

A Historical Perspective on Energy Policy: A Time of Unusual Change and Uncertainty

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Chairman Dorgan, thank you for the opportunity to be here today. For the record, I am president of Resources for the Future (RFF), a 58-year-old research institution based in Washington, DC, that focuses on energy, environmental, and natural resource issues. RFF neither lobbies nor takes institutional positions on specific legislative or regulatory proposals.

I emphasize that my views today are my own, and not those of Resources for the Future. I have included in an appendix, however, some related key studies and forthcoming research from RFF.

In the last few years, U.S. energy markets and energy policies have undergone incredible change. Ahead, we face more significant developments and uncertainties.

Markets have seen radical price swings. World oil prices began rising above \$40 per barrel in 2004, reached an extreme peak of \$137 in July 2008, and fell back to a low of \$34.00 in January 2009. Today, prices hover above \$80. Natural gas prices in this decade made similarly radical shifts.

Rising prices energized both markets and politics. Investors, consumers, and government policy changed in significant ways. New attention has been given to efficiency and to alternatives to oil and natural gas—much as we witnessed in the 1970's.

Government efforts to influence energy markets dramatically increased with the landmark energy legislation of 2005 and 2007 and the stimulus package of 2009.

A host of mandates, regulations, and subsidies have been adopted to influence investor and consumer behavior. A variety of goals is cited for various interventions: oil security, protection of the economy, and environmental urgency, especially with regard to climate change. Congress, of course, is currently grappling with major

initiatives embodied in the House-passed Waxman-Markey bill and the proposals under construction in the Senate.

These policy actions represent a level of market intervention not seen since the 1970's.

From the mid-1980s to early in this decade, market liberalization was the prevailing view. The most significant policy initiatives were the efforts in the 1990s to restructure the electric industry to bring competition into those markets, often misnamed "deregulation." There were only a few significant federal market interventions such as adoption of the production tax credit for renewables and the advancement of appliance efficiency standards. The Clean Air Act amendments of 1990, of course, imposed significant requirements on energy industries entailing major investments, but generally the changes were achieved at less cost than previously advertised. This was especially the case with the Acid Rain Program, which imposed a cap-and-trade system on electric utilities.

Compared to the 1970s, we now have available many technologies and techniques that are already changing our energy systems or have the potential to do so. This is in no small part due to past private and public investment in technology development, heavily pushed in the 1970s by the allure of rising energy prices and government policies—technologies that did not make it into our markets after world oil prices dropped in 1986 and government incentives were either repealed or became irrelevant.

During that time the nation also was embarking on serious environmental regulation that had major effects on industry and consumer behavior. Today we are focusing on greenhouse gas (GHG) emissions, which will have a profound effect, over time, on the production, distribution, and use of energy.

Assumptions Underlying Policy in the 1970s

Oil crises in 1973 and 1979 generated intense public focus on energy markets and policy. During that decade a number of widely held assumptions about our energy future influenced much of the policy that was adopted; indeed there was also much private investment driven by the same assumptions. Some have relevance for today.

1970s Assumption: Oil Supply disruptions likely. It was widely expected that oil supplies from the Middle East were vulnerable to periodic disruption, creating major costs for our modern economies and potential security issues for the West, especially *vis a vis* the Soviet Union.

Presidents of both parties made it a high priority to achieve "oil independence." A host of policies were adopted that presumably would cut oil imports. Most knowledgeable people understood such a goal to be very challenging, requiring a

transformation of energy markets that would be costly at least in the near term, though public rhetoric often made the path sound cheap and easy.

Major public investments were made in research, development, and even deployment of technology to push the use of domestic coal, gas, oil, and nuclear power and also advance solar, wind, geothermal, ethanol, and other longer-term possibilities.

Fuel economy standards (CAFE) were adopted in 1975 as the primary measure to cut gasoline consumption. Though strongly advocated by policy wonks and by President Carter, a major gasoline tax increase was not imposed.

Emergency preparedness also became a major policy focus. The Strategic Petroleum Reserve was created but took years to fill with crude oil. This program has been sustained for decades but we still have not achieved a clear consensus on when we should use the reserve.

Among other emergency measures was a plan for rationing gasoline. Billions of coupons were printed but later torched in the 1980s. At the time, many of us doubted we could successfully manage such a system, the likes of which had last been tried during World War II in a far smaller market.

The “oil crises” generated widespread public outrage and intensely volatile politics in Washington. In 1979, the shortage of gasoline and the long lines at filling stations ignited public fury, sparking a few instances of serious social disorder. In areas facing shortage, states adopted restrictions, allowing cars to be filled only every other day depending on the odd or even last number on license plates.

It is critical to note that federal policy at the time—price and allocation controls—almost certainly contributed to the regional gasoline shortages.

Our experience since the 1970s with respect to disruptions has been far more sanguine than expected. The global oil market has been far more resilient than predicted in the face of military actions in the Middle East and political and social turmoil that limited production from other key suppliers such as Nigeria and Venezuela.

Oil dependency remains a serious security issue for the United States. Ahead, of course, the possibility remains that a terrorist or military attack on critical oil facilities in the Middle East and elsewhere could create major and lengthy disruptions with great economic cost and potentially significant consequences for political and social stability in many countries.

70's Assumption: Oil prices would rise. It was widely believed that world oil prices would continue to rise in the years ahead. Disruptions in oil supply immediately translate into price spikes, but even in the absence of disruptions, oil prices were expected to rise, though there were major differences of opinion about how far and how fast. Some believed OPEC could and would push them higher; others believed global production would “peak” in the foreseeable future.

Such an assumption about the future meant there were big opportunities for private investment in alternatives to conventional oil and provided justification for many of the government’s investments in the commercialization of unconventional fuels, which became the focus of the government’s \$88 billion Synthetic Fuels Corporation.

The radical drop in oil prices in 1986 shattered this assumption, killing all kinds of private investments, and pulling the rug out from under claims about the cost-effectiveness of various government policies, many of which were repealed or went dormant. Today, the Great Plains coal gasification project is one of the few survivors from that era.

Many observers have long cited the Synthetic Fuels Corporation and other such policies as major failures. Clearly they did not produce the intended results, though a few defenders argue the government failed to stick it out. Given the major role oil prices play, it seems highly unlikely the goals could have been met without dramatically increasing oil costs either through taxation or regulation.

But, we should also recognize that some of the technology choices on the horizon today were advanced through past government investment. Public research and investment have contributed to today’s new shale gas supplies; to the variety of transportation fuel and technology options, such as plug-in hybrids and fuel cells; to breakthroughs in lighting efficiency; to advanced designs in windmills and nuclear power plants; and to smart grid technologies and more.

It is important to say a word about government efforts to directly control prices. Early in the 1970’s price controls on domestic oil had been imposed as part of an economywide anti-inflation program of wage and price controls; the controls were retained on the oil sector when the larger program lost credibility and was ended.

Such controls proved to be counterproductive to reducing oil imports. They deterred conservation and discouraged domestic production, and, further, they disrupted the internal shipment of fuels to consumers seen in the gasoline lines of 1979. We appear to have learned the lesson of such failure. During the recent run-up in oil prices, there were no political leaders calling for price controls.

So, where will world oil prices head? That is one of the most significant uncertainties that will shape our future energy markets. In general, many observers

believe that as the world economy rebounds there will be upward pressures on price. Some analyst are even certain that we could face a major market upheaval; they expect us to reach “peak” production in the near future—a view that is not yet the conventional wisdom. And of course, there is the possibility that prices will fall back to lower levels. Only a couple of years ago, a major forecaster claimed that market fundamentals meant the markets would settle somewhere above \$40 a barrel.

Despite major domestic and international efforts by industry, government, and academia to collect and analyze data, given the scale and nature of the global oil markets, we have difficulty answering with a high degree of certainty some of the most basic questions: How large are the reserves? What is the global level of production and consumption at any given moment? And, when are prices likely to radically shift?

1970s Assumption: Domestic natural gas supply would decline. For several decades prior to the 1970s, the federal government had been regulating well-head prices for gas sold into the interstate market. As a result, segregated markets had developed for “intrastate” gas in the producing states and adequacy of supply ultimately became a problem for much of the country beyond those states. Indeed, the big interstate pipelines were required to develop curtailment plans to establish which customers could be shut out during shortages.

In 1978, the National Gas Policy Act was adopted after ferocious political fighting. It was a complicated, but in the end effective, transition out of the bifurcated markets. Prices were deregulated for new supplies. (Old gas supplies were finally deregulated in 1989, without controversy.)

In 1978, the Fuel Use Act also was passed to block the burning of natural gas as a boiler fuel, especially when used in generating electricity, thus reserving it for preferred uses such as household heating, industrial processing, and chemical feedstock. When the supply assumption was shattered by a more favorable supply picture, the act was repealed.

At the same time, Canada was moving away from the “nationalistic” policies it had adopted during the 1970s energy crises and became a major supplier for the United States.

With gas deregulation and imports from Canada, supplies became readily available. Indeed, there was much talk about the “gas bubble” and argument over when it might break.

Over the last 40 years, we have witnessed several changes in the conventional wisdom about the availability of domestic natural gas.

In the 1990s, there was a major build-out of new gas-fired electric power plants. When gas prices unexpectedly rose significantly after the turn of the century, new concerns about supply availability arose.

Indeed, the prevailing assumption during consideration of the legislation in 2005 and 2007 was that we needed to accelerate the building of liquefied natural gas terminals to bring in foreign gas and resurrect plans for an expensive pipeline to bring natural gas from the Prudhoe Bay in Alaska down to the lower 48. (In the 1970s a major, but ultimately unsuccessful effort, was made to stimulate building of the line. Special regulatory incentives were adopted and a treaty was signed with Canada to facilitate construction.)

In only the last year or two, a whole new wisdom has emerged with the demonstration that we can economically extract gas from shale. We are only beginning to sort out just how large this supply may prove; how environmental regulation, especially with respect to water, may affect its availability; and what impact such supplies may have on fuel choices for electric generation and for transportation. Unless this new wisdom is short-lived, it will certainly reshape the thinking of energy investors and policymakers. Depending on policy choices, this new supply has the potential for making our path to decarbonization easier and cheaper over the next few decades.

1970s Assumption: Economic growth is dependent on growth in energy supply.

This assumption was widely held, though vigorously contested at the time. There had been a pattern of one-to-one growth in the United States—meaning a one percent growth in GDP was accompanied by one percent growth in energy supply. For many that meant that expanding supply was the most important policy need. Others pointed to experience in Europe and Japan which suggested economic growth was not so rigidly connected to energy supply. There was almost a pitched battle between two camps: those believing we should conserve our way out of the crisis and those determined to produce our way out.

Our experience since that time demonstrates the fallacy of this assumption. The energy intensity of our economy has significantly declined because of major efficiency gains and because the character of the economy has been shifting away from industrial production toward services and the newer digital opportunities.

Among the efficiency initiatives of the 1970s, two in particular endured for several decades: CAFE in the auto sector and the Public Utility Regulatory Policies Act (PURPA) in the electric sector.

While there has long been argument over the cost-effectiveness of the fuel-economy standards compared to other policy choices, it is generally accepted that our oil use and therefore our oil imports would be higher today had we not had such a policy. Of course, now the standards are being redesigned and tightened.

PURPA, another part of the 1978 Carter Energy Act, required electric utilities, when adding generation, to buy power from cogeneration facilities and small renewable sources, when the cost estimates did not exceed new conventional generation, a determination made by each state. Today, we are still trying to encourage greater acceptance of combined heat and power systems for which Congress recently added incentives.

PURPA also sought to encourage states to reexamine how they regulated prices with a view toward achieving more efficient end use. In recent years, the Federal Energy Regulatory Commission and several states have tried a number of pricing formulations to encourage peak shaving and more persistent end-use conservation.

The fuller story of the 1970s includes a number of other efficiency policies such as tax credits for home insulation and weatherization for the poor.

Today there is far wider agreement that we still have considerable potential for efficiency gains that can reduce oil dependency, reduce carbon dioxide (CO₂) emissions, and contribute to a competitive 21st century economy.

Many studies have identified cost-effective possibilities throughout our economy, but we have learned over the years that there are many barriers to achieving such gains. Consequently, a number of policies have been put in place and are under consideration now in Congress: performance standards, tax incentives, government purchase policies, public information systems, and so on. As we adopt regulation, however, we should not lose sight of the power of price to help drive innovation, speed the adoption of efficiency technologies, and change our habits.

Today, the digital revolution is empowering us to manage energy use in our homes, businesses, commercial buildings—in every aspect of our economy—with real-time knowledge about how much energy we are using, its changing costs, and how our usage compares to best practices. Much of this “management” can be automated to reduce the decisionmaking burden many consumers want to avoid. Several years ago, the Electric Power Research Institute tagged this possibility as “prices to devices.” Digitalization is improving the efficiency of the energy industry itself. “Smart grid” is all about operating the electric grid more efficiently and reliably as well as empowering customers to more efficiently manage their needs.

Modernizing our technology not only should help us meet our energy needs and reduce our carbon emissions, it is likely to prove essential for a modern, competitive economy. But, with digitalization, of course, comes the new challenge of cyber security.

The Carbon Challenge

We are now grappling with how we should change and indeed, transform, our energy system to deal with global warming over decades ahead. Significantly cutting

emissions of GHGs is a daunting challenge—global in scope, reaching deep into our economy, and requiring a long-term focus.

In the United States and elsewhere there are major public and private efforts underway to change the way we produce and use energy. Many incentives have been put in place to advance energy efficiency, renewables and lower-carbon fuels, and to develop potentially critical technologies such as carbon capture and storage and advanced nuclear reactors.

Currently under consideration are options for how to restrict GHG emissions, especially CO₂. A number of countries have adopted regulatory policies, as have several American states. The hard challenge is to design a policy framework or architecture which will hold up over many years and change our economy in the most cost-effective way.

At this time, we appear to have a choice between two broad strategies: 1) put a rising price on carbon, or 2) regulate emitters of carbon under the current provisions of the Clean Air Act. Pricing carbon, of course, can be accomplished either by adopting a tax that rises over time or adopting a cap on emissions with allowance trading—or some combination of the two. Either strategy—pricing carbon or regulating emitters—can put us on a path to cut emissions; both will spur some level of technological innovation.

Most economists and many policy analysts, however, believe the pricing option is superior in terms of finding the least-costly emissions reductions and providing incentives for continuous technological innovation.

Of course, in judging either strategy it is critical to know the details where the devil and angels reside. In pursuing such a long-term challenge requiring persistent policy, there are a few, perhaps obvious, lessons from our previous experience.

- We should pursue a portfolio of fuels and technologies—indeed, a portfolio of policies. This is a basic conclusion of multiple studies by multiple groups. Do not put all our eggs in a few baskets, as the saying goes.
- We should periodically conduct major assessments of the effectiveness of our policies—perhaps every 4 or 5 years. Such evaluation should not only be done inside the government, but also independently of the government. This committee and other Congressional committees, naturally, will need to continue their critical oversight role.
- And, whenever possible in policymaking, we should capitalize on the dynamism competitive markets can provide in meeting our policy goals.

Appendix: Relevant Research

Forthcoming Study: Toward a New National Energy Policy – Assessing the Options

Early this summer, Resources for the Future (RFF) will be presenting findings from its study entitled *Toward a New National Energy Policy – Assessing the Options*, funded by the George Kaiser Family Foundation. The main study report is designed to offer a thorough evaluation of the effectiveness and cost-effectiveness of a variety of energy policy alternatives, in order to provide decisionmakers with a clear basis on which to develop an overarching national energy policy that deals with the twin challenges of oil security and climate change.

In particular, the study uses the Department of Energy's National Energy Modeling System to examine and score on an "apples-to-apples" basis a variety of policies designed to spur reductions in oil consumption and greenhouse gas emissions in the United States. The report is being developed in collaboration with the National Energy Policy Institute (NEPI), and draws on several technical and background papers commissioned by RFF and NEPI.

Each technical paper focuses on a type of policy investigated in the study, including:

- Transportation policies such as fuel taxes, fuel economy standards, and feebates, as well as an emphasis on liquefied natural gas-fueled heavy trucks;
- Policies to promote deployment of hybrid, plug-in hybrid, and electric vehicles;
- Energy efficiency policies, such as building codes and subsidies versus financing of geothermal heat pumps;
- Carbon pricing policies (both cap-and-trade systems and carbon taxes);
- Policies such as clean energy portfolio standards that mandate electricity generation from renewables and other lower-carbon sources; and
- Policies (loan guarantees) to spur expansion of nuclear power generation.

(Some of the above policies are examined with and without newly expanded resources of natural gas.)

The report launch is currently scheduled for late June 2010, at which point a comprehensive Executive Summary will also be available.

Recent RFF Research on Energy and Climate

Recent RFF research addresses a number of questions central to the development of climate and energy policy. Topics include:

Options for regulating greenhouse gases through the Clean Air Act

- *Greenhouse Gas Regulation under the Clean Air Act: Structure, Effects, and Implications of a Knowable Pathway*
Nathan Richardson, Arthur G. Fraas, Dallas Burtraw
RFF Discussion Paper 10-23, April 2010

The economic impacts on U.S. industries from placing a price on carbon

- *Impact of Carbon Price Policies on U.S. Industry*
Mun Ho, Richard D. Morgenstern, and Jhih-Shyang Shih
RFF DP 08-37, December 2008

The regional and distributional impacts of different allowance allocation approaches

- *The Incidence of U.S. Climate Policy: Alternative Uses of Revenues from a Cap-and-Trade Auction*
Dallas Burtraw, Richard Sweeney, Margaret A. Walls
RFF DP 09-17-REV, June 2009

The relative merits of a carbon tax versus a cap-and-trade approach

- *Should the Obama Administration Implement a CO₂ Tax?*
Ian W.H. Parry, RFF IB 09-09, April 2009

The impact of a price collar on greenhouse gas emissions and the costs of climate policy

- *A Symmetric Safety Valve*
Dallas Burtraw, Karen Palmer, and Danny Kahn
RFF DP 09-06, February 2009

- *Alternative Approaches to Cost Containment in a Cap-and-Trade System*
Harrison Fell, Richard D. Morgenstern, RFF DP 09-14, April 2009

The economic and legal implications of different approaches to protecting energy-intensive, trade-sensitive U.S. industries under a U.S. carbon policy

- *Comparing Policies to Combat Emissions Leakage: Border Tax Adjustments versus Rebates*
Carolyn Fischer and Alan Fox, RFF DP 09-02 , February 2009

The long-term effect of newly increased U.S. natural gas supplies on carbon emissions

- *Natural Gas: A Bridge to a Low-Carbon Future?*
Stephen P.A. Brown, Alan J. Krupnick, Margaret A. Walls
RFF IB 09-11, December 2009

The potential role of tropical forests as a source of offsets

- *Forest Carbon Index: The Geography of Forests in Climate Solutions*
Adrian Deveny, Janet Nackoney, Nigel Purvis, Mykola Gusti, Raymond J. Kopp, Erin Myers Madeira, Andrew R. Stevenson, Georg Kindermann, Molly K. Macauley, Michael Obersteiner, RFF Report, December 2009

The effects of cellulosic fuel mandates on U.S. timber markets

- *The Implications of Increased Use of Wood for Biofuel Production*
Roger A. Sedjo, Brent L. Sohngen, RFF IB 09-04, June 2009

The cost-effectiveness of energy electricity efficiency programs

- *Cost-Effectiveness of Electricity Energy Efficiency Programs*
Toshi Arimura, Richard G. Newell, Karen L. Palmer
RFF DP 09-48, November 2009

Other Relevant Studies

Published Studies:

- Council on Foreign Relations. 2006. *National Security Consequences of US Oil Dependency*. Washington, DC: Council on Foreign Relations.
www.cfr.org/content/publications/attachments/EnergyTFR.pdf
- Deutch, John and Ernest Moniz, co-chairs. 2003. *The Future of Nuclear Power*. Cambridge, MA: Massachusetts Institute of Technology.
<http://web.mit.edu/nuclearpower/pdf/nuclearpower-summary.pdf>
- Deutch, John and Ernest Moniz, co-chairs. 2007. *The Future of Coal*. Cambridge, MA: Massachusetts Institute of Technology.
http://web.mit.edu/coal/The_Future_of_Coal.pdf
- National Commission on Energy Policy. 2004. *Ending the Energy Stalemate*. Washington, DC: National Commission on Energy Policy.
<http://bipartisanpolicy.org/library/report/ending-energy-stalemate> NOTE: A number of other topical studies are available on the NCEP website.
- National Petroleum Council. 2007. *Hard Truths: Facing the Hard Truths About Energy*. Washington, DC: National Petroleum Council.
<http://www.npchartruthsreport.org/>
- National Research Council. 2009. *America's Energy Future: Technology and Transformation*. Washington, DC: National Academies Press.
<http://sites.nationalacademies.org/Energy/index.htm>
- Revis James, Richard Richels, Geoff Blanford and Steve Gehl. 2007. *The Power to Reduce CO2 Emissions: The Full Portfolio*. Palo Alto, CA: Electric Power Research Institute. MERGE/PRISM analysis available at
<http://mydocs.epri.com/docs/public/000000000001019563.pdf>

Forthcoming Studies:

- Deutch, John, Chair. *The Future of Solar Energy*. Cambridge, MA: Massachusetts Institute of Technology.
<http://web.mit.edu/mitei/news/spotlights/solar-future.html>
- Kazimi, Mujid and Ernest Moniz, co-chairs. *The Future of the Nuclear Fuel Cycle*. Cambridge, MA: Massachusetts Institute of Technology.
<http://web.mit.edu/canes/research/fuelcycle.html>
- The National Academies. *America's Climate Choices*.
<http://americasclimatechoices.org/>

Phil Sharp
President, Resources for the Future

Since September, 2005, Phil Sharp has been president of Resources for the Future (RFF), an independent research institution.

Previously, he served 10 terms as a member of the U.S. House of Representatives from Indiana (1975–1995) and had a lengthy tenure on the faculty of Harvard’s John F. Kennedy School of Government where he also served as Director of the Institute of Politics.

Currently, he is serving on the Department of Energy’s Blue Ribbon Commission on America’s Nuclear Future and on the National Academies panel studying “America’s Climate Choices.”

He is a member of the MIT Energy Initiative External Advisory Board as well as the International Advisory Board of the Harvard Environmental Economics Program. He chairs the External Advisory Committees for both the MIT Nuclear Fuel Cycle Study and the MIT Future of Solar Energy Study. Previously, he chaired the advisory committees for MIT’s studies on the Future of Coal and on the Future of Nuclear Power.

Sharp also serves on the Board of Directors of the Duke Energy Corporation and the board of the Energy Foundation and is the congressional chair for the National Commission on Energy Policy.

Sharp received his undergraduate degree from Georgetown University’s School of Foreign Service as well as his Ph.D. in government.