five years, the department shall consider only compliance history at this site.

(3) **Categories of violations.**

a. Category A.

1. **Felony criminal violations.**

(a) The applicant has been convicted of or entered a plea of guilty or nolo contendre to, or had adjudication withheld for, a felony criminal violation of any environmental statute within the last five years.

(b) For purposes of this paragraph, if the applicant is a business entity, violations include violations committed by the applicant's officers, directors, trustees, partners, or employees who have legal or actual operational control over the facility for which a permit is being sought.

2. **Actual Harm**. The applicant is responsible for a violation of a department statute, rule, consent order, final order, or agreement that resulted in actual harm to human health and environment.

b. Category B.

1. **Other criminal violations**

(a) The applicant has been convicted of, or entered a plea of guilty of nolo contendre to, or had adjudication withheld for, a misdemeanor criminal violation of any environmental statute within the last five years; or

(b) For purposes of this paragraph, if the applicant is a business entity, violations include violations committed by the applicant's officers, directors, trustees, partners, or employees who have legal or actual operational control over the facility for which a permit is being sought.

2. **Circumvention or falsification.**

(a) The applicant is responsible for a violation involving the knowing submittal of any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained by department rules, statutes, orders, or permit conditions; or

(b) The applicant is responsible for a violation involving falsifying, tampering with, or knowingly rendering inaccurate any monitoring device or method required to be maintained by department rules, statutes, orders, or permit conditions.

3. **Actual Harm**. Any violation of a department statute, rule, consent order, final order, or agreement that resulted in actual harm to the environment and human health.

c. Category C.

1. The applicant is responsible for a violation of a department statute, rule, consent order, final order, or agreement that resulted in a significant risk to human health or environment.

d. Category D. **Pattern of Noncompliance.**

1. Multiple violations of department statutes, rules, consent orders, final orders, or agreements that establish a pattern of noncompliance indicating that the applicant is unwilling or unable to comply with applicable department standards and criteria.

(4) **Civil Violations.** The department may consider all civil violations that were committed during the relevant review period and that resulted in the initiation of a formal enforcement action by the department. However, if a civil violation has not been resolved by consent order or formally adjudicated prior to the time the department makes its determination on the application, the civil violation must be established by appropriate evidence in any subsequent proceeding challenging the department's proposed action. In all such proceedings:

a. The permit applicant has the initial burden in any proceeding challenging the proposed agency action of establishing a prima facie case that it has provided reasonable assurance and is entitled to the permit;

b. The department, or any party seeking to establish violations under this subsection then has the burden of presenting by appropriate evidence a prima facie case supporting the violations it contends warrant denial of the permit.

(5) **Factors to Consider.** If the department determines that the applicant has a history of compliance or there is no evidence of noncompliance, the department shall consider the applicant eligible for an expedited process for permit approval for a period of five years.

If the department determines that the applicant is responsible for any Category A, B, C, or D violations, the department shall initiate a further review. The following factors must be considered in order to evaluate such violations in the context of the applicant's overall performance history, and to determine whether the applicant has provided reasonable assurance of future compliance with department rules and statutes;

a. The number of violations and the seriousness of such violations;

b. The number of other facilities controlled by the applicant that have violations and the types of permits authorizing activities at those facilities;

c. The extent to which the violations involved activities that are the same as or similar to the activity for which a permit is being requested;

d. The extent to which the applicant has resolved or in good faith participated in a process to resolve any previous violations by the applicant; and

e. Whether the applicant has developed an internal compliance program designed to eliminate or reduce the likelihood of similar violations reoccurring.

(6) **Actions.** After considering the applicant's compliance history, including any mitigating factors, the department may, in its discretion, take one or more of the following actions:

a. Issue a permit for a period of five years or issue renewal of permit for a period of five years.

b. Issue a permit for a period of five years with special conditions that address compliance issues.

c. Issue a permit with an accompanying administrative order. The administrative order may include a schedule for coming into compliance with department rules, statutes, orders or permit conditions, additional operating, training, or auditing procedures necessary to assure compliance, specified penalties for future noncompliance for a period of five years.

d. Issue a permit with a duration of less than five years, if not prohibited by federal law.

(7) **Permit Denial**. In addition to the provisions of subsection (6), the department may, in its discretion, deny a permit application in accordance with the following:

a. If the applicant is responsible for a Category A violation, the department may deny the permit application, and the applicant shall not be entitled to apply for a permit for that installation, activity, or facility for a period of one year from the time a final order denying the permit has been entered.

b. If the applicant is responsible for two or more Category B violations, the department may deny the permit application, and the applicant shall not be entitled to apply for a permit for that installation, activity, or facility for a period of six months from the time a final order denying the permit has been entered.

(8) **Compliance Incentives.** Any applicant who meets the criteria set forth below is eligible for the following incentives unless otherwise prohibited by state or federal statute, department rule, or federal regulation, and provided that the applicant meets all other applicable criteria for the issuance of a permit.

a. Tier 1. An applicant shall be eligible for these incentives if the applicant operated the installation, facility or activity for at least 2 years or, if it is a new installation, facility, or activity, the applicant must have operated a similar installation, facility or conducted a similar activity under a department permit for at least two years and the applicant must have not been responsible for any Category A, B, C or D violations.

1. Extended permit. A renewal of an operation or closure permit, which may include expansions or modifications involving construction, shall be issued for a period of five years without agency action under the following conditions:

(a) At least 180 days prior to the end of the first five-year period, the applicant shall complete and submit the application to the department. Within 30 days after submission, the department shall conduct a review of the compliance history of the applicant and shall determine whether the applicant continues to meet the criteria set forth in paragraph (a) of this subsection.

(b) The department shall conduct at least one public hearing within 60 days of submittal of the application to allow the public the opportunity to present concerns regarding the compliance history of the applicant.

(c) If the applicant no longer meets the criteria set forth in paragraph (a) of this subsection, the department shall deny the automatic permit renewal, and shall require the applicant to submit a permit renewal application in accordance with applicable department statutes and rules.

(d) If the applicant seeks to transfer the extended permit to another entity, the transferee shall submit the application for transfer. If the department determines that the transferee has meet the criteria set forth in paragraph (a) of this subsection over the previous five years, and if the transfer complies with all other applicable criteria, the department shall agree to the transfer of the extended permit.

b. Tier 2. An applicant shall be eligible for these incentives if the applicant meets the same requirements as for Tier 1 described in paragraph (a), and must have implemented an environmental management system which results in performance surpassing the department's minimum compliance standards.

1. Extended permits and short-form renewal applications.

2. Fewer routing inspections.

3. Expedited review of requests for permit modifications.

4. Other incentives as may be provided by the department, which may include Secretarial recognition or program-specific incentives.

Approved by ALEC's National Board, May 2002

Power Plant Siting Act

Summary

This Act creates a single Board that functions as the permitting authority for all governmental approvals necessary to site a Power Plant in the state.

Model Legislation

Section 1. {**Title**} This act shall be known and may be cited as the Power Plant Siting Act.

Section 2. {**Findings**} The legislature finds and declares:

A. Demand for electricity is at an all time high.

B. Reasonably priced, reliable sources of energy are vital to the well-being and prosperity of the people of this state.

C. Power Plants are developed primarily through the free enterprise system, require a major commitment of funds and resources and years to build, and the decision to permit or deny their construction has a long term impact on the economy of the state.

D. Power Plants that sell into the wholesale power market strengthen competition and enhance the reliability of the electric transmission system.

E. The authority to regulate many aspects of the issues involved in the siting of Power Plants currently exists in a variety of departments and agencies within the government of the state and political subdivisions of the state; there is overlapping jurisdiction among several state agencies in the siting of Power Plants; and there is the potential for conflicting decisions being issued by the various agencies having authority over different aspects of the siting process.

F. There is a need for coordinating and expediting the review of applications for the siting of Power Plants and the authority and responsibility to perform that function should be consolidated in a single body that will render final decisions concerning the siting of Power Plants.

Section 3. {**Definitions**} As used in this Act:

A. "Board" means the Siting Board established by this Act.

B. "Power Plant" means an electric power generating plant with an installed capacity rating of [__] megawatts or more.

Section 4. {**Siting Board**} There is established a Siting Board, hereinafter referred to as the "Board," which shall be a part of the state government.

A. Composition. The Siting Board shall consist of five (5) members, as follows: the chairperson of the public utilities commission, who shall serve as chairperson of the siting Board; the director of the department of environmental protection; one designee of the Speaker of the House, one designee of the President Pro Tempore of the Senate and one member of the public, to be appointed by the Governor [State Agency heads may be added to the board at the discretion of the state legislature].

(a) Each member of the Board shall take an oath to administer the duties of office faithfully and impartially and that oath shall be filed in the office of the secretary of state.

(b) The members of the Board shall serve [with/without] compensation, but shall be reimbursed for their actual expenses necessarily incurred in the performance of their duties. The Board may engage any consultants or expert witnesses that it deems necessary to implement its statutory responsibilities; provided, however, that to the maximum extent possible, Board staff shall be drawn from existing state agencies.

(c) A quorum shall consist of a majority of the Board. A majority vote of the Board shall be required for all actions, including permitting decisions.

(d) The Board shall maintain and grant access to records and reports in its files to members of the public during normal working hours and shall permit copies of those records and reports to be made by interested members of the public at their expense; provided, however, that the Board shall not permit disclosure, other than to another government agency for the sole purpose of rendering an advisory opinion, of any information obtained by or submitted to the Board pursuant to the provisions of this chapter, upon a showing, satisfactory to the Board, that the information is entitled to protection as trade secrets or as privileged, confidential, or proprietary information. No other governmental agency shall disclose any trade secrets or privileged, confidential, or proprietary information.

B. Powers of the Board. No person shall construct or operate a Power Plant without first obtaining a permit authorizing the siting of the Power Plant from the Board. This requirement shall not apply to any Power Plant with an installed capacity rating of less than [__] megawatts that complies with the NOx standard of [__] parts per million.

(a) The Board is the sole authority for all permits, licenses, certificates, authorizations and other governmental approvals which, under any statute of the state or ordinance of any political subdivision of the state, including local governments, would be required for the siting, construction or operation of a Power Plant in the state.

(1) Any department, agency, commission or other administrative or regulatory body of the state or political subdivision of the state which, absent this Act, would be required to issue a permit or other governmental approval in order to allow the siting, construction or operation of a Power Plant shall operate at the direction of the Board. These agencies shall follow the procedures established by statute, ordinance, and/or regulation provided for reviewing the application for a permit or other governmental approval, but, instead of issuing the permit or other governmental approval shall forward its findings from the proceeding, together with the record supporting the findings and a recommendation for final action to the Board.

(2) Notwithstanding any provision in this Act to the contrary, in those instances in which the department of environmental protection exercises a permitting function under the delegated authority of federal law, including, but not limited to, the Federal Clean Water Act (33 U.S.C. § 1251 et seq.), the Clean Air Act (42 U.S.C. § 7401 et seq.), and those state laws and regulations which implement those federal laws, the department of environmental protection shall be the permitting authority, but in all other respects the department of environmental protection shall follow the procedures set forth in this Act.

(b) The Board is authorized and empowered to summon and examine witnesses and to compel the production and examination of documents and any other evidence that may be necessary for the discharging of the duties imposed by this Act.

(c) The Board is empowered to issue any regulations as may be required to effectuate the purposes of this Act.

C. Contents of Applications for Siting Power Plants. The rules and regulations promulgated by the Board shall set forth the form and contents of an application for a permit authorizing the siting a Power Plant under this Act. The applications shall contain at least the following, where applicable:

(a) Identification of the proposed owner(s) of the Power Plant, including identification of all affiliates of the proposed owners.

(b) Detailed description of the proposed Power Plant, including its location, function and operating characteristics, and complete plans as to all structures, including transmission facilities, associated with the proposed Power Plant.

D. Board's Review of Applications. The Board shall use the following procedures in reviewing an application for a permit authorizing the siting of a Power Plant:

(a) Within thirty (30) days of the filing of an application with the Board, the Board shall notify the applicant whether the application is in the form and addresses the matters that are required by this section and the rules and regulations as are promulgated pursuant to this Act. An application meeting these requirements shall then be docketed. Any application deemed to be deficient shall be returned to the applicant, together with a concise statement of the application's deficiencies. Within fifteen (15) days of the resubmission of an application following a rejection for deficiency, the Board shall docket the application together with specification of any additional deficiencies noted by the Board, if any.

(b) Within sixty (60) days following the Board's docketing of an application, the Board shall determine the issues to be considered by the Board in evaluating the application, and designate those departments and agencies of state government and of political subdivisions of the state which shall act at the direction of the Board for the purpose of providing findings and recommendations for final action on those issues.

(c) The Board shall consider as issues the ability of the proposed Power Plant to comply with the requirements of the laws, rules, regulations, and ordinances under which, absent this Act, the applicant would be required to obtain a permit or other governmental approval. The agency of state government or of a political subdivision of the state which, absent this Act, would have statutory authority to grant or deny the permit, shall function at the direction of the Board for hearing the issue and providing its findings and recommendations for final action thereon.

(d) The Board shall limit the scope of any agency's investigation where it finds that more than one agency has jurisdiction over a matter at issue in the permitting process. In these instances, the Board shall determine which agency shall make the necessary findings on the issue after giving proper consideration to the expertise and resources available to each of the agencies involved.

(e) Each agency of the state or political subdivision of the state designated shall proceed to consider the issue or issues assigned to it for review. Each agency shall conclude its consideration and issue its findings and recommendations for final action not more than 90 days following its designation or any lesser time that the Board may require, or the right to exercise the function shall be forfeited to the Board.

(f) Within thirty (30) days after the final date of submission of agency findings and recommendations for final action pursuant to this Act, the Board shall convene a hearing on the application. The purpose of this hearing shall not be to rehear the evidence which was presented previously before agencies designated by the Board, but rather to provide the opportunity to address in a single forum, and from a consolidated, statewide prospective, the issues reviewed, and the recommendations made by the designated agencies. The Board shall limit the presentation of repetitive or cumulative evidence. The hearing shall proceed on not less than thirty (30) days' notice to the parties and the public, shall be concluded not more than thirty (30) days following its initiation, and shall be conducted expeditiously. In the discretion of the Board, for good cause shown, the time prescribed for the hearing may be extended for up to thirty (30) additional days.

(g) Within sixty (60) days of the conclusion of the hearing, the Board shall issue its final decision on the application. A decision in favor of the application shall constitute a granting of all permits or other governmental approvals which under any law, rule, regulation, or ordinance of the state or of a political subdivision thereof would, absent this Act, be required for the proposed Power Plant. The decision may be issued conditional upon the applicant's receipt of permits required by federal law. The Board's decision shall explicitly address each of the findings and recommendations received from agencies, and include the Board's reasons for accepting, rejecting, or modifying, in whole or in part, any of those findings and recommendations.

(h) The decision issued by the Siting Board shall constitute the sole, final, binding, and determinative regulatory decision within the state for the purposes of siting a Power Plant.

(i) If the Board's decision is to approve the siting of the Power Plant, no action may be taken by any department or agency of state government, any political subdivision of the state, or any other person that would prevent the Power Plant from fully accessing the market for electricity or impose limitations or restrictions on the ability of the Power Plant to enter into contracts for the sale of electricity, including requiring the sale of electricity to any designated users.

E. Appeals. Any person that was deemed to be a party to the case during the hearing before the Board and is aggrieved by the decision of the Board may within ten (10) days from the date of the decision, obtain judicial review of the decision in the manner and according to the standards and procedures provided by law. The only issues to be decided in an administrative or judicial review of a decision by the Board shall be whether the Board acted arbitrarily or capriciously, abused its discretion or acted contrary to law in its review of the issues presented at the hearing.

No automatic stay of the Board decision is allowed as a matter of law without a finding by the Appeals court that the appeal will likely be successful.

F. {**Severability Clause**}

G. {**Repealer Clause**}

H. {**Effective Date**}

Approved by ALEC's National Board, January 2002

Conditioning Regulation of Non-Pollutant Emissions on Science Act

Purpose: The following language may be used as a freestanding bill or amendment to a bill, (*e.g.*, a bill to regulate carbon dioxide). It requires [State EPA] Administrator to perform an assessment that considers certain criteria prior to formally proposing or implementing regulation of any emission not listed as a "pollutant" under the Clean Air Act.

Under this approach, to propose regulation of carbon dioxide emissions, or to implement a statutory emissions cap, whether or not it is required by other state authorities, the Administrator must first report whether the proposal:

(1) reasonably demonstrates that the authority is necessary to protect the environment or public health or welfare;

(2) is likely to have a substantial and significant adverse effect on fuel or energy availability or price, its impact to be balanced against any benefits reasonably identified as deriving from the proposal (asserting both benefits and costs); and

(3) possesses feasibility and benefits comparatively superior to alternative means toward achieving the same end, potentially yielding the same or better result but with a stimulative impact in lieu of a putative negative economic impact.

This initiative does not require a cost-benefit analysis that must yield particular results in order for a proposal to advance. A proposal with no benefit or tremendous cost can still advance. It is instead a "regulatory right to know" requirement of disclosure, to accompany any such proposal, assessing any detectable benefits, and their relationship to costs.

An alternative approach to this bill is to create a process similar to the Clean Air Act requirement for listing criteria pollutants, for any state effort to regulate an air emission not already listed as a pollutant under the Clean Air Act.

Be it enacted by _____ *of the* _____.

Section 1. Short Title.

This Act may be cited as the "Conditioning Regulation of Non-Pollutant Emissions on Science."

Section 2. Required Assessment For Regulating Non-Pollutant Emissions.

Notwithstanding any other authority, prior to proposing regulation or implementing statutory limitation of an air emission not listed as a pollutant under the Federal Clean Air Act (42 U.S.C. Sections 7408 or 7412), the [State EPA] Administrator shall ensure and consider a specific, independent regulatory Assessment.

Section 3. Required Elements Of Assessment.

An assessment pursuant to Section (2) of this Act shall—

(A) include a detailed analysis of—

(1) improvements in environmental quality or public health or welfare expected to result from the proposed emission control or prohibition, employing specific environmental and other indicators as applicable; and

(2) the likely direct and indirect effects of the proposed control or prohibition on the availability and price of fuel and electricity in the State;

(3) a comparison of such likely market impacts to potential benefits reasonably identified as deriving from the proposal; and

(4) the comparative feasibility and benefits of achieving similar results through alternative means with a more positive economic impact.

(B) demonstrate whether the proposed emission control or prohibition is necessary to protect the environment or public health or welfare.

Section 4. Criteria For Regulatory Proposal.

The Administrator shall fully detail in his regulatory proposal as described in Section (2) of this Act whether—

(A) the assessment pursuant to Section (3) of this Act reasonably demonstrates that the authority is necessary to protect the environment or public health or welfare;

(B) the control or prohibition is likely to have a substantial and significant adverse effect on fuel or electricity availability or price that clearly outweighs any benefits reasonably identified as deriving from the control or prohibition;

(C) the State has sufficiently assessed the comparative benefits of achieving the same end through flexible, incentive-based means, for example by expediting capital turnover through providing accelerated asset depreciation or otherwise modifying capital gains or other tax schedules, including a detailed assessment of those alternatives considered and their benefits; and

(D) the proposal is a comparatively superior approach to alternative approaches analyzed.

Section 5. Assessment Procedural Requirements.

(A) SCIENTIFIC COMPONENT—Prior to formally proposing regulation as described in Section (2) of this Act, the Administrator shall empanel no less than five (5) qualified experts in related fields but independent of any regulatory agency, to assess and report on the specific potential environmental benefits to be derived from the proposal and from alternatives pursuant to Section 3(A)(4) of this Act, employing discrete environmental indicators;

(1) the Administrator shall to the extent possible ensure balance among the panel in terms of appointees' documented positions on related matters, and shall minimize potential appearances of conflict of interest;

(2) the panel's report shall be included in the Assessment pursuant to Section (2) of this Act and published as part of any regulatory proposal covered by this Act, and its written deliberations made available to the public at the same time; and

(3) the panel's analysis and considerations shall resemble to the extent applicable that required under 42 U.S.C. 7408 for determining criteria pollutants.

(B) ECONOMIC COMPONENT – Prior to formally proposing regulation, the Administrator shall empanel no less than five (5) qualified experts in related fields but independent of any regulatory agency, to assess and report on the potential economic impacts associated with the proposal and potential alternatives;

(1) the Administrator shall to the extent possible ensure balance among the panel in terms of appointees' documented positions on related matters, and shall minimize and avoid where possible potential appearances of conflict of interest; and

(2) the panel's report shall be included in the Assessment pursuant to Section (2) of this Act and published as part of any regulatory proposal covered by this Act, and its written deliberations made available to the public at the same time.

(C) PUBLIC NOTICE AND OPPORTUNITY FOR COMMENT—The Administrator shall provide public notice and reasonable opportunity for comment with respect to the panels' reports in addition to or as part of the regulatory notice and comment procedure, and shall grant such comments due consideration in finalizing any such proposal.

Section 6. {Severability} [*Insert Severability* Clause]

Section 7. {Repeal} [*Insert Repealer Clause*]

Section 8. {Effective Date} [*Insert Effective Date*]

Approved by ALEC's National Board, January 2003

Verifiable Science Act

Summary: In order to protect citizens from arbitrary and capricious regulations promulgated without any impetus that is justified by pertinent, ascertainable, and peer-reviewed science, this act guarantees citizens the right to access scientific data that is used to develop public policies.

Model Legislation

Section 1.{Title} This act shall be known as the Verifiable Science Act.

Section 2.{State rights.}Citizens have a right to access data from state funded studies in whole or in part, that are used for development of state law or regulation or enforcement action. Any regulations promulgated by the results of such studies shall be justified by pertinent, ascertainable, and peer-reviewed science.

Section 3.{State responsibilities.} Any scientific documentation, statistics, reports, or research must be made available to the public through (provisions of the state Freedom of Information Act) whenever such scientific data is used, in part or in whole, as the basis for proposed statutes, regulations, guidance documents, policy statements, official reports, legislative studies, or any other pronouncements which might carry the weight of law or which might be intended to lead directly to new regulations or statutes.

Section 4.{Severability clause.}

Section 5.{Repealer clause.}

Section 6.{Effective date.}

Approved by ALEC's National Board, January 2001

Expert Evidence Act

[Title, enacting clause, et cetera]

Section 1. {Short title.} This Act may be known and cited as the Expert Evidence Update Act

Section 2. {FRE 701: Opinion Testimony by Lay Witnesses.}

If the witness is not testifying as an expert, the witness' testimony in the form of opinions or inferences in limited to those opinions or inferences which are (a) rationally based on the perception of the witness, (b) helpful to a clear understanding of the witness' testimony or the determination of a fact in issue, and (c) not based on scientific, technical, or other specialized knowledge within the scope of [FRE 702].

Section 3. {FRE 702: Testimony by Experts.}

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts of data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied to principles and methods reliability to the facts of the case.

Section 4. {FRE 703: Bases of Expert Opinion Testimony.}

The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing. If or a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence in order for the opinion or inference to be admitted. Facts or data that are otherwise inadmissible shall not be disclosed to the jury by the proponent of the opinion or inference unless the court determines that their probative value in assisting the jury to evaluate the expert's opinion substantially outweighs their prejudicial effect.

Section 5. {Bars to Expert Testimony.}

(1) A witness qualified as an expert by knowledge, skill, experience, training, or education may only offer expert testimony with respect to that particular field in which the expert is qualified.

(2) The testimony of an expert witness may not be admitted if the witness may receive any compensation contingent on the outcome of any claim or case with respect to which the testimony is being offered.

Section 6. {Mandatory Pre-trial Hearing.}

If the witness is testifying as an expert, then upon motion of a party , the court shall hold a pre-trial hearing to determine whether the witness qualifies as an expert and whether the expert's testimony satisfies the requirements of [Secs. 3-5]. The court shall allow sufficient time for a hearing and shall rule on the qualifications of the witness to testify as an expert and whether or not the testimony satisfies the requirements of [Secs. 3-5]. Such hearing and ruling shall be completed no later than the Final Pre-trial Hearing contemplating under Sec.__. [NB: What section number will fill in this blank will vary according to existing state law in each state.]

Section 7. {FRCP 26(a)(2) and 26(b)(4)(A): Mandatory Pre-trial Disclosure of Expert Testimony.}

(A) Whether or not any party elects to requests a pre-trial hearing contemplating in [Section 6.], all parties shall disclose to other parties the identity of any person who may be used at trial to present expert evidence.

(B) Except as otherwise stipulated or directed by the court, this disclosure shall, with respect to a witness who is retained or specially employed to provide expert testimony in the case or whose duties as an employee of the party regularly involve giving expert testimony, be accompanied by a written report prepared and signed by the witness. The report shall contain a complete statement of all opinions to be expressed and the basis and reasons therefore; the data or other information considered by the witness in forming the opinions; any exhibits to be used as a summary of or support for the opinions; the qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years; the compensation to be paid for the study and testimony; and a listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years.

(C) These disclosures shall be made at the times and in the sequence directed by the court. In the absence of other directions from the court or stipulation by the parties, the disclosures shall be made at least 90 days before the trial date or the date the case is to be ready for trial or, if the evidence is intended solely to contradict or rebut evidence on the same subject matter identified by another party under paragraph (B), within 30 days after the disclosure made by the other party.

(D) A party may depose any person who has been identified as an expert whose opinions may be presented at trial. If a report from the expert is required under paragraph (B), the deposition shall not be conducted until after the report is provided.

Section 8. {Interpretation.}

In interpreting and applying this Code section, the courts of this state shall follow the opinions of the United States Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), *General Electric Co. v. Joiner*, 522 U.S. 136 (1997), *Kumho Tire Co. Ltd. V. Carmichael*, 526 U.S. 137 (1999), *Weisgram v. Marley*, 528 U.S. 440 (2000), and their progeny; moreover, the courts of this state may draw from other precedents binding in the federal courts of this state applying the standards announced by the United States Supreme Court in the foregoing cases.

Section 9. {Interlocutory Appeal.}

Interlocutory appeal shall be available for (i) any challenge to the constitutionality of this Act; (ii) any ruling on the admissibility of expert evidence that will help prove or disprove criminal liability; (iii) any ruling on the admissibility of expert evidence that will help establish civil liability at or above $75,000, where the testimony could be outcome-determinative for establishing liability or determining damages. In other rulings or the admissibility of expert evidence, interlocutory appeal will only be available at the discretion of the appellate court.

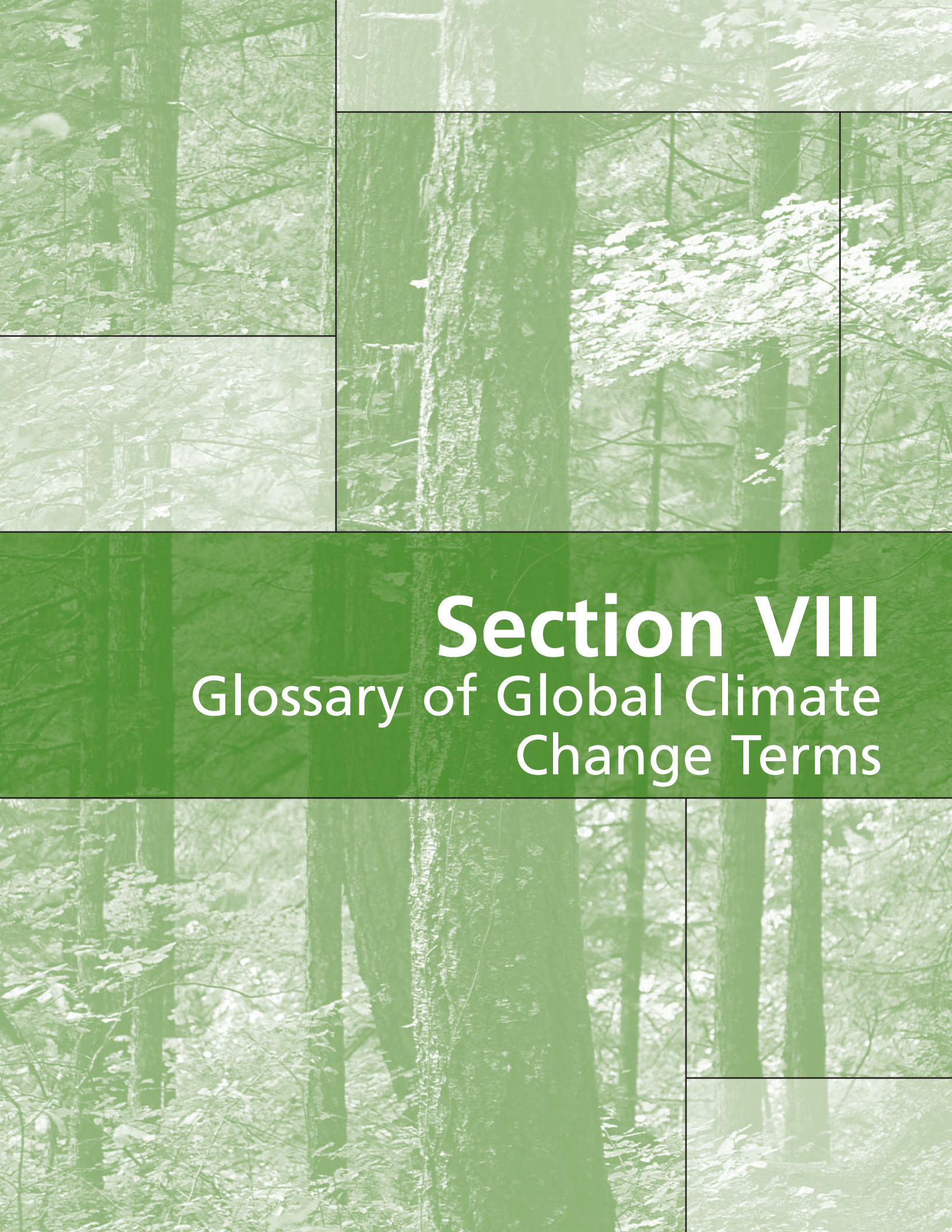
Section 10. {Standard of Review.}

As the proper admissibility of expert evidence is a question of law, the courts of appeals shall apply a *de novo* standard or review in determining whether expert evidence was properly admitted.

Section 11. {Effective Date.}

This Act shall become effective upon enactment and shall apply to all actions commenced on or after the effective date and to all pending actions in which trial has not been commenced on or after the effective date.

Approved by ALEC's National Board, August 2003 and Amended December 2005



Section VIII
Glossary of Global Climate Change Terms

Glossary of Global Climate Change Terms

Adaptation: Adjustment by human or natural systems to a new or changing environment.[1]

Alternative Energy: Energy derived from non-fossil fuel sources.[2]

Annex I Countries: Annex I to the 1992 UN Climate Convention includes all developed countries, countries with economies in transition, and most of Central and Eastern Europe. Annex I countries commit themselves to the aim of returning individually or jointly to their 1990 levels of greenhouse gas emissions.[3]

Annex II Countries: Annex II to the UN Climate Convention lists all countries with developed economies. These countries are expected to provide financial resources to assist developing counties in complying with their climate change obligations and to transfer environmentally sound technologies to these nations.[4]

Annex B: Annex B in the Kyoto Protocol lists those developed countries that have agreed to a commitment to control their greenhouse gas emissions in the period 2008-2012 (almost all of the same countries are listed as Annex I countries).[5]

Atmosphere: Envelope of gases surrounding earth. It is divided into four layers: the troposphere, where clouds and weather occurs (earth's surface up to 11 miles); the stratosphere (up to 31 miles); the mesosphere (31- 50 miles); and the thermosphere (transition zone to outer space).[6]

Banking: Saving excess emission allowances or credits for use in subsequently tighter regulation periods.

Baseline: The emissions that would occur without policy intervention (in a business-as-usual scenario.) Baseline estimates are needed to determine the effectiveness of emissions reduction programs.[7]

Biofuel: A fuel produced from dry organic matter or combustible oils produced by plants (e.g., alcohols, black liquor from the paper manufacturing process, wood and soybean oil).[8]

Btu Tax: Energy tax levied at a rate based on the Btu content of a fuel.[9]

Carbon Dioxide: A naturally occurring gas, it is a byproduct of animal respiration and fossil fuel combustion, and is consumed by plants as part of photosynthesis. CO_2 constitutes approximately 0.036% of the atmosphere.

Carbon Dioxide Fertilization: Enhancement of plant growth or yield as a result of an increase in the atmospheric concentration of CO_2. All trees, nearly all plants of cold climates, and most agricultural crops, including wheat and rice, are sensitive to CO_2 fertilization.[10]

Carbon Intensity: CO_2 emissions per unit of energy or economic output.[11]

Carbon Sequestration: The long-term storage of carbon in forests, soils, ocean, or underground depleted oil and gas reservoirs, coal seams, and saline aquifers.[12]

Carbon Tax: A tax placed on carbon emissions, based on a fuel's carbon content.[13]

Climate: The average trend of weather in a geographical region. The averaging period is typically several decades.[14]

Climate Convention: The UN's climate treaty "Framework Convention on Climate Change" (FCCC) was signed by more than 150 countries at the Rio Earth Summit in 1992.[15]

Climate Feedbacks: Interaction between greenhouse gases and important climate mechanisms, such as vegetation, water vapor, ice cover, clouds, and the ocean. These interactions can increase, decrease, or neutralize the warming produced by increased concentrations of greenhouse gases.[16]

Climate Models: Complex computer programs that attempt to mathematically simulate global climate. Also called General Circulation Models (GCMs).[17]

Cogeneration: The use of waste heat from steam and/or electricity generation to produce more electricity or to heat homes and businesses.[18]

Demand Side Management: Policies designed to reduce consumer demand for energy.

Early Action Credits: Issuing credits to parties that voluntarily reduce greenhouse gas emissions before mandatory regulation passes.

Emission Inventory: An account of total GHG emissions and GHG sequestration from natural and anthropogenic sources.

Emission Portfolios: Requirement that utilities provide electricity using a certain percentage of low- or zero-emitting energy technologies, or achieve a specified emission rate per unit of energy output.[19]

Emission Registry: A list of anthropogenic GHG emitters and a detailed account of their emissions. Usually used to establish baseline emission levels for regulatory regimes.

Emission Trading: A market-based approach that allows those reducing GHG emissions below what is required to use or trade the excess reductions to offset emissions at another source.[20]

FCCC: UN Framework Convention on Climate Change. See "Climate Convention."

Fuel Cell: An electrochemical device, like a battery, that combines hydrogen and oxygen to produce electricity, heat and water. The hydrogen source can either be pure hydrogen or a number of other fuels (such as methanol or other hydrocarbons) which are first converted to hydrogen and CO_2.[21]

General Circulation Model, or GCM: See Climate Models.

Greenhouse Effect: The trapping of heat by naturally occurring, heat-retaining atmospheric gases that keeps the earth about 60° F warmer than if these gases didn't exist.[22]

Greenhouse Gases, or GHGs: Gases within the lower atmospheric levels trap infrared radiation, which would otherwise escape into space, and subsequent re-radiation of some of this energy back to the Earth maintains higher surface temperatures than would occur if the gases were absent. The major GHG is water vapor. Other primary GHGs include CO_2, nitrous oxide, methane, ozone, and CFCs.[23]

Heat Island Effect: Localized warming produced in cities due to the density of infrastructure, such as pavement, buildings and roads that retain heat. This effect can influence temperature readings obtained from nearby weather stations.[24]

IPCC, or Intergovernmental Panel on Climate Change: Established in 1988 by governments under the auspices of the World Meteorological Organization and the UN Environment Program. It is organized into three working groups which address: 1) Science, 2) Impacts, Adaption, and Vulnerability; and 3) Mitigation.[25]

Kyoto Protocol: Adopted by all Parties to the Climate Convention in Kyoto, Japan in Dec. 1997, it requires Annex B countries (developed countries) to reduce greenhouse gas emissions an average of 5 percent below 1990 levels by 2008-2012.[26]

Mobile Emissions: Motor vehicles and other moving objects that release greenhouse gases.

No Regrets: Actions which result in greenhouse gas limitations and abatement, and which also make good environmental and economic sense in their own right.[27]

Precautionary Principle: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not established scientifically.[28] This principle was stated in the UN Framework Convention on Climate Change treaty.

Renewables: Non-depleting energy sources including wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.[29]

Renewable Portfolio: Requirement that electricity providers buy a specific percentage of their electricity from renewable energy sources.[30]

Stationary Emissions: GHG emissions from power plants and manufacturing plants.

Source Labeling and Disclosure: Requirement that electricity providers track GHG and other emissions to be made available for electricity customers.[31]

U.S. National Assessment, or USNA: An annual report sent to the UN since the 1992 Climate Convention detailing actions taken to reduce GHG emissions and updating the national GHG inventory.

Glossary of Energy Tax Terms

The following are types of taxes placed on energy extraction, energy sales, and energy companies.

Commodity Tax: Levied on the company that makes final delivery to an end consumer. Usually a rate per unit (e.g. kilowatt hour).

Consumption Tax: Levied on the end consumer by amount of energy consumed (e.g. $0.02 cents/kilowatt-hour consumed).

Corporate Income Tax: Assessed as a percentage of a corporations' total income.

Franchise Tax/Fees: Paid as part of a service agreement. Usually calculated on percentage of revenues derived from sales of electricity to customers in the franchise territory.

Gross Receipts Tax: Charged to utility companies on total revenues (e.g. 6% of gross revenues).

Payments in Lieu of Taxes: Charged to non-utility electricity providers (usually municipal owned utilities or electric cooperatives).

Property Tax (Ad Valorum): Based on the assessed value of the property.

Regulatory or Public Service Consumer Fees: Determined by the state public utilities commission and assessed on customer bills. There fees are often dedicated to specific funds like renewable energy or low income assistance programs.

Sales and Use Tax (Excise): Imposed on the retail sales price (e.g. 6% of total bill).

Severance Tax: A tax imposed distinctively on removal or natural products such as oil, gas, other minerals, timber, or fish and measured by value or quantity of products removed or sold.

Endnotes:

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