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A Framework for a New U.S. Energy Policy

William O'Keefe, CEO, and Jeff Kueter, President

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"The dogmas of the quiet past are inadequate to the stormy present.
The occasion is piled high with difficulty, and we must rise with the occasion.
As our case is new, so we must think anew and act anew."[1]

President Abraham Lincoln

Executive Summary

Growing dependence on imported oil during the 1960s and 1970s and the OPEC oil embargo of 1973 thrust energy into the forefront of the public's attention. In the ensuing 40 years, no fewer than seven energy policy acts and numerous regulatory initiatives related to energy have been enacted. The goals of each were two-fold: (1) to improve energy security, which was first defined as the pursuit of "independence" and eventually was relaxed to the more general objective of diversifying sources of supply; and (2) to develop non-fossil energy sources to meet the nation's energy needs to ameliorate environmental impacts. For the most part, federal energy initiatives have fallen short of their goals, have had numerous unintended consequences, and have done more harm than good.

A rethinking of the principles and approach to energy policy is seriously needed. The opportunity to do so is at hand, thanks to private sector innovation and technological breakthroughs. The situation faced today is new—the Americas are said to have the potential to achieve hemispheric energy self sufficiency—and that situation demands that we "think anew and act anew," as President Lincoln once encouraged the nation to do under different circumstances. Even if expectations for the energy reserves in the U.S. and Canada prove optimistic, a re-examination of the goals, programs, and processes used in energy policymaking is needed.

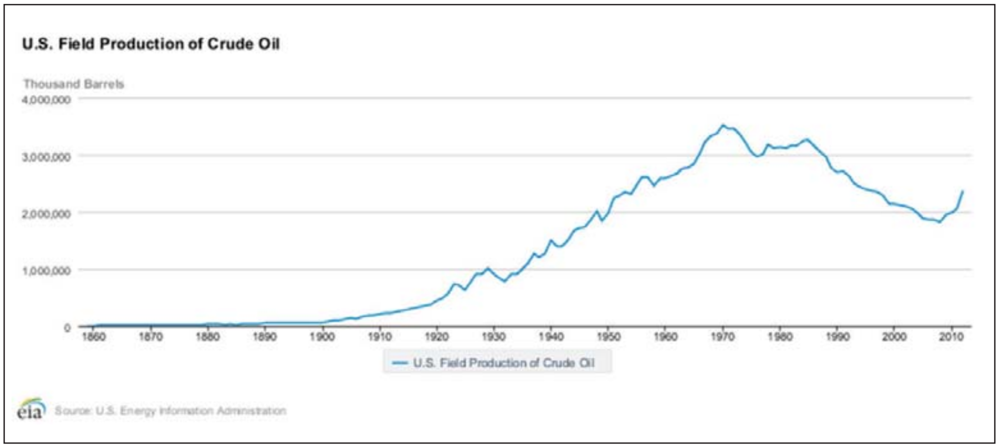
The basic lessons learned over the past two decades are that:

- markets do work;
- government actions should focus on aiding their workings, not supplanting or redirecting them or imposing barriers based on ideology;
- abundant, competitively priced energy is essential for robust economic growth;
- subsidies or similar industrial policy actions generally do more harm than good; and
- a collaborative relationship between government and private industry should be built on the comparative advantages of each.

For too long, energy policy has pursued the illusion of energy independence; an impractical aspiration beset with unintended consequences. In an interconnected world economy, dependence is a fact of life. The real issue is not dependence, but the level of risk that accompanies dependence. Going forward, oil imports should be viewed as

a risk management issue and dealt with accordingly. Less than a decade ago, dependence on oil imports was projected to reach 62% by 2020,[2] and only a few years ago, it was predicted that the United States was destined to become a large importer of natural gas.[3] That outlook has radically changed because of advances in technology and the high price of oil. Domestic oil production has reached a nine-year high[4] (see Figure 1) and could go higher, and natural gas reserves are judged to be adequate to meet needs for a century.[5]

Figure 1. Domestic Production of Crude Oil, 1860-2013



Concerns about environmental impacts from energy production and use are an increasingly salient public and political issue. Undoubtedly, there are environmental consequences, but like dependence, if society wishes to enjoy the benefits provided by energy some amount of environmental impact is inevitable. Also like dependence, a risk management approach offers effective options for managing these environmental concerns.

Fossil energy will remain the dominant source of energy for decades to come despite government policies to promote "alternative energy" sources. Acceptance of that fact provides a foundation for an energy policy based on economic and technology realities. Since energy is to the economy what oxygen is to the human body, policy should encourage abundance while taking into account national priorities that may be impacted by energy development. Under such a framework, government would stop efforts to pick winners, support long term basic research to promote knowledge creation, strive for balance in energy related regulation, and look for the least-cost option for addressing externalities, including environmental impacts.

Rethinking national energy policy should also involve recognition of the uses and limits of long-range planning, the need for flexibility, the importance of a "look back" capability, and the increased potential for innovation that results from research and technology.

Introduction

U.S. energy policy is at a crossroads. Predicated since the 1970s on the assumption that foreign dependence, scarcity, and environmental externalities demanded government intervention, the federal government has grown a byzantine architecture of regulations, subsidies, loan guarantees, supports, mandates, and research and development intended to shape how Americans use energy and the types of energy they consume. The 2012 presidential election focused both political parties on energy as each saw gains to be made in framing the content and composition of their competing visions of the nation's energy future. President Obama has made energy and climate issues a focal point of his second term agenda. Unfortunately, the current tenor of what constitutes U.S. energy policy discourse differs little from its antecedents, fails to fully appreciate the implications of the transformation that is underway, and implicitly rejects the need to "think anew and act anew."

> *In sum, the pursuit of alternatives has defined U.S. energy policy for decades, resulting in the spending of hundreds of billions of taxpayer dollars and implementation of countless regulations. Despite this effort, the alternative energy sources supported are still not capable of providing significant shares of U.S. energy supply because they remain non-competitive and lack the attributes that make fossil energy preferable.*

Fundamental drivers of past energy policies—the pursuit of security, the fear of scarcity and environmental degradation—have all shifted in ways that demand reevaluation of basic assumptions and the actions based on them. Since the 1970s, ensuring that energy supplies were secure and abundant were the principal goals of U.S. policy. The OPEC oil embargo focused American attention on where our energy came from and prompted policy makers to support policies and programs intended to reduce American dependence on imported oil. Military action in the Persian Gulf in the 1990s to the present and the terror attacks of September 11, 2001 further reinforce concerns that the import of oil from the region creates a security dilemma for the United States. The drive for independence from Middle Eastern oil, coupled with concerns about long-term supplies of fossil fuels, created opportunities for those who saw the energy future dominated by alternatives to fossil fuels—synthetics, nuclear and renewables, principally—to construct a policy regime extending supports and subsidies to overcome the perceived competitive and technical obstacles to their widespread adoption.

As concerns about the environmental consequences of energy use intensified, further impetus was supplied to the push for alternative energy sources, allowing for the expansion of government assistance to their development through direct and indirect financial supports and government mandated markets for their use. Aiding this trend was the adoption of ever more stringent environmental regulations on conventional energy sources, which succeeded in improving environmental quality, but which also were intended to raise the cost of operating conventional sources vis-à-vis alternatives. In sum, the pursuit of alternatives has defined U.S. energy policy for decades, resulting in the spending of hundreds of billions of taxpayer dollars and implementation of countless regulations. Despite this effort, the alternative energy sources supported are still not capable of providing significant shares of U.S. energy supply because they remain non-competitive and lack the attributes that make fossil energy preferable.

But, a fundamental shift in energy is underway. Driven by technical breakthroughs, robust supplies of unconventional petroleum and natural gas are now price competitive with conventional crude oil and coal. Affordable and abundant energy supplies from large reserves of both unconventional oil and natural gas found in the U.S. and Canada suggest both energy security and supply scarcity are less pressing problems than previously thought. Environmental concerns remain, but the steady improvement in key indicators of air and water quality suggests that existing regulations are more than sufficient to address those externalities.

These facts necessitate changed thinking about energy policy. A major flaw of past energy policies is their lack of flexibility. Seven energy policy acts laid out goals, timetables, and means without regard to uncertainties, either economic or technological. Policy should allow for adjustment as circumstances change and new knowledge becomes available. In business, plans are routinely updated and adjusted. An effective energy policy should as well. In the 1960s, James Schlesinger, an analyst at the Rand Corporation who would become Secretary of Defense, Secretary of Energy, and CIA Director, wrote an insightful paper that dealt with defense planning and uncertainty, but it has broader utility. Schlesinger argued:

> *Very roughly, one can distinguish between two general approaches to planning. Cook's-tour planning rests... on the supposition that the future is sufficiently certain that we can chart a straight course years in advance. By contrast what may be termed Lewis-and-Clark planning acknowledges that many alternative courses of action and forks in the road will appear, but their precise character and timing cannot be anticipated. Neither the size of commitment nor even the direction of movement should be stipulated too far in advance. ... Retrospectively one may map what has taken place; but the planning function is not to chart a precise course of action. Rather it is to prepare to cope with the uncertain terrain of the future, to note the signs in the environment showing that a decision point has been reached, and to respond in a timely fashion. Wherever uncertainties are substantial the balance should shift in the direction of Lewis-and-Clark planning. ...The appropriate planning concept is one that is conducive to (1) facing uncertainties ... and (2) hedging against uncertainties .... Nevertheless, in all bureaucracies there are strong pressures to go too far in the quest for Cook's-tour planning.*[6]

An approach like the one outlined by Schlesinger will not be easy to implement. Governmental bureaucracies, the Congress, and rent-seeking private entities all can be expected to work against a neutral framework in favor of approaches they can manipulate to their own preference and benefit. But, unless a more effective energy planning approach is adopted, the nation will continue to squander scarce resources and fall short of achieving substantial economic and energy benefits.

An energy policy framework reflective of these principles would not set mandates, would not subsidize or otherwise financially prop up projects or technologies, and would not manipulate the tax code or the regulatory process to preferentially treat one approach over another. It would recognize that, based on experiences, markets do work. Instead, government should support public and private knowledge creation and diffusion and structure its tax approaches to encourage private investment in new capital stock without regard to content. Government's regulatory framework should be transparent and balanced, based on the perspective that treats energy policy as a risk management issue. Under such an approach, the government actively encourages investment in new knowledge by itself and the private sector, aids the diffusion of knowledge into private hands, and provides inducements for that knowledge to find its way into productive uses. But, government would act in a way that allows private actors to assess the commercial potential of particular approaches, bear responsibility for the risks of failure, and reap the rewards of success. This starkly contrasts with the industrial policy approach of the past 40 years.

Energy Politics and Energy Realities

Since the 1970s, public (and policymaker) interest in energy policy relates directly with the price of energy.[7] Interest in energy issues moves in tandem with energy prices. When prices are high, interest intensifies as the public worries about their wallets and their worry causes policymakers to become concerned about their constituents' welfare as well as their own political futures. When prices and tensions fall, interest in energy generally ebbs. Ongoing concerns about the prospect of military action against Iran's nuclear ambitions, Syria's civil war, and general unrest in the Middle East in the aftermath of the Arab Spring focus attention on the stability of foreign supply with the expectation that those tensions will cause prices to rise.

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The degree to which energy policy has become a venue wherein the political parties and candidates can score gains against each other was amply demonstrated during 2012.[8] President Obama outlined his thinking on energy issues at a speech at the University of Miami on February 23, 2012.[9] Not to be outdone, Governor Romney detailed his vision of the nation's energy future in late August 2012. Republican legislators and presidential candidates excoriated the President and his Administration for its support of loan guarantees to Solyndra and other failed "green" energy firms. A run-up in gasoline prices earlier in the year took a toll on the President's polling numbers as well, providing increased incentive to his political opponents to focus on the issue.[10]

After the election, President Obama continued to highlight energy issues. In June 2013, a presidential advisor called the new emphasis on climate change "a legacy issue" for President Obama.[11] In his 2013 State of the Union address speech, he acknowledged the progress made to expand domestic production of energy and committed the United States to an "all-of-the-above plan" to achieve cleaner power and greater energy independence.[12] Tempering those commitments are plans to curtail climate change through legislative or executive action with the goal to "speed the transition to more sustainable sources of energy." In September, the Environmental Protection Agency (EPA) released new rules governing coal-fired power plants, prompting some to ask whether coal has a future.[13]

The current attention paid to energy, however, reflects an old debate. Drawing its origins from the 1970s oil crises and from concerns over the environmental and security externalities of fossil fuel use, a coalition of environmentalists and national security analysts joined domestic economic interests to lobby for policies and programs to ostensibly improve energy security and aid the environment through the greater exploitation of domestic energy reserves and development of alternative transportation fuels, vehicles, and energy sources.

An objective of many such measures is to move the U.S. off of fossil fuels or, put more euphemistically, to "go green." Investments in renewable energy (solar, wind, biomass, etc.) and regulations on fossil fuels are a core element of the "go green" energy strategy. As global warming emerged on the national stage in the late 1980s and early 1990s, demands for regulations on and alternatives to coal and natural gas as sources of electricity intensified, as did focus on alternative transportation fuels (such as ethanol) or the electrification of the transportation system. Together, energy security and environmental protection provided the rationale for federal and state policies to preferentially treat renewables and other non-fossil fuel approaches through a portfolio of regulations, subsidies, mandates, and other mechanisms. These actions were intended to indirectly induce or directly force electric utilities to use particular technologies. In the transportation sector, the combination of federal regulations to increase fuel efficiency of vehicles, guaranteeing market share to alternative fuels, federal investment and subsidization for new vehicle technologies and alternative fuels, and preferential tax treatment for new vehicles (such as the Chevy Volt) forms the structure of the "off oil" strategy.

Altering the patterns of energy supply and demand involves a multitude of factors, but energy policy remains largely a political exercise and, as such, rarely has the consistency and seriousness of effort to overcome the economic and technological forces that influence energy consumption over the long run. Notable recent examples of politically driven energy policy are the Solyndra loan guarantees and President Obama's decision to delay the Keystone XL pipeline offer. In the case of Solyndra, senior Obama Administration officials directed federal loan guarantees to a company whose financial prospects made it an unworthy candidate for such assistance. Solyndra had been touted by the President as a green company of the future, and it served as a symbol for the transformation of the energy sector from fossil fuels to renewable energy. Solyndra is not an isolated case. The Obama Administration allocated billions of dollars to its preferred energy technologies in hopes that federal support will speed their maturation and market adoption.[14] Such behavior is not unique. Other presidents, both Republicans and Democrats, have used similar tools to advance technologies and preferentially treat industries. Solyndra's collapse does highlight the costs and risks ultimately borne by the taxpayer from these interventions into the energy marketplace.

The President's 2012 decision to delay[15] the Keystone XL pipeline to carry Canadian petroleum to the U.S. came after months of intense scrutiny and lobbying by environmental groups. Many environmental organizations were particularly disappointed with the State Department's grant of approval to the project to proceed. Some even had characterized it as a watershed decision for environmentally conscious voters. In that context, the President's action was not surprising. Several months after the elections, environmental groups gave credence to this assessment by mobilizing a major public campaign in the wake of a new State Department assessment and U.S. Senate's endorsement of the project.[16] As of the fall of 2013, a "final" decision from the President still has not been made.

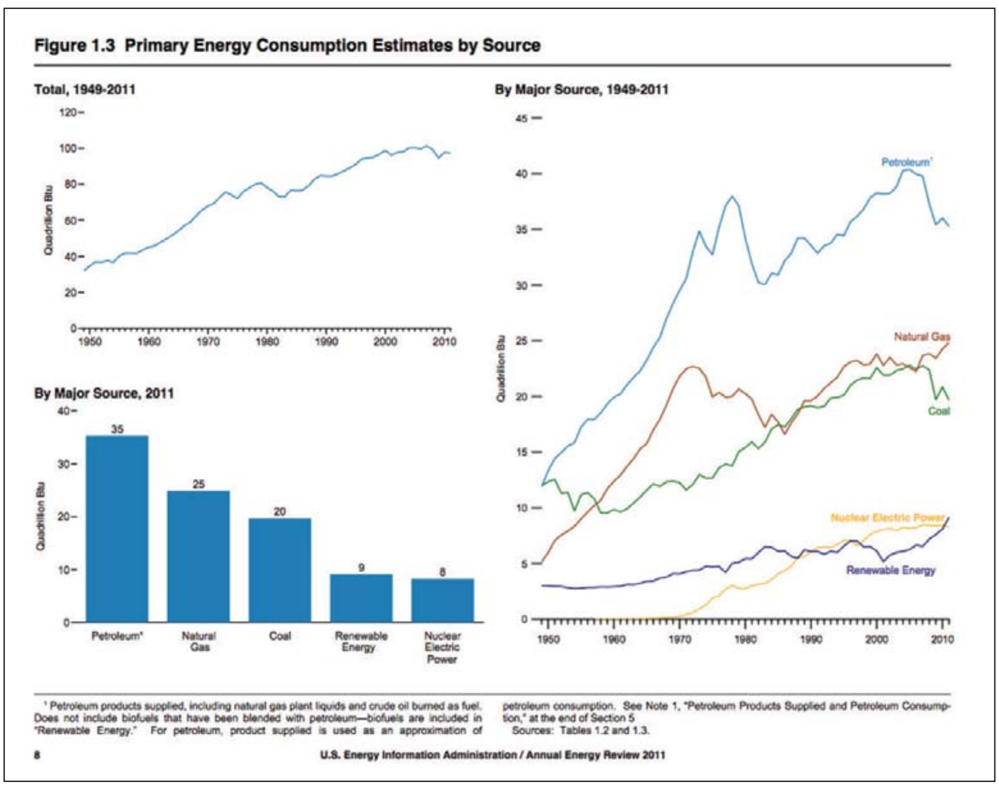
Other notable examples of politically motivated energy policies are:

- In 2011, President Obama set a goal for 80% of the country's electricity to come from "clean energy sources" by 2035.
- Also in 2011, the President called for 1 million electric cars on U.S. roads by 2015.
- President George W. Bush supported a 5-year, $1.2-billion Hydrogen Fuel Initiative.
- President Bush also imposed a moratorium on off-shore drilling, hampering the effort to reduce imports of petroleum.
- The Energy Policy Acts of 2005 and 2007 created and expanded the Renewable Fuel Standard that requires a certain percentage of the nation's gasoline supply come from biofuels with specific goals for specific kinds of biofuels. The 2007 Act allows the Environmental Protection Agency to set annual goals with a steady increase to an overall level of 35 billion gallons in 2022.
- President Clinton launched the Partnership for a New Generation of Vehicles, which sought to leverage federal research and development support to develop vehicles capable of 80 mpg.
- Presidents Ford and Carter championed the Synfuels Corporation, which spent billions of dollars without useful results.
- In 1974, President Nixon launched Project Independence and with it a host of initiatives designed to eliminate U.S. petroleum imports by 1980.

All these initiatives were doomed to failure. The reason is simple. The prevailing policy framework ignores basic realities about the operation of the energy marketplace and how technology is adopted, while assuming that government can influence the direction and character of the energy market and change consumer preferences through its regulatory power and subsidization of preferred technologies.[17] This interventionist mind-set achieves results only at great cost and with fleeting success.

Figure 2 offers broad illustration of this point. It shows the patterns of U.S. energy consumption since 1970. If federal intervention into the energy market were successful, one would expect to see noticeable shifts from coal, petroleum, and natural gas towards renewable fuels and nuclear energy. The patterns show that the share of energy provided by nuclear and renewables has grown over time to approximately 17% of present energy consumed. The bulk of that figure is nuclear power, which has benefited enormously from government support. Still, natural gas, coal, and petroleum provide over 80% of the energy consumed in the U.S. even after decades of support to alternatives to their use.

Figure 2. U.S. Energy Consumption Patterns, 1949-2011



Energy Information Administration (EIA) projections show this pattern is expected to hold in the decades to come. Assuming the continuation of current laws and regulations, the EIA projected petroleum use will comprise 78% of the nation's transportation fuel in 2035, even with significant growth in renewable and other liquid biofuels. For electricity, in 2010, fossil fuels provided 70% of the nation's requirements, with nuclear providing 20% and renewables 10%. EIA predicts a shift in these shares by 2035: fossil fuels will provide 67%, nuclear 15%, and renewables 18%. The future of nuclear power in the United States is in question, providing an opportunity for renewables to expand their share of the electricity market, but fossil fuels remain the dominant provider of the nation's electricity needs.[18]

Similar patterns are revealed when the focus shifts to global demand of energy. The International Energy Administration (IEA) projects coal, oil, and gas will provide more than 75% of global energy demand in 2035 under current policies.[19]

These projections reflect several persistent trends. First, worldwide demand for energy is on the rise. Estimates from the IEA, the EIA, and private entities all agree that global demand for energy will increase markedly in the decades to come as developing countries modernize their residential and industrial systems, and as consumers and industry in China, India, and elsewhere expand their energy consumption. The global growth in energy consumption comes even as the European and North American economies continue their slow projected growth. World energy demand is expected to jump 32% between 2010 and 2040, with all of the growth foreseen in non-OECD countries. Energy demand in Africa and India more than doubles over the period, China's demand jumps 35%, and Latin America's demand is up over 73%.

Figure 3. Projected World Demand for Energy

World	Energy Demand (Quadrillion BTUs)				
Regions	1990	2000	2010	2025	2040
World	**360**	**415**	**525**	**633**	**692**
OECD	189	224	227	234	224
Non OECD	171	191	298	400	469
Africa	17	22	29	44	62
Asia Pacific	91	125	205	267	301
China	33	44	102	132	138
India	13	19	28	45	61
Europe	74	79	81	82	78
Union	68	72	73	73	69
Latin America	15	20	26	36	45
Middle East	11	18	30	42	51
North America	95	114	113	118	112
United States	81	96	94	96	90
Russia/Caspian	57	38	42	43	43

Source: International Energy Agency

Second, scalability and technical maturity are critical, but largely overlooked, variables when comparing alternative energy sources. Demands to replace the current fuel base with alternatives must be evaluated on the basis of their ability to expand to meet the projected demand. The ability to expand is influenced both by the technical maturity of the option and its business case. The business case is frequently closed with government assistance in the form of direct subsidization or through market manipulation, with obvious costs to consumers and the economy. Questions of technical maturity and scalability may prove more compelling. Many alternatives, such as cellulosic ethanol, do not have the capacity to expand sufficiently to make a significant contribution to meeting energy demand. Others face seemingly insurmountable physical barriers. And still others require additional technical work before they can reliably provide energy in the consumer market.

For the United States, the EIA estimates that 235 gigawatts will be added to the electricity base by 2035. Sixty percent of that additional electricity will be generated by natural gas, while 27% will come from wind and biomass used to generate electricity. Those statistics mask the dramatic growth that must occur to meet that projection. Natural gas presently provides 350 gigawatts of electricity and the EIA projects 142 gigawatts of additional electricity will be provided by gas in 2035, for a growth rate of nearly 50%. Wind and biomass, on the other hand, presently provide 55 gigawatts and they are projected to add 74 gigawatts by 2035 for a growth rate of greater than 100%.[20]

In the transportation area, similarly optimistic assumptions exist. Present renewable fuel standards that call for 35 billion gallons of biomass fuels to be provided in 2022 almost certainly will not be met. Current projections forecast a shortfall of approximately 10 billion gallons in 2022, despite billions in expenditures in support of biofuels through R&D, subsidies, and the tax code.[21] The EIA forecast contends the threshold of 35 billion gallons will only be met in 2035 if cellulosic ethanol enters the market successfully.[22] Cellulosic fuels, while holding great potential, face significant scientific and technical obstacles to their commercialization, making the EIA forecast optimistic.[23] Indeed a recent National Academy of Sciences review concluded that "no proven commercial-scale technologies were available for converting lignocellulosic biomass to fuels."[24]

Third, government intervention into the energy marketplace is inefficient, costly, and may not elicit the technical breakthroughs desired. The successful transformation of the energy economy from fossil fuel dependent sources of energy to non-fossil sources depends, in large part, on overcoming the aforementioned technical and scalability variables. Government support for technology development and research and development (R&D) is seen as a key enabler for this transformation. A critical review of government R&D policy would reveal key differences between the current set of circumstances and examples of successful government action. Among the most notable is the subsequent role of government as the principal buyer for the technology. In the most successful examples of government-sponsored R&D becoming a commercially viable product, there is an intermediate period where a government agency (usually the military or space programs) purchases the newly emerged commercial product regardless of price because of its utility to a government mission or objective. While efforts to use the Defense Department as an incubator for energy transformation are growing, experience suggests that transitioning any newly emerging energy source will face difficulties in sustaining itself in a competitive market.

Energy and Prosperity

Economic growth is a result of production, which is a function of labor, capital, energy, productivity, and ingenuity. Each element is essential to success. Put another way, economic activities across the spectrum of industries depend on power and mobility to produce and distribute the "goods" that are "produced." The traditional view holds that "Energy is a fundamental input in our economy, essential for running our country's factories, shipping the Nation's output, and ringing up the sales."[25] Professor John Moroney of the University of Texas similarly observed:

> *Why is commercial energy so vitally important in the United States? The reasons are straightforward. Factories must have energy from natural gas, refined oil products, coal, or electricity. Modern cars, trucks, buses, railroads, airplanes, and ships require gasoline, diesel fuel, jet fuel, or bunker fuel. Modern agricultural equipment cannot run without diesel fuel, and we rely on natural gas, heating oil, and electricity to maintain comfort in our homes, hospitals, and offices.*[26]

The Encyclopedia of Energy includes a survey article by David Stern of Rensselaer Polytechnic Institute which observes that "energy use and the level of economic activity are found to be tightly coupled."[27]

In view of this tight coupling, the test of an energy policy is the strength of its contribution to economic growth. As a nation, the United States has come to expect average economic growth of somewhere between 3% and 4%. Between 1982 and 2006, average economic growth was 3.5%, which is consistent with maintaining full employment and rising standards of living. Such growth rates are needed to meet expectations for rising standards of living and employment rates of a growing population. Indeed, the deep recession of the past several years reveals plainly the consequences on American families of inadequate growth.

A nation's economy prospers when it can easily and competitively engage in commerce—the buying and selling of goods and services. As a general principle, the larger is the scope of commercial activities, the more robust a nation's economy. The abundance of natural resources, including energy, combined with an open economic system, entrepreneurs, and highly trained work force has enabled the U.S. to develop a diverse range of commercial activities. In addition, because of the United States' large land mass and low population density, economic activities require abundant and affordable energy.

Expanding Demand for Energy in the Information Economy

"The information economy is a blue-whale economy with its energy uses mostly out of sight. Based on a mid-range estimate, the world's Information-Communications Technologies (ICT) ecosystem uses about 1,500 TWh of electricity annually, equal to all the electric generation of Japan and Germany combined—as much electricity as was used for global illumination in 1985. The ICT ecoystem now approaches 10% of world electricity generation. Or in other energy terms—the zettabyte era already uses about 50% more energy than global aviation."

"The growth in ICT (energy demand will continue to be moderated by efficiency gains. But the historic rate of improvement in the efficiency of underlying ICT technologies started slowing around 2005, followed almost immediately by a new era of rapid growth in global data traffic, and in particular the emergency of wireless broadband for smartphones and tablets. The inherent nature of the mobile Internet, a key feature of the emergent Cloud architecture, requires far more energy than do wired networks. The remarkable and recent changes in technology mean that current estimates of global ICT energy use, most of which use pre-iPhone era data, understate reality. Trends now promise faster, not slower, growth in ICT energy use."

"Electricity fuels the infrastructure of the world's ICT ecosystem—the Internet, Big Data and the Cloud."

Excerpts from Mark Mills, The Cloud Begins With Coal (August 2013), http://www.tech-pundit.com/wp-content/uploads/2013/07/Cloud_Begins_With_Coal.pdf?c761ac&c761ac

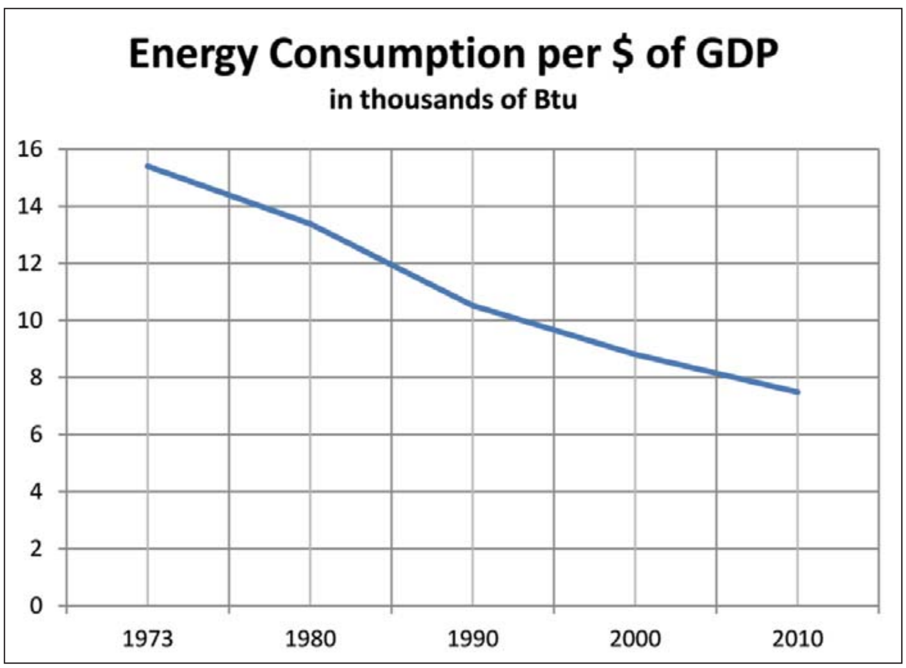
Over the past 50 years, the composition of U.S. economy has changed significantly, shifting from a heavy emphasis on manufacturing, along with agriculture and construction, to one reflecting the growth of the service and information technology industries. As the composition of the economy has evolved, so has the use and mix of energy. Manufacturing, which is energy intensive, uses energy both to produce goods and to transport them. For the service and information technology industries, the transportation of ideas, information, and skills is just as essential as it is for the movement of physical goods. There, the transport is provided primarily by electricity consumed in moving data and information. Looking to the future, an effective energy policy contributes to economic prosperity by ensuring access to both abundant and cost competitive supplies of electricity and transportation fuels.

The patterns of energy use reflect these structural shifts (see Figure 2). In the 1970s when the first oil shocks occurred, American industries and economic activity were oil-driven. Sixty percent of economic activity was directly dependent on oil and products based on oil, such as plastics. In the intervening years, that dependency has dropped dramatically. Today, 60% of economic activity, instead of being dependent on oil-based products, depends on electricity generated principally from coal and natural gas.[28] The nation's transportation needs are still wholly dependent on petroleum, but productive economic activity elsewhere draws its energy from a variety of other fuel sources.

Robert Bryce in his book, *Power Hungry*, cites a railroad lawyer who asserted that "without transportation, there is no commerce." Bryce observes that: "… the global transportation system depends almost exclusively on oil. No other substance provides such high energy with such incredible versatility."[29] Mobility is an important economic and social value. While it is clear that mobility is an important value for commerce, it is easy to lose sight of why it is also an important personal value. Past policies have put an emphasis on fuel efficiency, accomplished by downsizing and discouraging driving. But, personal mobility eliminates constraints on where citizens live and how and where they work. Freedom of movement is an important societal value. While the information economy is fueled by electricity, oil remains an important part of the nation's energy budget because it is the primarily transportation fuel. Hence, it is important that energy policy not adversely impact mobility and impose unnecessary costs on either personal or commercial transportation.

Similarly, the economy's intensifying use of electricity necessitates a broad awareness of the drivers of innovation and cost in that sector. The nation's climate change policies, in particular, will have enormous impact on the evolution of this sector in the coming years. The Obama Administration's recent decision to impose new restrictions on coal-fired electricity offers just a recent example of how government policies attempt to dictate the composition of electricity generation.

Figure 4 – U.S. Energy Intensity Trends, 1949-2010



Trends in the relationship of energy use to GDP—or energy intensity—over time offer important lessons for evaluating national energy policy. From the 1970s forward, the U.S. has consistently reduced its energy intensity ratio, as shown in Figure 4. This reduction is the product of the continuous introduction of new technologies that generate greater economic output for the same amount of energy use as well as structural changes in the economy, such as the movement away from heavy manufacturing to less-intensive service industries.[30] The widening gap between increases in GDP growth and energy use demonstrates that the economy is using energy differently than before. The trend reflects the technological transition that has occurred over the past several decades—the shift toward a silicon economy, the relative decline of hard manufacturing, and the growth of the service sector. Those increasingly important economic activities do not use less total energy, but they are more productive in how they convert energy into economic growth, which has allowed for GDP to rise faster than energy consumption.

There is also a degree of inevitability to the trends. As human activity has evolved from subsistence to industrialization to silicon, this transformation is aided, and it may be argued, driven, by discovery and utilization of improved power sources. The amount of energy used per unit of GDP consequently has been falling for thousands of years.[31] Better understanding of the implications of this trend and the forces driving it are needed to improve upon the ad hoc nature that has come to characterize U.S. energy policymaking.

Ad Hoc Policy, Ad Hoc Results

U.S. energy policy pursues twin goals. On one hand, since the 1970s, policy makers have acted to move policy towards "energy independence." Independence was believed to insulate the American economy and U.S. security interests from the vagaries of manipulation of the world oil market by foreign countries and oil traders. On the other hand, concerns about the environmental impact of fossil fuel use gave rise to a new perspective about energy policy. Both goals seek to monetize an externality of energy use, when put in economic parlance. The market price of energy, it is argued, fails to adequately represent these added costs of the prevailing mix of energy used. That rationale is used to justify additional government intervention in the energy market through taxes, price supports, subsidies, market share mandates, and research and development to raise the price of fossil fuels and achieve greater diversification of energy supplies. But, these justifications conveniently ignore the effects of regulations in internalizing externalities.

Over the past 40 years, federal and state governments have passed laws and regulations aimed at improving environmental quality. Those efforts, and the economic and technological developments over the period, have greatly reduced pollution and improved environmental quality. According to the annual *Almanac of Environmental Trends*

> *The chief drivers of environmental improvement are economic growth, constantly increasing resource efficiency, technological innovation in pollution control, and the deepening of environmental values among the American public that have translated to changed behavior and consumer preferences. Government regulation has played a vital role, to be sure, but in the grand scheme of things regulation can be understood as a lagging indicator, often achieving results at needlessly high cost, and sometimes failing completely. Were it not for rising affluence and technological innovation, regulation would have much the same effect as King Canute commanding the tides*.[32]

The United States has seen major reductions in air pollution,[33] improved water quality, declining amounts of hazardous waste produced, and declining rates of exposure to a host of chemicals and pesticides[34] in recent decades. According to the *Almanac*, "aggregate emissions of the six 'criteria' pollutants regulated under the Clean Air Act have fallen by 53 percent since 1970," and the trend is expected to become evident in other parts of the world in the years to come as those nations adopt new technologies and industrial processes.

In spite of improving trends, the prevailing approach to environmental regulation remains anchored in the past. Overall, federal regulations are on the rise. Susan Dudley, director of the regulatory studies center at George Washington University, documents that the Code of Federal Regulation has grown by a factor of 7 over the last 50 years and the cost of developing and enforcing regulations has grown from a few billion dollars annually to over 50 billion.[35] This command-and-control regulatory paradigm drives the EPA's approach. According to a recent Heritage Foundation analysis "the most expensive regulation of 2011 was imposed by [EPA], which issued a total of five major regulations at a cost of more than $4 billion annually."[36]

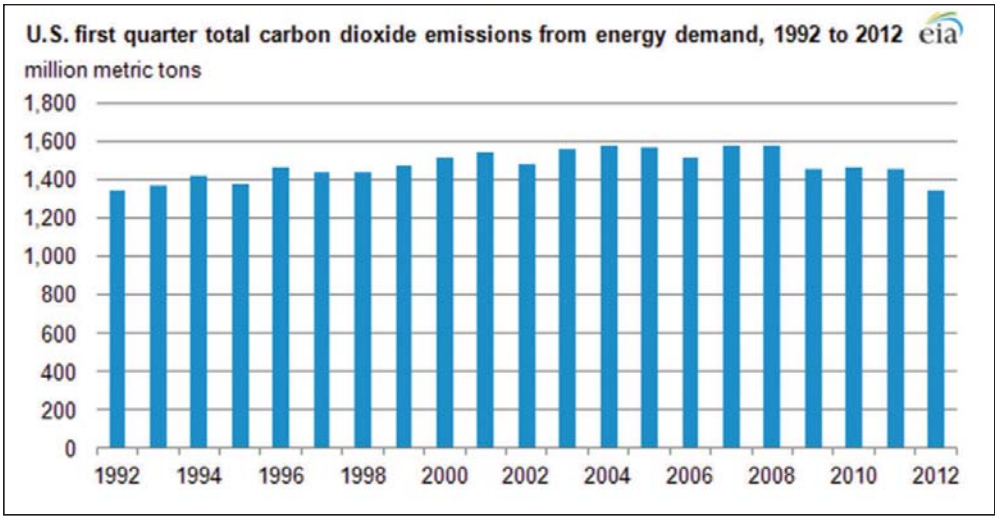
Concerns about the environmental effects of natural gas and shale oil production may risk limiting the long-term exploitation of these domestic energy resources. American companies experimented with oil shale production in the 1970s-1980s, but high costs and immature production technologies made economic exploitation impossible. Technological breakthroughs, principally horizontal drilling and hydraulic fracturing, enable the cost-effective production of natural gas and shale oil across the United States. These approaches use large amounts of water and chemicals in the fracturing process, raising concerns about groundwater contamination, proper wastewater storage, rates of water usage, and even earthquakes. The Environmental Protection Agency is increasingly scrutinizing the fracturing activities.[37] The EPA clearly is looking to apply existing regulatory controls and identifying new areas to expand its oversight of these efforts. Many states are performing their own reviews. Will states be allowed to set their own standards and thereby make the decision on the balance between environmental protection and economic development or will the federal environmental regulatory apparatus subsume those efforts? That question will shape domestic energy policy in the years to come.

Worries about global climate change driven by emissions from fossil fuel use have given new impetus to calls for regulation, subsidization, and diversification. No comprehensive policy has yet to be enacted to address climate change, but President Obama is seeking to stitch one together using a growing architecture of regulatory and legislative actions in pursuit of the goal of constraining fossil fuel use to drive down emissions.[38] In September, the EPA released what they call "the first milestone outlined in President Obama's June 25 Memorandum to EPA on "Power Sector Carbon Pollution Standards," a major part of the President's Climate Action Plan."[39] Under the proposal, new large natural gas-fired turbines would need to meet a limit of 1,000 pounds of CO_2 per megawatt-hour, while new small natural gas-fired turbines would need to meet a limit of 1,100 pounds of CO_2 per megawatt-hour. New coal-fired units would need to meet a limit of 1,100 pounds of CO_2 per megawatt-hour. Analysts see this effort as the first of many to come. Restrictions on existing coal-fired plants are expected in spring 2014.[40]

Even in the absence of comprehensive climate policy, U.S. carbon dioxide emissions have been declining since 2007 (see Figure 5). Certainly, low economic growth rates contribute mightily to this trend, but the EIA notes the 2012 decline is the first to accompany an *increase* in gross domestic product.[41] The carbon intensity of the U.S. economy has been declining steadily since the 1960s, and the trend appears to be accelerating in recent years.[42] This trend is largely the result of fuel-switching and enhanced efficiency over the long-run. Improved technologies enable more efficient use of energy in the transportation and industrial sectors, allowing for greater output with the same amount of energy consumed. As industry and consumers replace their capital equipment (such as machinery, factories, equipment, cars, heating/cooling systems, refrigerators, etc), improved technology results in less energy per unit of output being consumed. The purchase of new capital is driven by a host of factors, of which energy cost savings can be one. Fuel switching is an energy provider decision. In the long-run, electric utilities have moved from using oil to generate electricity, replacing oil with coal, and now coal with natural gas. But, the decision to switch from coal to gas (or from oil to coal) is explained by price differentials between the respective fuel supplies. Technological breakthroughs greatly expand the available supply of natural gas and, in turn, reduced the cost of electricity generated from gas, inciting the electricity providers to switch from coal to gas.[43]

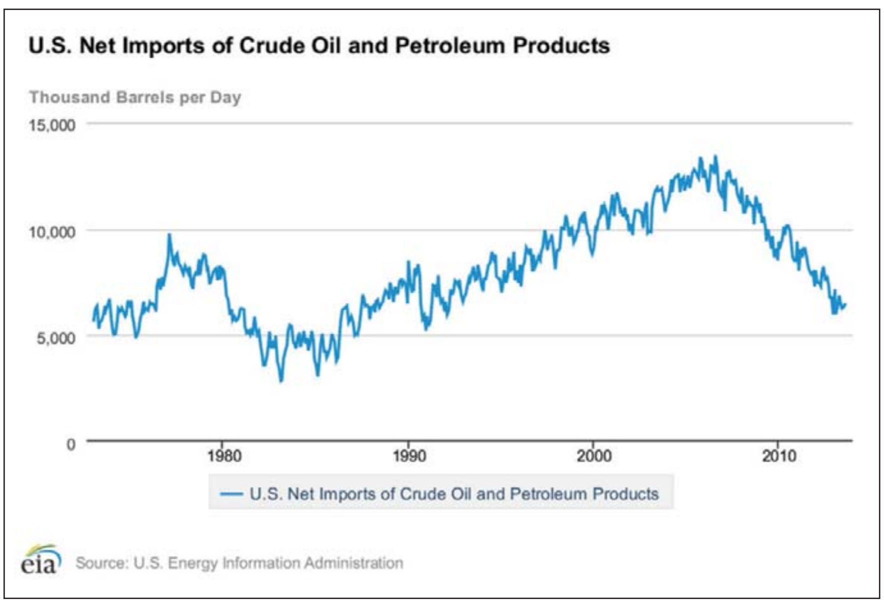
Fuel switching is less possible in the transportation sector. Petroleum provides more than 90% of the energy used in the transportation sector. Imports account for much of that supply, but imports have been dropping steadily since 2005 and are now at their lowest levels in two decades. Nevertheless, concerns about import dependency has led every U.S. president since Nixon to pursue energy "independence" as an explicit objective of his energy policy. What initially may have begun as a quest for complete replacement of imported oil with domestic sources eventually evolved to a lessening of dependence on Middle East petroleum. For example, President Carter proclaimed the U.S. would "never use more foreign oil than we did in 1977—never." In February 1977, the U.S. imported a then historic high 9,763 thousand barrels per

Figure 5. Energy-Related CO_2 Emissions



day, a threshold that remained the U.S. high until May 1997 when U.S. net imports totaled 9,941 thousand barrels per day.[44] Imported petroleum is down 11% since 2005, driven by a decline of domestic consumption due to the recession and a major expansion of domestic supply (see Figure 6).

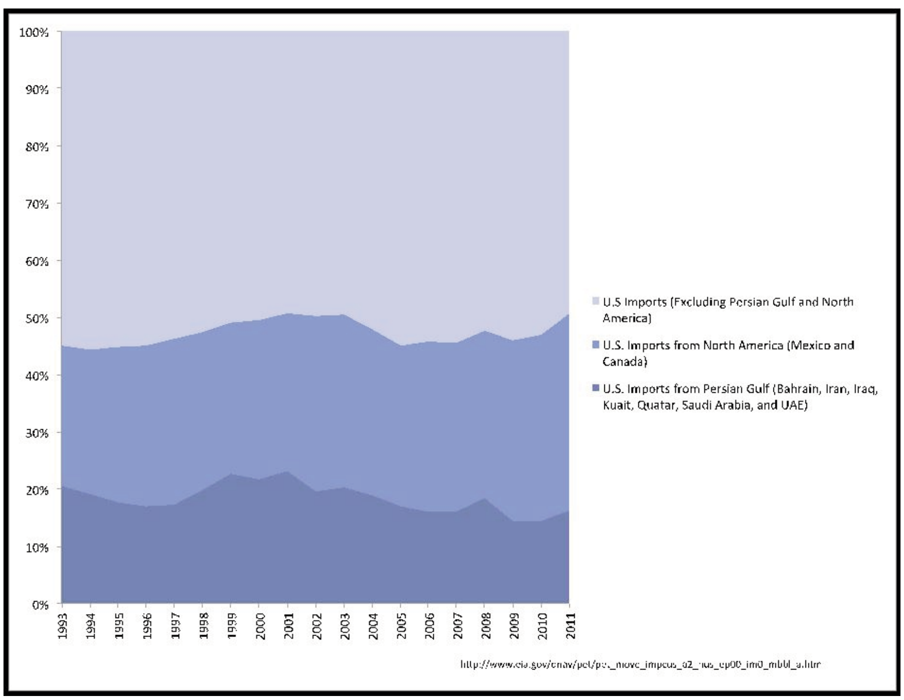
Figure 6. Imports and Consumption of Petroleum



Encouraging domestic production of petroleum has long been an energy policy goal of many energy policy experts. In years past the question involved drilling in Alaska or greater access to off-shore drilling opportunities on both coasts and, while those questions remain, the exploitation of shale gas and oil is now the center of U.S. energy discussions. Indeed, technological developments enabling hydraulic fracturing as well as directional drilling opened competitive access to sources of petroleum in the United States and Canada heretofore considered uneconomic. Analysts at Citi argue that the U.S. may become the world's second leading supplier of petroleum by 2020 as a result of these developments.[45] According to Mark Mills, "the net effect of the trajectory that the U.S. is now on will lead to essentially net zero imports for total hydrocarbon needs (though some continuing oil imports)."[46] Staying on this trajectory, however, will be determined by future regulatory and legislative decisions by the states and federal governments. Measured by traditional standards, the pursuit of energy security is over. Stable, substantial, cost-effective, domestic (qua North American) supplies of energy were the aspirational objectives of U.S. energy security policy for decades.

Diversification of imports also is a priority of energy policy. Figure 7 offers an illustration of the sources of these imports. Over the period, 1993-2011 imports of petroleum from the Persian Gulf generally have provided less than 20% of U.S. demand. North American sources account for at least 20% of U.S. imports over the period, with the majority of U.S. import needs provided by other nations around the world. Energy security rhetoric would have one believe the Persian Gulf was the predominant source of U.S. oil imports. Instead, the U.S. import history shows a diversified portfolio of suppliers with large shares coming from dependable, neighboring trading partners.

Figure 7. U.S. Imports of Petroleum by Source, 1993-2011



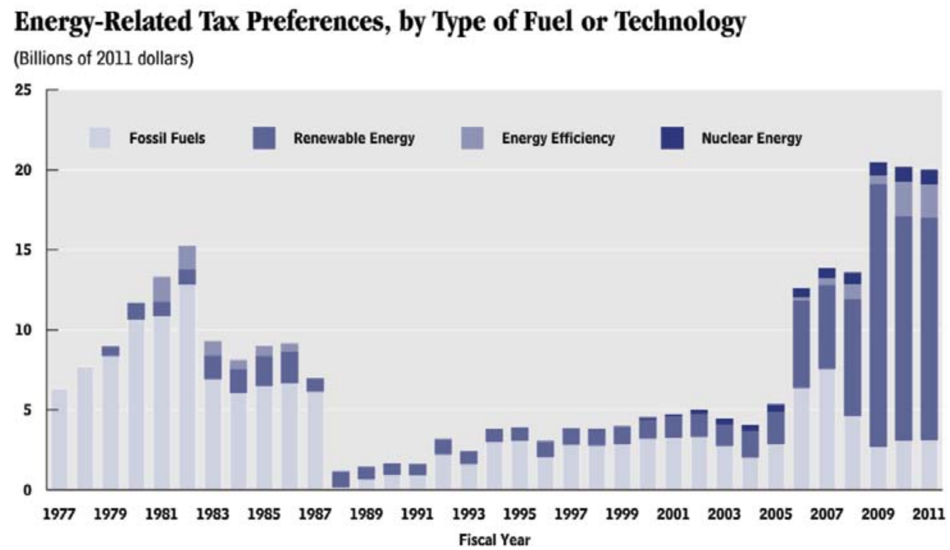
Despite a relatively diverse portfolio of international suppliers and now with the potential for increased domestic supplies, the pursuit of an "off-oil" agenda shows few signs of ending. In the immediate aftermath of the 1973 oil embargo, federal budgets for energy research expanded rapidly and the character of federal policy shifted dramatically. Federal intervention into the marketplace was seen as justified and public support for technology development moved much closer to commercialization than ever before. As one observer of the period described: "This push to move the federal government far closer to what would now be viewed as commercial activities were not merely hypothetical suggestions but were ideas that enjoyed broad bipartisan support and which were put into practice."[47] Three signature efforts dominated federal policy at the time. They were:

- "The cumulative federal investment in the Synfuels Program (1970-1984) was approximately $4 billion (in 2005 US dollars).
- The federal government's cumulative investment in the short-lived Large-Scale Solar Demonstrations Program (1978-1982) was approximately $2 billion.
- The cumulative federal investment in the development of breeder reactors 1968-1985 was nearly $16 billion (almost 10% of all federal R&D invested between 1961-2008)."[48]

The net effect of those investments and the billions more spent on R&D on the nation's energy mix is negligible, as Figure 1 illustrated. Billions have been spent pursuing these goals. An EIA analysis found that support for energy subsidies of all forms (R&D, direct subsidies, and tax supports) doubled in real-terms from FY 1999 to FY 2007.[49] The Congressional Budget Office put the FY 2011 total at $24 billion.[50] Figure 8 illustrates trends in federal tax support for energy from 1977. Beginning in 2006, federal support jumps dramatically, from approximately $5 billion (in 2011 dollars) to over $20 billion at the peak in 2009. Renewable energy supports, in particular, a $6.1 billion excise tax credit for biofuels, explain the rapid increase.

Another recent example is the use of fuel efficiency standards to influence automobile markets. The Obama Administration has directly supported the development of electric vehicles and also pushed through a considerable increase in federal fuel efficiency standards. Prior efforts to raise fuel economy standards drove certain classes of automobiles to extinction, with unanticipated consequences. The demise of the station wagon is attributable, in part, to rising fuel economy standards. Consumer demand for larger vehicles gave rise to the sport utility vehicle as its replacement because trucks were treated differently under federal rules. Presently, there are currently over 250 million cars on the road with a turnover rate of about 6% per year. Even with improvements in technology and higher mileage standards, it will be several decades before the current fleet is replaced. Even then, gasoline and diesel-powered vehicles will still dominate, according to EIA, as they will represent 93% of the light duty fleet in 2025. Hybrids will make up 4% and the remainder will be electric vehicles, plug-in

Figure 8. Federal Tax Support for Energy, 1977-2011



Source: Congressional Budget Office based on data from Molly F. Sherlock, *Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures,* CRS Report for Congress R41227 (Congressional Research Service, May 2, 2011), p. 26; Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2011–2015*, JCS-1-12 (January 17, 2012), pp. 33–35; and Office of Management and Budget, *Budget of the U.S. Government, Fiscal Year 2013: Appendix* (February 2012), p. 1068.

Notes: The estimates do not account for any potential interactions among preferences and do not include tax provisions estimated to cost less than $50 million.

Estimates do not reflect the amount of revenues that would be raised if those provisions of the tax code were eliminated and taxpayers adjusted their activities in response to those changes.

The figure does not include tax preferences that could not be allocated to a particular fuel or technology.

hybrids, and natural gas vehicles.[51] Hybrids and their all-electric counterparts will not be able to capture a larger market share until their costs are reduced and significant advances in battery technology are achieved. In 2008, MIT's Sloan Automotive Laboratory examined alternative ways to reduce fuel use to 2000 levels by 2035. It concluded that "the magnitude of the changes required to achieve these reductions is daunting, especially as current trends all run counter to those changes."[52] Assuming that the EIA forecast, along with its private counterparts, are a reasonable reflection of realities over the next two decades, policy should focus on bringing to market abundant and affordable supplies of liquid fuels and on research to advance cellulosic technology, hybrid system improvements, and significant reductions in advanced battery costs.

Since the OPEC oil embargo in 1973, the U.S. has enacted about 7 overarching energy policy acts and 18 pieces of legislation dealing with energy issues. A state of policy flux guarantees policy failure and a fair assessment would be that these energy policy initiatives have fallen short of their goals. Effectively exploiting the opportunities that exist today requires a new approach to energy policymaking.

A New Policy Framework for Energy

Earlier, we quoted at length from Secretary Schlesinger, who argued for government to adopt a planning approach that was flexible enough to (1) face uncertainties and (2) hedge against uncertainties. Based on the "lessons learned" from past policies and recognizing Secretary Schlesinger's approach, the following are a set of principles to guide energy policy making. An energy policy should:

- promote abundant and affordable supplies of energy because that is essential for strong economic growth;
- contribute to economic and energy security by diversifying sources of supply to lessen dependence on unstable sources and dampening price volatility;
- maintain the Strategic Petroleum Reserve;
- be consistent with realistic and cost-effective environmental standards and expectations for continued progress in air and water quality and exposure to hazardous substances;
- promote resilience in the energy system through incentives to upgrade the electric power grid and actions that limit the effects of disruptions within the system;
- promote both public and private R&D and provide an investment climate that encourages business to invest in new technologies;
- avoid picking technological favorites by mandating specific types of energy, timelines for them to be provided, or subsidies for their use.

When reviewing past presidential energy policies, the approach outlined is consistent with the framework spelled by President Reagan in 1981. Indeed, that period of the nation's history has striking similarities to the present.The nation's economic prospects were uncertain and energy policy favored government intervention. In the quoted statement that follows, President Reagan first summarized his efforts to roll back price supports put into place in response to the oil embargo, and he then offered a forward looking vision. He said:

> *This does not mean that the Federal government is withdrawing from all involvement in energy. It cannot and should not. The Government itself is directly responsible for lands which contain a major share of our resource wealth.*
>
> *There is also an appropriate Federal role in certain long-term research and development related to energy production and distribution. The goal of these projects is to develop promising technological innovations to the point where private enterprise can reasonably assess their risks.*
>
> *Given our continued vulnerability to energy supply disruptions, certain emergency preparations—such as rapid filling of the Strategic Petroleum Reserve—remain principally a Government responsibility. But our basic role*

is to provide a sound and stable economic and policy environment that will enable our citizens, businesses, and governmental units at all levels to make rational decisions on energy use and production—decisions that reflect the true value, in every sense, of all the Nation's resources.[53]

President Reagan articulates an enabling role for government. Government is responsible for management of federal lands and therefore for administering and limiting the lease rights on those lands which will have enormous influence over future domestic energy supplies. Government promotion of R&D within limits is another central role. But, the most important guidance offered is in the last statement where providing a "sound and stable economic and policy environment" is called the basic role for government. That objective stands in contrast with efforts to manage to specific outcomes or promote particular approaches.

Looking to the future, EIA and other energy analysts conclude that overall energy consumption grows at a slower rate due to a prolonged economic recovery, continued gains in efficiency, and demographic factors. In these forecasts, oil remains the dominant transportation fuel, coal consumption declines as it is replaced by natural gas, natural gas becomes a larger part of the energy budget, nuclear energy increases but slowly, and renewables, including hydropower and biomass, show the largest growth, although from a small base. The overall energy mix does not change significantly because infrastructure changes slowly, so does the auto fleet, and new technology involves long lead times.

The EIA analysis indicates that as a nation the United States is moving in the right direction on energy. Imports from the Persian Gulf are declining, natural gas is growing as a source of electric power generation, coal consumption is falling while exports of coal are growing, renewables are growing, although their growth is being sustained by costly subsidies, and energy intensity, a measure of efficiency, continues to decline.

Both EIA and private forecasts make it clear that the end of the oil era is nowhere in sight. That being the reality, the United States needs a more aggressive exploration and production program for oil. Leasing on federal lands is not proceeding at a sufficient pace and exaggerated environmental fears continue prevent drilling in Alaska's coastal plain, which could contain oil reserves equaling or exceeding Prudhoe Bay.[54]

Because of its tremendous coal reserves, research related to clean coal technology may have great potential. However, commensurate with the stated limitations on the diversion of federal R&D for industrial policy purposes, industry must take the lead as clean coal technologies are mature, but still not commercially competitive.

The future of nuclear energy is tied to resolving the waste issue and finding ways to lower construction costs. The cost of capital is high because of perceived risks. Until that cost is lowered or until new technologies make nuclear power more efficient and cost-effective, nuclear power's potential is constrained. Disjointed federal policy has long delayed resolution to the waste disposal problem. The inability of policymakers and regulators to offer consistent direction to industry on this issue is an apt example of the dangers of federal intervention in the energy market.

As indicated, renewables like ethanol, solar, and wind are sustained by costly subsidies. Originally, the infant industry rationale was used to justify those subsidies. Even if that rationale is accepted, the subsidies for ethanol, wind, and solar have gone on well beyond any reasonable period for "maturing" an "infant" industry. The economic and technical evidence for wind and solar overwhelmingly demonstrates that, at best, they have a niche role, even under optimistic scenarios. Ironically, a recent survey reveals that "current government policies provide incentives only for production of clean energy," but "they do little to solve potential market failures" and "as a result, those policies may prove to be quite ineffective instruments to stimulate the cost reduction in clean energy."[55]

The ethanol mandate is embedded in existing law and it is politically naive to think that it could be eliminated any time soon. However, two policy changes should be made until it can be repealed. With a mandate in place, there is no need or justification for any ethanol tax credit or similar supports for other energy sources. Lawmakers should be mindful to avoid both creating a market, via a mandate, and then subsidizing that market, via a tax credit. Second, the Congress set a requirement that 35 billion gallons of cellulosic ethanol be used by 2022. Currently, so little is available that refiners have to pay a penalty for not using a product that does not exist. That is foolish and the cellulosic mandate should be eliminated.

A well-developed and robust R&D policy should be put in place and allowed to operate without political interference for at least 10 years. Current and past government R&D policy is not well thought out, lacks focus on sustained priorities, and does not adequately reflect what government can do best. As a first step, such an R&D policy would rebalance the roles and responsibilities of the federal government, universities, and the private sector. An R&D policy needs flexibility, but for too long government policy has operated with blurred lines of responsibilities. Using various rationales, such as protecting an infant industry or overcoming a valley of death in technical risk, government frequently provides financial and regulatory support for preferred technical approaches and industries. In doing so, industry shifts significant risk onto the taxpayer. The effects run deeper than Solyndra-like failures. Public funds spent in this manner are not spent elsewhere and, indeed, contribute to the relative decline of U.S. emphasis on basic knowledge creation. Government is most successful when it supports the exploration of areas of technology that can have big payoffs, but are too risky for the private sector. Wise policy would recognize that energy companies have strong incentives to conduct research on alternatives and to make the use of energy as efficient and as environmentally benign as practical. Government can complement existing private sector incentives to develop new technologies through content-neutral tools, such as the R&D tax credit and accelerated depreciation for new capital investments. Such an approach is not biased toward any particular technology, but instead encourages private investment in advanced technologies generally, allowing individual entrepreneurs and corporations to choose what to support.

The Department of Energy is attempting to replicate the success of the Defense Advanced Research Projects Agency (DARPA) for developing new technology. There is $275 million in the current budget for this Energy-ARPA initiative.[56] DARPA succeeded in large part because its R&D was focused on meeting the needs of its clients — the armed services. E-ARPA does not have clients or customers who have a clear demand to be met. Private companies have customers; government does not. Analyses of past R&D efforts have concluded that success is based on a close linkage between the R&D initiative and customer needs.

In 2005, John Deutch of MIT and former government executive outlined clearly what government can do effectively and what should be left to the private sector. In the end, he concludes, "Success for government action requires both more resources and a willingness to change the conventional approach to government's support for energy technology commercialization."[57] While his preference is for a quasi-public corporation, there could be other ways to provide stable funding for a technology strategy that are insulated from congressional ear-marking and special interest lobbying.

Energy R&D spending reflects the industrial policy priorities of energy policy generally. Over the years, the R&D budget began to institutionally reflect the government's emphasis on supporting specific industries and their underlying technologies. According to the American Association for the Advancement of Science's analysis of Department of Energy R&D funding patterns, DOE R&D grew from a base of $1.5 billion in FY 2006 to a peak of $2.27 billion in FY 2010.[58] The budget provides specified funds for solar, wind, geothermal, biomass, hydrogen, nuclear, and fossil fuels. Movement of funds from one area to another requires the approval of politicians in the Administration and the Congress and therefore is subject to lobbying from the respective industries and academic institutions with vested interest in maintaining the budgets. This stratified system organized by technology type should be replaced with a goal-based approach where funding decisions are the product of competitive proposal assessments. Using the recommended 10-year planning horizon, Congress and the administration would provide guidance to the Department of Energy on goals, from which industry and academia would be invited to compete for research funds.

In addition to ensuring that the U.S. economy has energy in sufficient quantities and at competitive costs, energy policy needs to address what Daniel Yergin calls the Fifth Fuel—efficiency. Over the past 4 decades, the U.S. has made tremendous progress in reducing its energy intensity—the amount of energy required to produce a dollar of GDP. Today the United States uses about half as much as we did in 1973. Part of that improvement is a result in a shift in the composition of economic output. Yergin, in his book, *The Quest,* states that "studies suggest that somewhere between half and two thirds of the change…represents real efficiency gains."[59] He points out that incentives for continued progress are tied to concerns about climate change and the surge in global energy consumption. Support for additional research in system efficiency, incentives and information that benefits all energy users, and a better regulatory framework are consistent with market-based policies.

Complementing these efforts, there needs to be a new approach to environmental regulation based on the importance of balancing costs and benefits and allowing for rational assessment of trade-offs. A model for decision making in this manner already exists and, indeed, is required in the Toxic Systems Control Act. This approach, by design and implication, would result in less reliance on the technology-specific mandates enabled by the Clean Air and Water Acts. A new approach would provide incentives that reward companies for operating and compliance excellence. Without this, the regulatory system will continue to be driven by the worst performer, which, by default, penalizes the better ones.

All regulatory actions involve trade-offs, either explicit or implicit. And, since all regulations involve matters of uncertainty, there will be unintended consequences in their implementation. A new approach would begin by prioritizing risks and using that ranking to drive resource allocation. There should also be a regulatory budget that limits the costs—burdens—that are imposed on society and a comparison of how those costs compare to the benefits gained. For regulations, that have a cost of greater than $100 billion there should be a stronger provision for Congressional review. That was the intent of the Congressional Review Act, but it has not been achieved. Likewise, the Data Quality Act was intended to make sure that the best available data were used by agencies and that the process for using data was transparent.

Finally, a new approach should productively adopt a risk management perspective. Two areas in particular are appropriate for this approach. The first is managing import dependency. Even with expanded domestic supplies, the United States will continue to import petroleum in significant amounts from non-North American sources. Encouraging the diversification of the world supply base lessens the risk that the U.S. will become overly dependent on a single region or be placed in competition with other nations for supplies out of a particular region. Towards that end, the U.S. should encourage other nations and corporations to expand their exploration and development efforts. The management of the risks associated with hydraulic fracking offers the opportunity to implement a more thoughtful approach. Claims of wastewater pollution and earthquakes caused by fracking require investigation to provide policymakers at local, state, and federal levels with the information needed to judge causality and risk. Furthermore, these levels of government ought to work in coordination to provide a stable and consistent decision-making environment, but one that is driven, not by federal directive, but through collaboration between state and federal government.

Conclusion

For most of the past 40 years, government energy policy has been driven by an industrial policy mindset that was intended to achieve energy independence and constrain fossil fuel use. Tax dollars, legislative actions, and regulations have been used to enrich promoters of alternative energy that has not been able to compete in the market place. Those attempts have failed and in the process wasted tax dollars, promoted crony capitalism, and imposed higher costs on consumers. One outrageous example is the renewable energy production tax credit that was then followed by lobbying for renewable energy mandates at the state level. Uneconomic forms of energy were supported by consumers and tax payers while promoters enriched themselves.

The time has come to call a halt to energy industrial policy and discontinue loan guarantees, grants, tax credits, or any other forms of subsidy that are targeted to advance one energy system while hampering competitors. There is enough experience and history to know that government initiatives to pick winners in the energy market place will not work. Too often, subsidies are confused with broad-based incentives that can include tax credits and deductions. If a credit, such as the R&D tax credit, is available to all business, it does not tilt the playing field. Similarly, accelerated depreciation or dual capacity rules that avoid double taxation serve a legitimate economic purpose. Whether broad based credits and deductions make economic sense is a matter that needs to be determined on a case-by-case basis.

Our framework for energy policy accepts President Lincoln's admonition to think "anew," is consistent with President Reagan's recommendation to focus government action on crafting an environment for rational decisions to be made by individuals, and accepts Secretary Schlesinger's recommendations for successful policy making. It outlines steps for government that recognize the economic and technical realities of the energy marketplace, as well as the present opportunities, and focuses government action on those areas where it will exert the most productive influence within the limits society elects to place on government. Our framework is cognizant of the errors made by past government overreach and recommends alternative approaches to avoid those errors. In essence, our approach demands that policymakers, the energy industry, and the public reject the industrial policy approaches that have characterized policy, programs, and budgets and embrace the role for government that shapes, rather than directs, the energy market.

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November 2013