Securing a Clean Energy Future

A Call to Action

Founded in 1908, the National Governors Association (NGA) is the collective voice of the nation's governors and one of Washington, D.C.'s most respected public policy organizations. Its members are the governors of the 50 states, three territories, and two commonwealths. NGA provides governors and their senior staff members with services that range from representing states on Capitol Hill and before the Administration on key federal issues to developing and implementing innovative solutions to public policy challenges through the NGA Center for Best Practices. For more information, visit *www.nga.org*.

Foreword

—Minnesota Governor Tim Pawlenty
NGA Chair, 2007-2008

For the better part of the past century, America has enjoyed the spoils of an energy system that has been relatively inexpensive and easy to use. But our continued reliance on this finite system has made us increasingly vulnerable to unstable countries that house vast amounts of the world's energy resources and has jeopardized our relationship with the environment.

Our country is too dependent on foreign sources of energy. By 2030, we will be providing only 65 percent of our own energy needs—35 percent will come from foreign sources, mostly oil. Our total energy-related carbon dioxide (CO_2) emissions are projected to increase more than 25 percent by 2030. Continuing down this dangerous pathway risks our economic well-being, energy security, environmental future, and quality of life.

America is at a tipping point. As has happened at other key moments in our nation's history, the public is ahead of policymakers, with citizens seeking strong leadership for a new direction. As some of this country's leading policymakers, my colleagues and I have a unique opportunity to move the United States toward a cleaner, more independent, more secure energy future. That's why as chair of the National Governors Association, I'm launching a yearlong initiative—*Securing a Clean Energy Future*—to enlist the efforts of all governors to make our nation a global leader in energy efficiency, clean technology, energy research, and the deployment of alternative fuels.

I believe we can and must craft a new, more comprehensive and multifaceted energy future that does not require sacrificing prosperity. Our new energy future can increase our national security, improve our environment and bring economic benefits to our communities.

Earlier this year, 45 governors discussed initiatives to develop alternative sources of energy or promote conservation in their 2007 State of the State Addresses. *Securing a Clean Energy Future* will draw on these and other efforts to benefit every state and the nation as a whole. This initiative will focus both on what we can do immediately and on what we must do in the future to reduce overall energy demand while keeping our economy strong. A bipartisan task force, comprised of forward-looking governors who share a common desire to advance clean energy ideas and who represent a cross-section of the country, will guide the initiative's efforts.

Over the course of the next year, *Securing a Clean Energy Future's* gubernatorial task force will identify and implement approaches that:

- Use our energy resources better through efficiency and conservation;
- Promote non-petroleum-based fuels such as ethanol and biodiesel;
- Take reasonable steps to reduce greenhouse gas emissions; and
- Accelerate research and development of advanced clean energy technologies.

Achieving these goals will require a new devotion to conservation, research, piloting of new energy technologies, and development of a clean fuels infrastructure. Changing our current practices, reducing our current dependencies, and using new technologies will take a long-term commitment. States have shown they are willing to lead the way. Together, we can find and follow a pathway to a better, cleaner, more independent energy future.

The *Securing a Clean Energy Future* Task Force

Minnesota Governor Tim Pawlenty—Co-Chair
Kansas Governor Kathleen Sebelius—Co-Chair
Connecticut Governor M. Jodi Rell
Florida Governor Charlie Crist
Hawaii Governor Linda Lingle
Montana Governor Brian Schweitzer
Pennsylvania Governor Edward G. Rendell
Washington Governor Chris Gregoire

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Securing a Clean Energy Future—A Call to Action

"America is ready for bold, innovative energy policies that will make us safer, more independent and better stewards of the planet. We've been asleep at the switch for too long—the time for action is now."

—Minnesota Governor Tim Pawlenty
NGA Chair, 2007-2008

We Must Act Now

The U.S. economy, the world's largest, is heavily dependent on foreign sources of oil. While our economic engine has for years been powered by relatively inexpensive energy, there is evidence that this era is coming to a close. Meanwhile, we are increasingly aware of the serious impacts of global climate change—and how America's consumption of fossil fuels is contributing to a warming Earth. In the face of these intersecting concerns, we must chart a new course of action.

Our dependence on imported oil leaves the U.S. economy and consumers vulnerable to supply interruptions, and jeopardizes both our energy and economic security. To meet our current energy needs, we rely largely on fuel sources that emit greenhouse gases, such as carbon dioxide (CO_2), which contribute to climate change. We must change our policies and our habits today to avert serious consequences, and to ensure that our future is secure, healthy, and prosperous.

While there has been some limited national progress achieved to date, states have taken decisive action to enact policies to ensure a clean energy future. Governors, recognizing that there is no single solution, are taking a number of short, intermediate, and long-term steps to reduce our dependence on imported oil and limit our greenhouse gas emissions. To forge a new path to a sustainable future, states are seeking to increase the supply and consumption of renewable sources, improve energy efficiency and conservation, maintain energy reliability and affordability, and reduce greenhouse gas emissions.

Despite these advances, there is more to be done. Governors are determined to lead the effort to a more secure energy future and understand that inaction is not an acceptable policy choice.

In this *Call to Action*, we will:

- **Define the problem.** We will focus on our dependence on imported oil and how our growing consumption of fossil fuels for transportation and electricity increases greenhouse gas emissions.
- **Look into the future.** We will use the best available projections to examine how our growing dependence on imported oil and our increasing greenhouse gas emissions impact our energy and economic security and our environment.
- **Dispel the myths.** We will explore the realistic potential for cost-effective alternatives to fossil fuels for transportation, such as biofuels, renewables, and more efficient energy sources for electricity.
- **Describe the role of states.** We will outline how states influence energy policy and why they are positioned to lead America's effort to a cleaner, more secure energy future.
- **Present a roadmap.** We will briefly describe the National Governors Association's (NGA's) planned activities and areas of focus for *Securing a Clean Energy Future*, the 2007-2008 Chair's initiative.

The nation faces significant and serious energy challenges that call for action today.

The Problem—Our Energy Mix Today

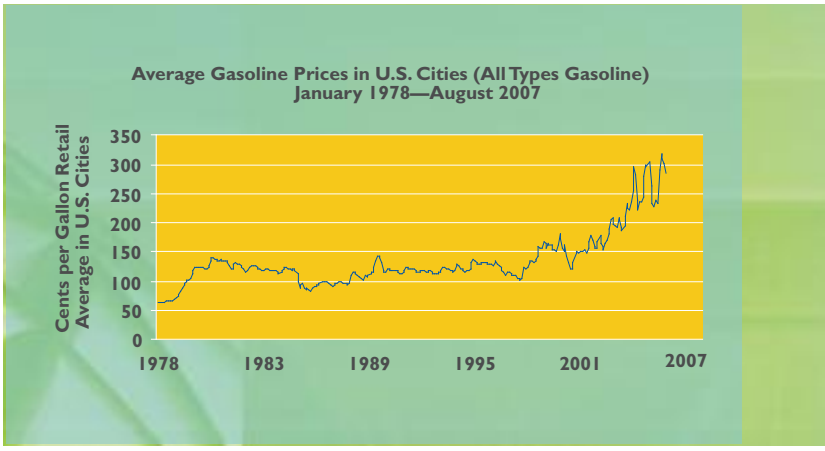
Our energy mix today is characterized by two significant challenges: dependence on imported oil and growing greenhouse gas emissions. This troubles Americans. Business leaders, national security experts, environmental advocates, policymakers at all levels of government, and the public have all expressed apprehension over our vulnerability to the geopolitical, economic, and environmental impacts of our energy use. The data show that the concern is warranted; we are on an unsustainable path.

Petroleum Dependence

The United States today uses approximately 7.6 billion barrels of petroleum a year.[1] The need for petroleum is greatest in the transportation sector, which accounts for more than two-thirds of United States oil consumption.[2] As the United States population has increased—almost doubling from 165 million people in 1955 to 295 million people in 2005[3]—and has migrated from cities to suburbs to exurban communities, the vehicle miles traveled each year have dramatically increased. Miles traveled have skyrocketed by more than four times from 1955 to 2000 (from 600 billion miles to 2.75 trillion miles), and are expected to reach 3 trillion miles soon.[4] And we are traveling these additional miles in automobiles that, on the whole, are only slightly more fuel-efficient than they were in the early 1980s.[5] The combination of population growth, greater sprawl, and lack of improvements in automobile efficiency has meant more miles traveled and more need for oil.

As the United States and other nations' appetite for oil pushes against the limits of worldwide supply, price increase at American gas pumps has become the norm (**Figure 1**). In January 1978 the price for a barrel of crude oil in the United States was $13.38. As recently as December 1998, the price had dropped to $8.51. In July 2007 it rose to $70.63 a barrel, and as of November 2007 prices exceeded $98 a barrel.[6] Compounding the crude oil price rise are problems such as constrained refinery capacity. These factors have conspired to erode processing capacity such that the per-day idle crude oil distillation capacity declined by almost 56 percent between June 1985 and June 2007.[7]

Figure 1. Price Volatility at U.S. Pumps (Not Adjusted for Inflation)



Source: Energy Information Administration

Americans are increasingly dependent on imported oil to satisfy growing demand. In 1981, we imported almost 2.2 billion barrels of crude oil and petroleum products; by 2005, that number more than doubled to just over 5 billion barrels.[8] Today, approximately 60 percent of our liquid fuels consumption—primarily petroleum—comes from imported sources.[9] For every $10-per-barrel increase in the cost of oil, the United States sends approximately $50 billion more to foreign nations annually.[10] As demand for petroleum has grown, U.S. crude oil production, which reached more than 3.5 billion barrels in 1970, declined to just under 1.9 billion barrels in 2005.[11]

Many have touted the use of biofuels—corn-based ethanol, biodiesel, and cellulosic ethanol—as products that will offset or even replace petroleum for transportation. But these alternatives have not yet put a dent in our need for imported oil. For example, E-85 (an 85 percent ethanol, 15 percent gasoline blend) is not widely available and only a small number of so-called "flex-fuel" vehicles are equipped to run on it. E-85 is only available at 1,120 fueling stations nationwide out of a total of 170,000, and there are only 6 million vehicles that can run on E-85 out of a total of 230 million vehicles nationwide.[12] Even when taking into account the more commonly used E-10 blend (10 percent ethanol, 90 percent gasoline), which constitutes approximately 99 percent of the ethanol fuel sold in the United States and can be used in all automobiles, the United States produced and used just around 5 billion gallons of ethanol in 2006—only 4 percent of the motor gasoline pool by volume.[13] To put all of this in perspective, the total amount of ethanol we used in 2006 roughly equals the amount of gasoline we used over a 13-day period in 2005.[14]

Growing Greenhouse Gas Emissions

Greenhouse gas emissions in the United States and worldwide have been on the rise since the industrial revolution. There are a number of greenhouse gases that are released into the atmosphere as a result of human activities, but carbon dioxide—at 84 percent of all U.S. greenhouse gas emissions in 2005—is by far the most abundant.[15] While agricultural activities are a significant source of greenhouse gases being released into the atmosphere (primarily methane and nitrous oxide), energy-related fossil fuels are the dominant source of atmospheric greenhouse gas in the form of carbon dioxide.[16] Carbon dioxide emissions worldwide have risen 130-fold since 1850, with the highest increases coming from the energy-supply and transportation sectors.[17]

Studies show that global temperatures rose alongside human-fueled greenhouse gas emissions. Temperatures have gone up by more than 1 degree Fahrenheit over the last 100 years and, in the period from 1995-2006, the world recorded 11 of the 12 warmest years since global surface temperature measurements began in 1850.[18] Scientific studies show that over the last 400,000 years, global temperature increases or decreases have corresponded to the levels of carbon dioxide in the atmosphere.[19] The amount of carbon dioxide concentration in the atmosphere was 379 parts per million in 2005, up from a preindustrial concentration of 280 parts per million—higher than at any time in the last 400,000 years (determined using ice cores).[20]

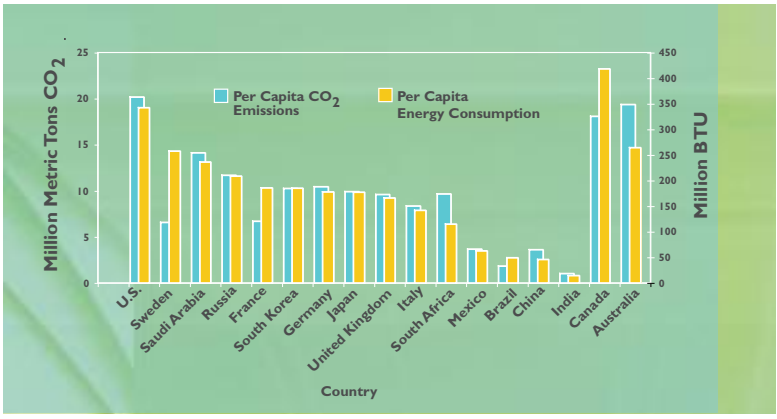
Although the climate is always changing, a report by the National Academy of Sciences affirmed that the Earth is indeed warming and that warming is most likely due to human activities with some contribution from natural variability.[21] Scientists believe that, beginning in the 1750s, human activity began to increase the concentrations of atmospheric carbon dioxide and other greenhouse gases, causing an enhanced greenhouse effect that, in turn, raised global temperatures.[22] The Intergovernmental Panel on Climate Change (IPCC), which includes top scientists from the United States and around the world, in a 2007 report updating the scientific understanding of climate change, concluded with 90 percent certainty that human activities are warming the planet.[23]

There are a number of serious consequences associated with this warming, some of which we are already seeing today. The IPCC report found that as temperatures in the oceans—which absorb more than 80 percent of the heat added to the climate system—increased, sea waters expanded and sea levels rose.[24] Warming temperatures are believed to melt glaciers and ice sheets, which further contribute to the swelling oceans.[25] Scientists also have observed changes in the levels of precipitation, more extreme occurrences of hot days and heat waves, more intense and longer droughts, and increased intensity in North Atlantic hurricanes since 1970.[26] Some argue that these changes are not directly attributable to human-caused global warming, but these observed trends have raised concerns that global warming may already be having an impact on the environment and human life. There are concerns that future sea-level rises could render low-lying coastal areas uninhabitable and create "climate-change refugees."[27] Some studies have linked recent heat waves, including a 2003 European heat wave that killed thousands of people, to global warming.[28]

In executive orders, legislation, regulatory actions, and regional agreements, governors and states have recognized the potential harms associated with global climate change, including sea-level rise; ecological harms such as habitat degradation and species extinction; heat-related illnesses and deaths; exacerbated health risks from air pollution and vector-borne diseases; reduced snowpack and loss of winter-season tourism and activities; more severe forest fires and storms; altered precipitation and severe droughts; and agricultural challenges from loss of moisture and increased pests.[29]

The United States accounts for 25 percent of the global total of all greenhouse gas emissions, despite having only 5 percent of the world's population.[30] Developing countries such as China and India are the fastest growing emitters of greenhouse gases; due to its massive population and expanding economy, China is now reported to have overtaken the United States as the world's largest emitter of greenhouse gases. However, per-capita U.S. greenhouse gas emissions and energy consumption are still much higher—in many cases double or triple—that of developing and developed nations (**Figure 2**[31]).

Figure 2. Per-Capita CO_2 Emissions and Energy Consumption Among Nations



Source: Energy Information Administration

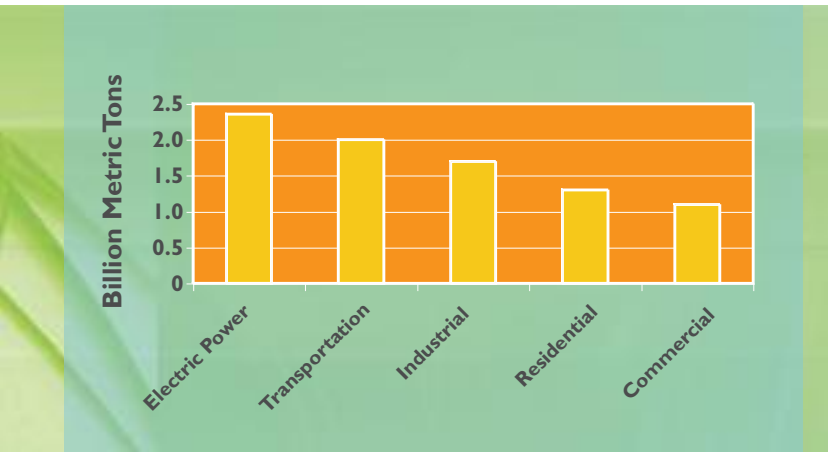
As indicated, these countries' per-capita carbon dioxide emissions in most cases track relatively closely with per-capita energy consumption (with certain exceptions, such as France, which relies more heavily on nuclear power, which does not emit carbon dioxide).

To get an accurate picture of U.S. emissions, it is helpful to look at sources of energy consumption by breaking down energy-related carbon dioxide emissions by end-use sector (**Figure 3**). The transportation sector is the largest end-use sector source of energy-related carbon dioxide emissions—and the fastest growing—due to the burgeoning vehicle miles traveled, as discussed above.[32] The industrial sector is the second largest end-use sector. The residential sector's carbon dioxide emissions, partly attributable to use of electricity, grew by more than 25 percent between 1990 and 2006, mainly due to population growth and increased demand for electricity.[33] During that same period, the commercial sector's emissions (also partly attributable to use of electricity) grew by more than 33 percent.[34] In the industrial sector, and particularly the commercial and residential sectors, electric power production is a primary contributor to energy-related carbon dioxide emissions.

The transportation sector's emissions mainly come from the combustion of carbon-intensive petroleum for gasoline, diesel, and other fuels. Emissions from electric power production are primarily attributable to the use of natural gas and coal, which emits the most carbon dioxide per unit of energy of any fossil fuel.[35]

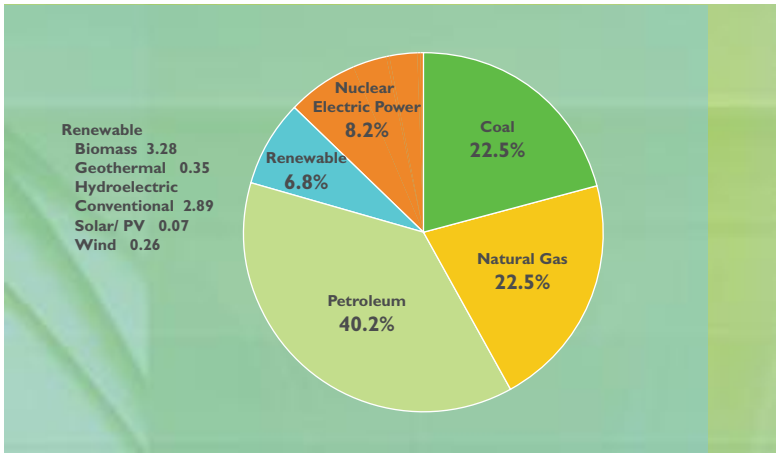
Many of those concerned about greenhouse gas emissions advocate for increased use of renewable energy sources that emit less or no carbon dioxide. Despite efforts to increase renewable energy production and use, it is clear that carbon-intensive fossil fuels continue to dominate as the nation's primary energy sources. Renewable sources accounted for less than seven percent of the nation's total energy consumption as of 2006 (**Figure 4**).[36]

Figure 3. Carbon Dioxide Emissions by Sector (2005)



Source: Energy Information Administration
Note: The electric power bar represents the total emissions from electricity use, but electric power is not an end-use sector. The electric power bar aggregates emissions from electricity use from the four end-use sectors represented. Thus, transportation is the largest end-use sector source of emissions, followed by industrial, residential, and commercial.

Figure 4. Sources of Energy in the U.S.



Source: Energy Information Administration

By 2030, we will import 4 million barrels more of petroleum per day than we did in 2005, and our energy-related CO_2 emissions will have increased by more than 25 percent.

A Look Into the Future

Our current energy consumption habits, combined with our reliance on fossil fuels, particularly imported petroleum, challenge our nation. As troubling as the situation is now, consider our future in the absence of significant policy and technology changes. While there is increased public awareness about our energy problems—and some effort on the part of industry and government policymakers to address them—our dependence on imported oil and our greenhouse gas emissions are both projected to significantly increase in coming years. Under a business-as-usual scenario, by 2030, we will import 4 million barrels more of petroleum per day than we did in 2005, and our energy-related carbon dioxide emissions will have increased by more than 25 percent.[37]

Oil Dependence Will Continue

Despite federal and state incentives and standards aimed at increasing our use of ethanol and other renewables, the daily number of barrels of petroleum we import is projected to increase by almost 20 percent by 2030 (**Figure 5**).[38] This is due to continued population growth and growth in vehicle miles traveled. Our increased demand for transportation fuels will far outpace any projected increase in alternative fuel use.[39] To meet the surge in demand for transportation fuels, gasoline consumption is expected to increase by 34 percent by 2030.[40] Ethanol use is projected to grow as well, particularly through E-10 blends, but ethanol will constitute just 8 percent of the future gasoline pool (by volume) by 2030.[41] Likewise, biodiesel use will grow, but is only anticipated to become .5 percent of the distillate fuel market by 2030.[42]

Despite the expanded use of biofuels, and a projected increase in the number of hybrid and alternative-fuel-ready vehicles on the roads, the growing demand for liquid transportation fuels will continue to be met with gasoline (**Figure 6**). By 2030, gasoline is projected to remain the dominant transportation fuel, contributing to our increased dependence on imported oil.[43]

Greenhouse Gas Emissions Will Surge

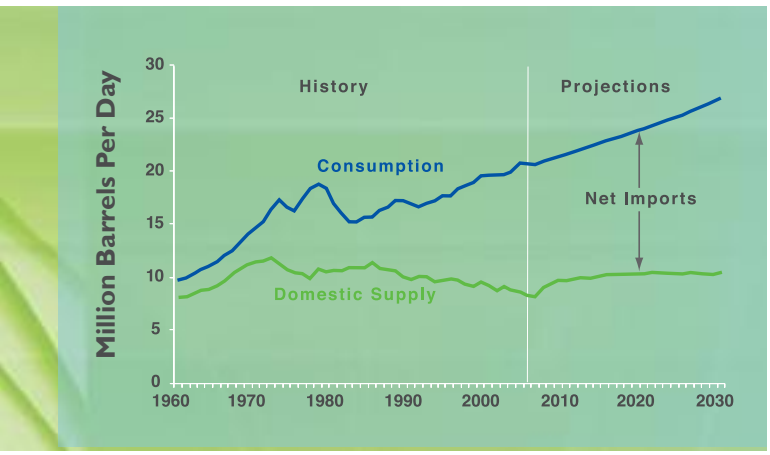
In the face of concerns about growing greenhouse gas emissions, our current energy infrastructure is projected to remain more or less static, with carbon-intensive fossil fuels continuing to meet growing demand, and alternative sources unable to capture a much greater share of supply. As a result, under current policy, total U.S. energy-related carbon dioxide emissions are projected to increase by more than 25 percent by 2030, with the electric power and transportation sectors accounting for the most significant portions of U.S. emissions (**Figure 7**).[44]

Our overall energy consumption is projected to increase by more than 30 percent by 2030, with fossil fuels accounting for 87 percent of the growth.[45] In the transportation sector, the growth in demand means more use of petroleum and, correspondingly, more greenhouse gas emissions.[46] In addition to providing energy for electricity generation, coal may become a cheaper alternative to oil for transportation through the use of coal-to-liquid technology, which could produce even more carbon dioxide emissions than conventional petroleum fuels.[47]

Electricity consumption is projected to grow by more than 30 percent by 2030.[48] To meet this growth in demand, coal consumption, which emits more carbon dioxide per unit than natural gas or oil—the other two fossil fuels used for generation—may increase by more than 32 percent.[49] Coal's share of the nation's electricity supply may go up from approximately 50 percent today to 57 percent in 2030.[50]

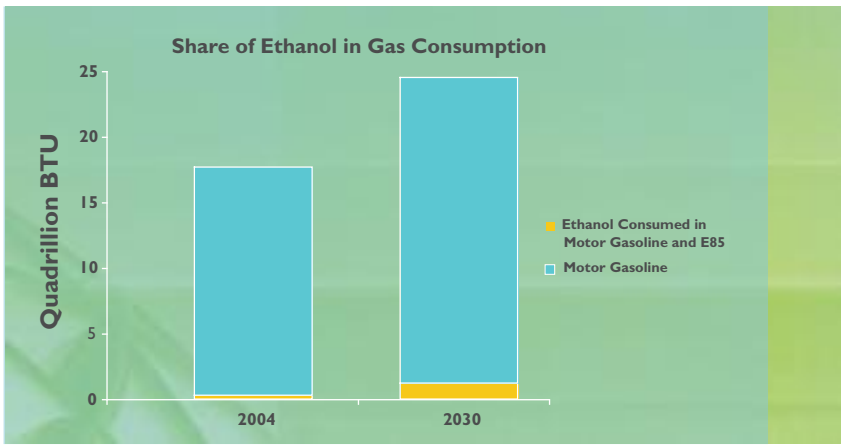
While the use of nuclear power is expected to grow, nuclear energy's share of the electricity portfolio is projected to decrease. Supplies of renewable energy sources for electricity will go up by 2030, but projections show their overall share will not rise beyond the current 9 percent.[51] This includes renewable supply that is required under existing state renewable portfolio standards.

Figure 5. U.S. Petroleum and Liquids Supply Consumption and Net Imports



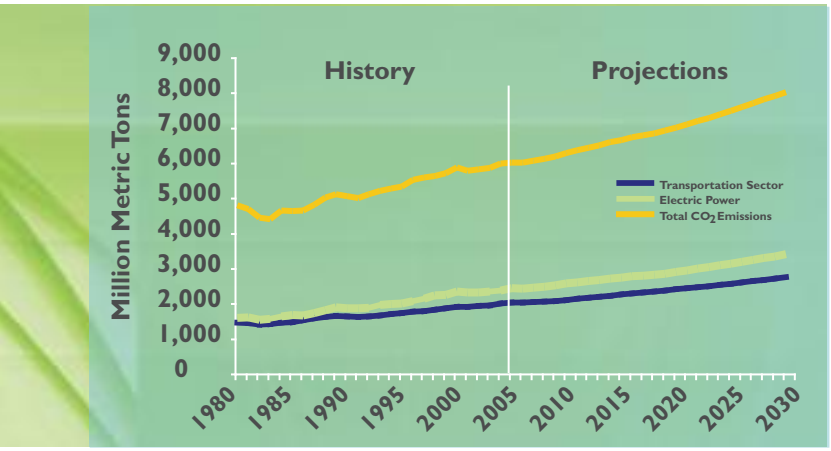
Source: Energy Information Administration

Figure 6. Gasoline Use Projected to Outpace Ethanol Use



Source: Energy Information Administration

Figure. 7. U.S. CO_2 Emissions



Source: Energy Information Administration
Note: The total CO_2 emissions figure includes additional sector emissions (industrial, residential, and commercial) that are not broken out separately.

Consequences for Our Energy Security and Environment

We are currently witnessing the consequences of our dependence on imported petroleum, our growing appetite for electricity consumption, and our increasing greenhouse gas emissions in the form of price volatility, energy security concerns, and climate change. But the situation going forward could be worse.[52] As fossil fuel usage for transportation and electricity increases, and as greenhouse gas emissions accumulate in the atmosphere, we face a range of environmental, health, economic, and other challenges that could seriously impact societies here and around the world. Three of those future consequences—supply interruptions, price spikes, and environmental impacts—are discussed below.

Supply Interruptions

Because we must import oil—much of it from unstable parts of the world—the U.S. is vulnerable to supply interruptions that could reverberate throughout our economy. Rising prices for transportation oil could increase the cost of goods and services, roiling stock markets.[53] Supply interruptions, not unprecedented, historically have had these consequences. The 1973 oil embargo, for example, led to dramatic price increases, leading the United States to establish the Strategic Petroleum Reserve.[54]

Price Increases

Price increases in petroleum can lead consumers to reduce spending on retail, tourism, and airline travel, and can impact shipping and other sectors.[55] Sustained higher oil prices—or dramatic price volatility—can impede economic growth.[56]

Energy-intensive companies could face increased costs that they are unable to pass on to consumers—who also would be hard-hit—resulting in reduced productivity and layoffs and creating a ripple effect throughout the economy.[57, 58]

Price increases are an ongoing risk associated with our dependence on imported oil. Our dependence on imported sources for such a large share of our oil, coupled with our overall consumption rates, risks our energy security and economic vitality.

Environmental Impacts

Our fossil fuel consumption carries serious consequences for the environment. IPCC's emissions scenarios show that worldwide greenhouse gas emissions need to be cut by 50 percent to 80 percent from 2000 levels by 2050 just to stabilize atmospheric concentrations of greenhouse gases and avoid the most damaging harms from climate change.[59] In addition to the rise in U.S. emissions, worldwide carbon dioxide emissions are projected to increase by more than 37 percent by 2030.[60] While the fastest growth in greenhouse gas emissions will come from developing nations such as China and India, on a per-capita basis China's emissions will still only be one-fourth and India's one-fourteenth of the U.S.'s emissions by 2025.[61]

While there is evidence that the changing climate has already altered human health, ecosystems, and sea levels, higher concentrations of atmospheric greenhouse gases could hasten these and other problems, including:

- Severe droughts, reduced snow cover, and melting glaciers, leading to a reduction in freshwater resources;[62]
- The extinction of large numbers of plant and animal populations;[63]
- Acidifying oceans that become less hospitable to many forms of marine life;
- Climate-related disturbances on land—frequent flooding, droughts, and wildfires—that damage habitats and reduce food supplies and biodiversity;[64]
- Global warming that renders some areas more hospitable to agriculture crops even as many other places see a drop in crop productivity;[65]
- The displacement of millions of people living in low-lying coastal areas—where 54 percent of the U.S. population resides—that face frequent flooding due to rising ocean levels;[66] and
- Climate change-related casualties from heat waves, floods, storms, fires, droughts, and increased disease risk,[67] impacting the most vulnerable among us, including the poor, infants, the elderly, and people living in the least developed nations that lack resources to adapt.[68]

[i] This is because carbon dioxide is emitted from both the coal production plant that turns coal into liquid fuel and from the vehicle using the fuel. Even if the majority of carbon dioxide emissions were captured and sequestered from the production plant, emissions could still be higher from coal to liquids than from conventional petroleum-based fuels.

Energy Myths

As our nation looks to meet the twin challenges of reducing dependence on imported oil and cutting greenhouse gas emissions, we are confronted with a number of myths and misconceptions that stand in our way as we try to reach consensus on how best to act. By addressing these myths, we can demonstrate that clean energy solutions are not only warranted, they are achievable.

Myth #1—Alternative Energy Equals More Expensive Energy

Myth: *We must choose between cleaner, more expensive energy and dirtier, cheaper energy.*

Fact: *Many sources of clean energy are cost-competitive now, and will be even more competitive in the future.*

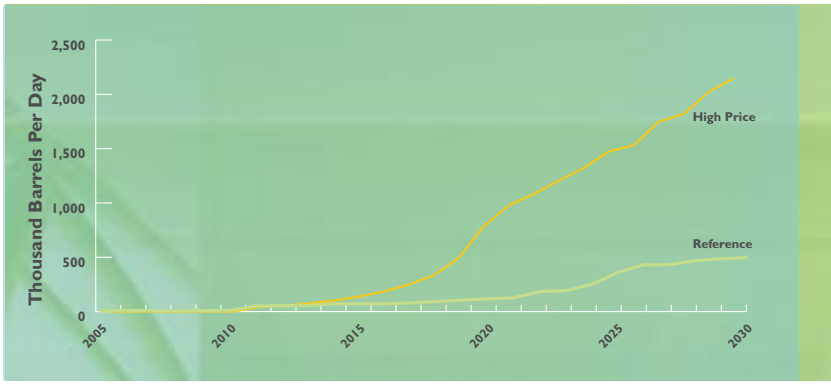
The old paradigm is that alternative energy is more expensive than traditional sources of energy, but this has begun to change. Prices for traditional sources of fossil energy are rising and supplies are tightening. Some clean sources have already become cost-competitive with traditional sources, and clean energy will continue to become more cost-competitive due to a number of factors explored below.

- **Prices for traditional sources are rising.** Traditional fossil fuels are facing production and pricing challenges. The world's supply of fossil fuels, such as petroleum, is finite, and we will increasingly use unconventional and more costly methods of obtaining these energy supplies. To fully meet future demand we will need to rely on difficult-to-extract fuels like tar sands, oil shale,[ii] and coal-to-liquid, particularly if world oil prices continue to rise (**Figure 8**).[69] Oil prices are not expected to drop below $70 per barrel in the near term,[70] so we are likely stuck with higher gasoline prices for the foreseeable future.[71]

  The United States also will be competing for finite oil resources with fast-growing nations such as China, the world's fastest growing consumer of oil.[72] China's total transportation energy fuel use is expected to increase by more than 11.2 quadrillion BTU (British thermal units) from 2004 to 2030, with road vehicles accounting for 70 percent of that growth.[73]

- **In a carbon-constrained future, clean energy will be increasingly cost-competitive.** As state and federal policymakers move to regulate carbon dioxide emissions, clean alternative sources will become cost-competitive. Carbon constraints would have a major impact on the electric power sector in particular. Coal has provided the bulk of the fuel for our nation's electricity needs and has been relatively inexpensive, although electricity prices have risen by 19 percent over the past three years.[74]

Figure 8. Total U.S. Unconventional Oil Production, 2005–2030



Source: Energy Information Administration

States, including **California, Montana, New Hampshire, Oregon,** and **Washington**, are already enacting greenhouse gas emissions performance requirements for new power plants. Meanwhile, **Massachusetts** set carbon dioxide emissions requirements for its six highest emitting power plants, and the 10 Northeast and Mid-Atlantic states participating in the Regional Greenhouse Gas Initiative are capping carbon dioxide emissions from power plants. Broader adoption of carbon constraints at the state and federal levels could make construction of traditional coal-fired power plants less likely. We have started to see potential future costs of carbon dioxide emissions regulation factored into investment plans for new coal plants, leading in some cases to the cancellation of proposed plants.[75] The costs for coal-fired electricity generation will likely increase even for coal gasification plants capable of sequestering carbon dioxide because they are more expensive to construct than conventional plants, and may in some cases require costly underground pipelines to transport carbon dioxide to storage sites.[76]

Natural gas may a better-suited traditional source in a carbon-constrained future, and some states are requiring all new power be at least as clean as natural gas. **California** already requires that greenhouse gas emissions for new capital power plants—whether for in-state plants or the purchase of out-of-state plants—be no higher than emissions from new combined-cycle natural gas plants.[77] **Washington** requires that power plants selling power in the state must either be at least as clean as new natural gas plants, or sequester excess carbon dioxide emissions.[78] Prices for natural gas, however, more than tripled between 1990 and 2005, and may continue to rise in the future due to projected increases in production costs and increased demand.[79]

Bottom line—While for decades we have enjoyed inexpensive, readily available, and uninterrupted power from traditional sources, we are entering a new era of increasing demand, tightening supplies, and unconventional production combined with regulatory-based carbon constraints. Some clean sources are already cost-competitive, given the challenges traditional sources face, many more clean sources will become cost-competitive.

[ii] Oil shale is rock that, when heated, releases petroleum-like liquids. Tar sands refer to a "combination of clay, sand, water, and bitumen, a heavy black viscous oil," which can be "mined and processed to extract the oil-rich bitumen, which is then refined into oil." Recovering oil from oil shale and tar sands is more complex, expensive, and energy intensive than recovering oil from conventional sources. Source: Bureau of Land Management, U.S. Department of the Interior. *Oil Shale and Tar Sands Leasing Programmatic EIS.* http://ostseis.anl.gov/guide/tarsands/index.cfm. Accessed Nov. 2007.

Myth #2—We Cannot Break Our Oil Addiction

Myth: *The United States has no viable alternative sources to an oil-based transportation system. Alternatives require costly new infrastructure and cannot be brought to scale in the near term.*

Fact: *While transportation accounts for approximately two-thirds of our oil use, there are several promising alternative fuels making inroads, and a number of alternatives to oil that can use existing infrastructure.*

There is no question that the United States is dependent on oil, 60 percent of which is imported (primarily for our transportation sector), and that this dependence is projected to continue and even increase in the future. We currently lack a diversified energy portfolio in the transportation sector, which is almost wholly dependent on oil.[80] There are, however, many commercial and cost-effective technologies that exist today that could transition the U.S. away from imported oil while diversifying our energy portfolio and improving energy security.[81] There are near-term solutions that would not require major new infrastructure and could be brought to scale today.

- **Corn-based ethanol and biodiesel**—Corn-based ethanol has limited potential, because corn crops are needed for food. Even in the unlikely event that the entire U.S. crop is used for ethanol it would only displace 25 percent of gasoline use.[82] In the short-term, however, biofuels like corn-based ethanol at various blends, such as E-10 and E-85,[iii] and biodiesel, with blends like B-2–B-5, B-20, and B-99–B-100,[iv] are the most readily available alternative fuels. Most are already available at fueling stations, can be used in most automobiles (although only flex-fuel vehicles can use E-85), and are priced competitively.[83] Planned plant investments will dramatically expand the potential for biodiesel and could boost U.S. biodiesel production capacity to 3.28 billion gallons per year within the next few years (this compares with 2005, when the U.S. produced 75 million gallons of biodiesel, compared with 40 billion gallons of diesel used for road transportation).[84] With investments in distribution infrastructure and more fueling stations offering ethanol and biodiesel blends, these fuels could offset significant portions of gasoline and diesel consumption, offering cleaner and cost-competitive alternatives.
- **Hybrid electric vehicles**—Hybrid electric vehicles (HEV) can produce higher fuel economy and reduce greenhouse gas emissions and, with tax incentives, can compete with traditional gasoline—or diesel-powered vehicles. Sales of HEVs—powered by a combination of a gasoline motor and electric battery—have grown rapidly in the United States, accounting for more than 2 percent of light vehicle sales so far in 2007.[85] HEVs are expected to make up almost 5 percent of light vehicle sales by 2010, and 10 percent by 2030.[86] In addition to traditional hybrids, plug-in electric hybrids, with batteries charged by the existing electricity infrastructure, offer a significant near-term potential alternative to gas-powered vehicles. Plug-in hybrids, designed to run for up to 40 miles on purely electric power with no tailpipe emissions, can expand that range to more than 600 miles when they operate their gasoline engines. Estimates are that plug-in hybrids could operate inexpensively (as low as 75 cents per-gallon-equivalent), reduce oil consumption by 60 percent, and cut greenhouse gas emissions by two-thirds, possibly more if the current electricity portfolio in the United States becomes cleaner, compared with traditional vehicles.[87] There are challenges around the costs of the battery, but plug-in hybrids are a promising technology.
- **Advanced diesel**—Diesel-fueled vehicles are more efficient and produce less green greenhouse gas emissions per mile than traditional gasoline-run vehicles.[88] Already prominent in Europe, diesel vehicles are projected to make up 10 percent of U.S. sales by 2015. If one-third of U.S. vehicles were diesel-powered, the United States could save up to 1.4 million barrels of oil per day.[89] Today's diesel engines and fuel are cleaner than even 10 years ago, and emit far less particulate matter, sulfur dioxide, and nitrogen oxides.[90] Another benefit of diesel fuel: today's vehicles already run on it, the fuel is widely available, and a new infrastructure is not needed to produce it.
- **Longer-term solutions requiring new infrastructure**—Longer-term solutions include hydrogen fuel cell technology and cellulosic ethanol (produced from straw and plant waste), which would have the advantage of transitioning us away from food-based alternative fuels. Cellulosic ethanol holds the greatest promise as an alternative fuel to reduce petroleum demand. Research indicates that the United States has enough available biomass to produce 270 billion gallons of ethanol a year, a figure almost double the total U.S. gasoline consumption per year.[91] Costs to produce cellulosic ethanol have declined and with additional commercial development, it could hold its own against gasoline in the future.[92] **Michigan** recently announced a new cellulosic ethanol plant that aims to become the first commercial-scale producer in the United States. Other states are working in partnership with the private sector to pursue this new technology.[93] While a demonstration plant in Canada is already producing nearly one million gallons of cellulosic ethanol a year from wheat straw, cellulosic ethanol still requires additional research and development before it can be considered a viable, cost-effective alternative.[94]

[iii] Blends of E-10 are 10 percent ethanol and 90 percent gasoline and are commonly used in all automobiles, while E-85 is an 85 percent ethanol, 15 percent gasoline blend that can only be used in alternative fuel vehicles capable of using E-85.

[iv] B-2–B-5 is a blend of 2-5 percent biodiesel, 95-98 percent diesel and can be used in most diesel automobiles. B-20 is a 20 percent biodiesel and 80 percent diesel mixture, and B-99–B-100 are 99 and 100 percent biodiesel respectively. Some traditional diesel automobiles may be capable of running on B-20 with modifications, but B-99–B-100 can be used only in specialized vehicles.

Bottom line—The United States is currently addicted to oil and our demand significantly exceeds domestic production. However, we have a number of both short- and long-term alternatives—including many clean diesel, hybrid vehicles, and plug-in hybrids—that use the existing infrastructure. If we create new infrastructure for clean alternative sources and further develop transformational fuels, such as cellulosic ethanol, we can break our oil addiction.

Myth #3—We Need Hundreds of New Power Plants

Myth: *Demand for electricity is projected to continue to grow robustly, and we can only meet that new demand by building new fossil fuel power plants.*

Fact: *Hundreds of new plants are not necessary. While fossil fuel plants will continue to meet a portion of demand and there will be new ones built, cost-effective energy efficiency is available to reduce a significant portion of new demand, and renewable energy can cost-effectively provide a portion of new capacity. Additionally, advanced coal technologies and new nuclear generation may be available to meet growing demand.*

Even allowing for some improvements in energy efficiency, electricity consumption is projected to increase more than 30 percent by 2030.[95] Without an increase in share for renewable sources and without vast improvements in energy efficiency and conservation, the U.S. Department of Energy's (U.S. DOE) Energy Information Administration has projected that we would need to add 347,000 megawatts of additional generating capacity, which, assuming an average plant capacity of 500 megawatts, would mean almost 700 new power plants coming on line by 2030 to meet the projected growth in electricity demand.[96] Other options are available to reduce the need for new fossil fuel-based power generation:

- **Energy efficiency**—In the electric power sector the source that has the greatest potential to offset demand for coal, natural gas, and petroleum is not actually a power source at all, but rather efficiency and conservation. The most recent efficiency and conservation study by the American Council for an Energy Efficient Economy (ACEEE) indicates that the nation could reduce electricity use by 1.2 percent per year through conservation and efficiency,[97] potentially offsetting 80 percent of the projected growth in electricity demand. Another recent study by the McKinsey Global Institute finds that the United States could use existing technologies to halt the growth in energy consumption and greenhouse gas emissions through improved productivity from existing energy use.[98] McKinsey has also found that projected global growth in energy consumption could be cut by more than half in the next 15 years using existing technologies and that the necessary steps to reach this goal would save consumers money.[99]

An earlier report, *The National Action Plan for Energy Efficiency*, jointly sponsored by the U.S. Environmental Protection Agency and U.S. DOE, cited state and regional studies that collectively found that economically attractive but untapped energy efficiencies could yield a more than 20 percent savings in total electricity demand nationwide by 2025, cutting growth in load demand by 50 percent or more.[100] This could create annual energy savings of almost $20 billion, defer the need for 20,000 megawatts of new capacity, and reduce carbon dioxide emissions by more than 200 million tons. Current investment nationwide in organized efficiency programs is less than $2 billion per year, but four times that amount of investment is needed to achieve the economic and environmental benefits cited above.

Efficiency can be the cheapest method of meeting growing demand. For instance, a study by ACEEE in **Florida** showed that the state could meet much of its growth in electricity demand through efficiency programs (combined with increasing supply of renewable energy), saving an estimated $28 billion over 15 years through reduced need for new power plant construction.[101] Implementing the energy efficiency and renewable energy programs called for in the study would result in 14,000 new jobs, help meet peak power demands, and avoid 37 million metric tons of carbon dioxide emissions by 2023, according to the study.

There is also great potential to save energy and money through state building code reform. According to U.S. DOE, if all states adopted and fully implemented a model energy code for commercial buildings, owners and tenants would lower their utility bills by $100 million in the first year and save $5.7 billion over 10 years.[102] **California's** 2005 residential and commercial construction code is expected to save 180 megawatts in annual energy demand, equivalent to the electricity needs of 180,000 homes.[103]

California, in fact, proves that energy efficiency and conservation can reduce the need for new generation. While per-capita energy consumption in the United States has been on the rise over the past several decades, **California** has held per-person consumption steady since the 1970s through a number of replicable efficiency programs and standards.[104]

- **Renewable energy**—In addition to meeting demand through efficiency and conservation, alternative electric power generation sources can help meet future electricity demand. Admittedly, there are challenges to increasing the renewable power supply; it's not always sunny or windy, so solar and wind power have their limits. These sources are still expensive and not available in certain regions.[105] Renewable sources do offer a significant advantage in that, over time, they can be less expensive to operate than traditional power plants because their fuel (as in the case of solar, wind, and geothermal energy) is often free or less expensive than traditional sources.

Still, geothermal energy, in particular, can provide power for electricity and heating, and is already at work in a number of states. Particularly in the Western states, this type of energy, which is generated by heat stored in the surface of the Earth, has the potential to offset traditional sources in a cost-competitive manner. In **Hawaii**, domestically produced, clean geothermal power provides low-cost electricity to residential and commercial consumers, meeting 20 percent of demand on Hawaii's Big Island and eliminating the need for 4 million barrels of oil over 10 years.[106] A recent study found that geothermal has the potential to produce 100 gigawatts of cost-competitive generating capacity over the next 50 years, and that most of the key technical requirements are already in place across the country.[107]

Solar power, biomass, and wind power are also clean alternatives, although sun and wind are intermittent and for that reason may not be perfectly suited for baseload generating capacity. Solar has significant potential, but is constrained by cost and intermittency issues (caused by cloud cover, seasonality, nighttime, etc.).[108] Wind power now provides less than 1 percent of total electricity in the United States, but has the potential to provide up to 6 percent by 2020 at a cost-competitive rate.[109] Biomass has the greatest potential of the three to provide significant electric power generation. A study by the National Renewable Energy Laboratory examined the potential for biomass to meet electricity demand in **Minnesota** and found that the state has enough energy crops and residual biomass to meet up to 99 percent of electricity consumption (assuming that the most efficient conversion technologies are used).[110]

Studies indicate that a goal of 25 percent renewable energy by 2025 is realistic and that as renewable sources such as wind, solar, and biomass come down in price, they should become more realistic alternatives at that scale.[111] In fact, in states already requiring that a certain percentage of power come from renewables through a renewable portfolio standard, the median increase in electricity bills for consumers in the year when the target reached its peak was relatively small, at 38 cents per month, according to a Lawrence Berkeley National Laboratory study.[112]

- **Developing and expanding cleaner coal**—While coal is the most carbon-intensive fossil fuel resource, there are efforts underway in states and nationally to transition to cleaner coal technologies. Already, there are integrated combined-cycle gasification (IGCC) coal power plants operating in the United States. The benefits of these plants include improved efficiency, reduced emissions of nitrogen oxides and sulfur oxides, and the potential to more cost-effectively concentrate and capture carbon dioxide emissions.[113] However, once the carbon dioxide emissions are captured, they must be sequestered (in underground geologic storage) to fully realize the greenhouse gas emissions reductions benefits of IGCC technology. While there are pilot demonstrations of commercial-scale carbon dioxide capture, injection, and sequestration, this is a relatively untested technology.[114] There are also other issues that remain to be resolved around insurance and liability for the sequestration storage sites, which could leak carbon dioxide and pose a threat to human health. Despite concerns over carbon dioxide leakage and commercial viability, a number of policymakers believe the technology has strong potential.

  Through a mix of incentives and requirements, states are promoting the adoption of cleaner coal technology. **Pennsylvania** is offering financial and regulatory incentives to utilities to shut down older, less efficient coal-fired plants and re-power them with IGCC technology.[115] **Montana** requires that all new coal-fired power plants are capable of capturing and sequestering at least half of the carbon dioxide produced by the plant, and **Kansas** is offering property tax incentives for land used for carbon storage.[116] The U.S. DOE, in partnership with industry and states, is working on mapping geologic sites for sequestration potential and developing demonstration projects that will test the feasibility of commercial scale IGCC plants that use sequestration to achieve zero or near-zero emissions.[117] Analysis from the Electric Power Research Institute shows that IGCC with carbon sequestration has the potential—along with complementary efforts in energy efficiency and increased use of renewable sources—to transform the nation's electricity portfolio, and dramatically reduce carbon dioxide emissions.[118]

- **Expanding nuclear capacity**—Currently nuclear power provides approximately 20 percent of the electricity used in the United States without emitting greenhouse gases, and the Energy Information Administration projects that nuclear capacity will increase from 100 gigawatts in 2005 to 112.6 gigawatts in 2030.[119] This would, however, represent a decline in the overall share of nuclear power in our electricity portfolio due to growing demand for electricity. The last nuclear plant to come online in the United States was in 1996 (the last order for a plant was in the 1970s), and while nuclear capacity has been growing, this is due to additional generation from existing plants. One reason for the lack of new nuclear plant construction is the high capital cost, although the 2005 Energy Policy Act (EPACT) federal legislation provides tax credits to help address those costs.[120] Safety is another concern; however, the greatest ongoing concern with nuclear power is where to safely store nuclear waste. There are efforts to explore reprocessing, recycling, and destroying nuclear waste products, but these methods require additional investment and new infrastructure.[121]

  For some states and policymakers, however, nuclear power is one part of a clean energy future. Utilities and industry are now showing renewed interest in constructing new nuclear plants (some with advanced safety systems) and, depending on the economics, it is possible that we could see a much larger expansion in nuclear capacity than is currently projected by the Energy Information Administration. The U.S. Nuclear Regulatory Commission and the nuclear power industry expect applications for at least 32 new nuclear power reactors in the next few years.[122] This would provide additional electricity generation to meet growing demand without emitting additional greenhouse gases.

Bottom line—While demand for electricity is growing, and fossil fuel plants will continue to meet a portion of demand, building hundreds of new fossil fuel plants is not our only option. It is possible to keep consumption per capita flat over a period of years, reducing the need for new baseload generation. We have cost-effective energy efficiency and renewable energy to meet a significant portion of demand. Additionally, advanced coal plants with the capacity to sequester carbon dioxide and new nuclear generation could help meet demand while emitting limited or no additional greenhouse gases.

Myth #4—Climate Change Has Progressed Too Far

Myth: *Climate change is inevitable, and we lack the ability to reduce greenhouse gas emissions enough to make a difference.*

Fact: *While some warming is now inevitable, we still have a chance to avoid the worst consequences of climate change by acting now to reduce emissions through currently available technology.*

Having already raised the atmospheric levels of greenhouse gases beyond their known high concentration for the past 400,000 years we have committed the planet to a certain amount of warming.[123] The gases already in the atmosphere due to human activity will stay there for decades—in some cases even longer—warming the planet for the next few hundred years.[124] There will be a number of negative consequences from this warming, but if we do nothing to reduce our emissions and stabilize greenhouse gas concentrations in the atmosphere, we commit ourselves to even higher temperature increases, further imperiling plant, animal, and human life.[125]

For every degree Fahrenheit that we increase temperatures, the consequences become more dramatic and less reversible. A temperature increase of one or two degrees Fahrenheit compared with eight or 10 degrees Fahrenheit could mean the difference between preserving a habitable planet and severely endangering our communities and our way of life. Climate change has economic consequences as well. The *Stern Review on the Economics of Climate Change*, authored by Sir Nicholas Stern, head of the Government Economic Service and advisor to the British government, spells out the consequences. Stern's economic analysis finds that by failing to act, we risk losing 5 percent of global gross domestic product (GDP) annually "now and forever," and in the worst case, face losses of up to 20 percent annually.[126]

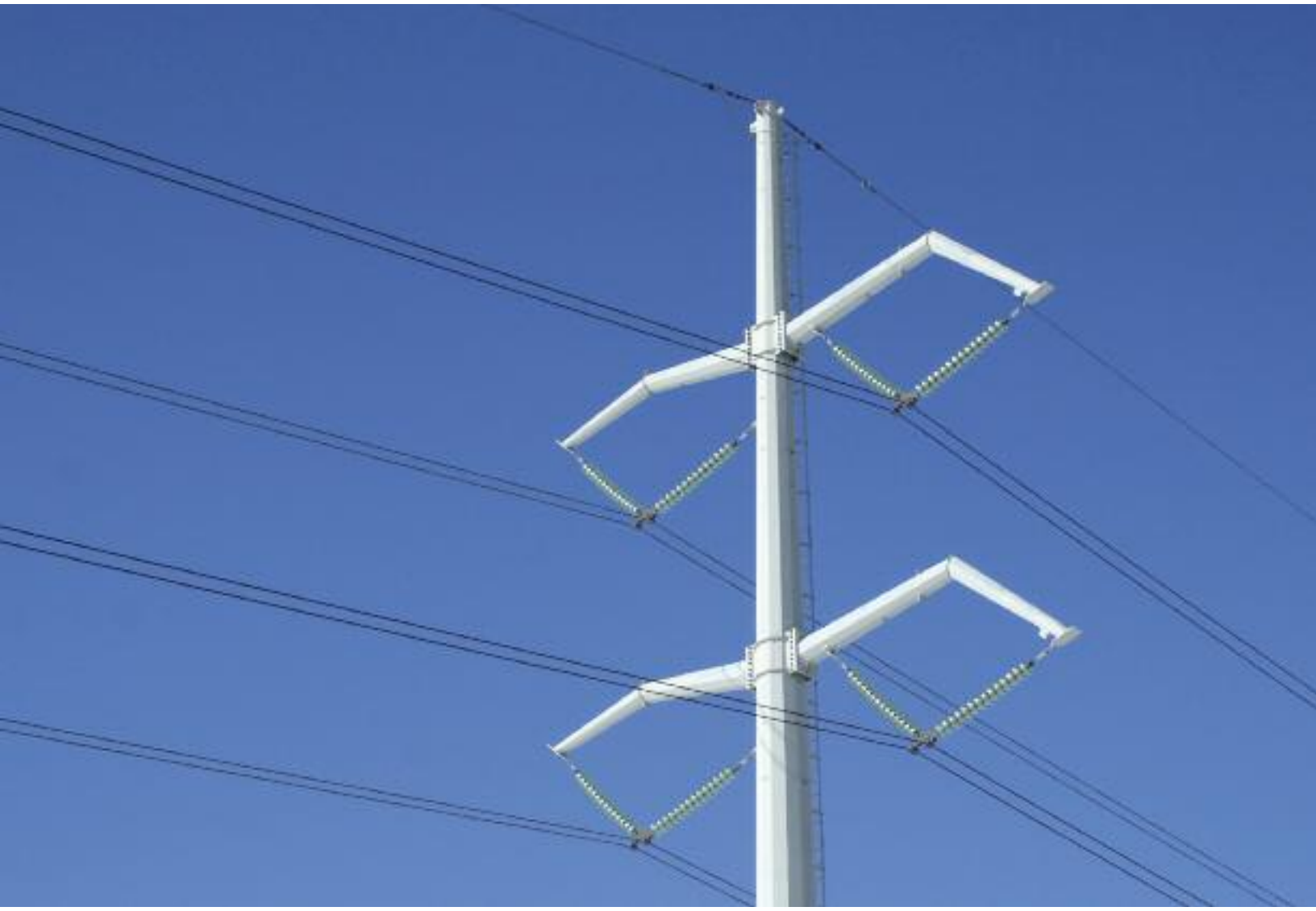
Alternatively, by acting to reduce greenhouse gas emissions in the next few decades, we can avoid the worst consequences and limit the economic impact of climate change to an annual loss of 1 percent GDP.[127] **The question is this:** Can we continue to grow the economy while reducing and then stabilizing our greenhouse gas emissions to avoid the most harmful effects of climate change? The answer is yes, but as the options below demonstrate, it won't be easy.

- **What we can do**—Two scientists from Princeton University offer a plausible, if sobering, analysis of how we can avoid the most harmful effects of climate change. Using IPCC data, Robert Socolow and Stephen Pacala have developed the Stabilization Wedge model.[128] Socolow and Pacala look at what it will take to stabilize the concentration of carbon dioxide in the atmosphere at no more than double our pre-industrial level. This would require reducing global greenhouse gas emissions from a projected 14 billion tons to 7 billion tons by 2055. This is the level at which the IPCC predicts we can avoid the most harmful effects of climate change.

  Socolow and Pacala divide up the 7 billion tons into seven wedges—each worth a 1 billion-ton reduction in greenhouse gas emissions. They examine commercially available technologies that could be brought to a greater scale, and find a number of possible ways to reach the 7 billion ton reduction.

  For example, improving energy efficiency by 25 percent for buildings and appliances by 2055 would represent a 1 billion ton reduction (one wedge). Another wedge would be decreasing vehicle miles traveled for 2 billion automobiles that get 30 miles per gallon from 10,000 miles per year to 5,000 miles per year by 2055. Yet another would be building 1 million 2-megawatt wind turbines and, in the process, displacing an equivalent amount of coal power. Increasing the efficiency of coal power production represents another wedge. There are 15 wedges that Socolow and Pacala identify as feasible options.

Bottom line—Although some warming is inevitable, that is not an excuse for inaction or hesitation. The IPCC report is clear: To achieve stabilization at the concentration that is necessary, with minimum negative consequences for economic growth, we must act now.[129] The wedge model demonstrates that by investing in and scaling up currently available technologies, we could achieve the reductions necessary to avoid the most harmful effects of climate change.



Governors have the unique ability to engage consumers, businesses, and the broader public to change our energy future.

States Are Positioned to Lead

Given these facts, we are compelled to find solutions. States have historically operated as policy laboratories, experimenting with innovative initiatives that are often the basis for broader regional and national policies. As national attention has focused increasingly on the twin challenges of reducing our dependence on imported oil and lowering our greenhouse gas emissions, states have stepped in to take action.

The federal government has broad energy policy responsibilities, such as regulating interstate transmission of electricity, natural gas, and oil. In addition, the federal government can impact consumption through mandates, tax policy, and regulatory authority (such as setting automobile fuel efficiency standards).

However, states can enact policies to complement federal initiatives and fill a void in the absence of federal action. States are nimble enough to address policy challenges head on. They can act to address energy concerns regionally or use their unique authority and incentives to reduce consumption and increase the use of clean, domestically produced renewable sources for transportation and power. Many governors have taken the first steps to lead their states in what will be a long-term commitment to change America's energy future. State actions, in tandem with reforms at the federal level, can create the conditions for a secure energy future.

States Can Be Nimble in Responding to Challenges

A cornerstone of U.S. federalism is that states have a specific role to play in policymaking that is enshrined in the U.S. Constitution. As Supreme Court Justice Louis Brandeis stated, "[I]t is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country."[130] With a smaller population to govern and, in some cases, broader regulatory authority than the federal government, states can respond more immediately and in diverse and innovative ways to challenges like climate change.

For example, states are credited with leading the welfare reform movement, which eventually led to a federal welfare reform law. Decades before the federal Clean Air Act was enacted, **California** passed its landmark Air Pollution Control Act.[131] And in health care policy, states have been leading the way on enacting reforms to improve access to coverage for all state residents.[132]

States have also shown agility in response to energy and climate change challenges. While the federal government has been developing—through congressional legislation, administration proposals and, most recently, federal court actions—policies to address climate change, there is currently no national limit or tax on greenhouse gas emissions or targeted sector-specific caps. Seventeen states, however, have set greenhouse gas emissions reduction targets, and coalitions of six Western states and 10 Northeastern and Mid-Atlantic states are developing regional cap-and-trade markets to cost effectively reduce their emissions.[133] In developing varied policies that fit their regional resources and by testing different policy approaches, states can be leaders in responding quickly and effectively to America's energy challenges.

Regional Approaches May Be Necessary

The ability of states to act in regional coalitions sets them at the forefront of shaping the nation's response to our energy challenges. Clean energy resources, such as ethanol, wind, solar, geothermal, and other types are more readily available in certain regions, making regional energy planning necessary. Working individually or in coalitions, states are in the best position to support the production and use of these clean energy sources. States are closer to the producers and consumers of these resources and understand what is practical and possible.

Clean Energy Resources for Electricity

States and regions have varying potential for different clean energy resources. For this reason, the states that have developed renewable portfolio standards (RPS), which require or encourage a certain percentage or megawatt target for renewable electricity generation, have tailored their standards to the resources available in their state or region. The 29 states that have individually developed an RPS are collectively helping to diversify the nation's energy portfolio.[134] State action, because it allows for flexibility in standards and accommodates the use of regionally available resources, is uniquely suited to promote the use of renewable energy for electricity generation. Some states use a carve-out provision in their RPS standards to spur the development of underused resources by setting specific electricity consumption targets for particular sources (e.g., 5 percent from solar).

Clean Energy Resources for Transportation Fuels

As with clean electricity generation sources, states and regions also have varying potential to produce and use clean transportation fuels. Unlike electricity, however, there is less ability to transfer certain clean fuels produced in one state to another, which has meant that for some fuels a more regionally oriented approach has developed.

The production and use of corn ethanol is an example of this regional approach. Production of corn ethanol is less expensive when it is closer to the feedstock supply. Moreover, corn ethanol blends cannot be piped through existing petroleum pipelines and must be transported by truck, rail, or barge, adding significant costs when it is used in states far from production centers. As a result, production and use of this alternative transportation fuel has been greatest in the corn-growing states of the Midwest.[135] These states have also enacted policies that promote the use of their homegrown fuel. For example,

Minnesota requires all gasoline to include at least 10 percent ethanol, and **Kansas** requires the use of E-10 ethanol blends in state vehicles and equipment when it is cost effective (priced no higher than 10 cents more per gallon than regular fuel).

Similarly, other alternative fuel sources have regionally based advantages—in production and/or transportation—that have tended to regionalize their use. While the nation seeks to increase the use of domestic clean fuels, states and regions are using their varied resources to promote the production and use of the fuels that best fit their needs.

States Have Unique Levers and Can Lead By Example

States have the power to regulate broadly for the health, safety, and welfare of their citizens.[136] States are also closer to their citizens and can work effectively with consumers to achieve state energy objectives. Among the levers states have at their disposal are the ability to lead by example, to impose incentives and mandates, to shape the built environment, and to use public procurement to drive markets.

States Lead by Example—State government, which is often one of the largest energy users, can lead by example. States can require that all government buildings meet green building performance standards for energy efficiency. For example, **Washington** requires that all state buildings, new public schools, and other facilities receiving state funding achieve a Leadership in Energy and Environmental Design (LEED) silver rating.[137] States can also require that all appliances or equipment in state government meet energy efficiency standards. States can also authorize public entities such as schools, municipalities, and state agencies to use projected savings to finance the purchase of energy efficient equipment (eliminating the need for up-front capital because an energy service company will typically arrange for the financing, installation, and operation).[138] This is known as performance contracting.

Incentives and Mandates—States have significant regulatory authority over their utilities, often through state utility commissions whose members are in most cases appointed by governors. Working with utilities and, indirectly, through the consumers those utilities serve, states have a close connection to the end power users.

One approach states can take with their utilities is to shape utility rates and cost recovery provisions to encourage and reward clean energy investments. A number of states have done so with their natural gas utilities, and fewer have done so with their electric utilities, although states are exploring both options.[139] In some cases states are exploring additional incentives for utilities that aggressively promote energy efficiency. Some states have set up competing "sustainable utilities" whose sole purpose is to provide energy efficiency services to consumers. States can also issue loading orders, which require utilities to use cost-effective and untapped energy efficiency to meet growing demand before considering traditional methods of meeting demand, such as constructing new power plants or expanding existing plants. Some states also require that a certain percentage of utility profits (or a small cost item on consumers' utility bills) be invested in public benefit funds devoted to clean energy and energy-efficiency programs.

States can also require their utilities to purchase and use renewable energy. As mentioned, 29 states now have renewable portfolio standards that require their utilities to reach a certain percentage or megawatt target for use of renewable energy in the state. States also can set interconnection standards and require that utilities offer net metering. These steps encourage consumers to purchase and use on-site renewable energy because they can ensure that consumers can lower their utility bills by using their own power. In cases where they produce excess power, consumers can sell it back to the utilities through the grid.

In addition to incentives and mandates for alternative electricity generation, states can use incentives and mandates to promote alternative transportation fuels and vehicles and to reduce consumption of petroleum. Some states require that gasoline contain a certain percentage blend of ethanol, or that all diesel contain a certain percentage blend of biodiesel. Other states also offer incentives for the development of alternative fuel infrastructure such as fuel pumps that offer alternative fuels. Another option is to pursue a low-carbon fuel standard that requires all transportation fuel sold in the state to be less carbon-intensive. A number of states have adopted a greenhouse gas emissions standard for vehicles. States also offer incentives to consumers to purchase advanced vehicles such as gasoline-hybrids.

Procurement Power—State government can send a strong signal to the market by purchasing clean electricity for state buildings, and requiring the purchase of efficient or alternative fuel vehicles for the state fleet. For example, **Connecticut** requires that by 2020, half of all electricity purchased by state government and universities must come from renewable sources, increasing that to a requirement of all electricity from renewable sources by 2050.[140] In addition to providing an initial market for emerging technologies, state procurement of clean energy and clean vehicles also provides a rationale for clean energy infrastructure development to service state government.

Built Environment—States can shape the built environment to make buildings more energy efficient and reduce vehicle miles traveled. By adopting more stringent building energy codes and appliance standards, states can achieve significant gains in energy efficiency and save consumers money on their energy bills. States also have a role (through state infrastructure investments and also, in some states, through growth management laws) in shaping development, which can be a critical component in reducing vehicles miles traveled and conserving transportation fuels.

Conclusion—Roadmap to a Clean Energy Future

The nation faces significant and serious energy challenges that call for action today. Governors have the unique ability to engage consumers, businesses, and the broader public to change our energy future. While the choices will not always be easy, we must not wait to act. It is not tenable to deny having a problem; our consumption patterns and our reliance on traditional fossil fuel sources clearly say otherwise.

Changing our behavior is a difficult proposition. Looking at our growing dependence on imported oil, our rising greenhouse gas emissions, and projections that business as usual will only lead us down an unsustainable path, it is understandable that one might be pessimistic or paralyzed by inaction.

Yet, as this *Call to Action* shows, there are reasons for hope and optimism. There are numerous policies at hand that can change the projections, transform our energy portfolio, and realize the promise of clean energy.

Over the course of the *Securing a Clean Energy Future* initiative, governors across the nation, led by a bipartisan task force of eight governors, will work to make meaningful progress. Governors will explore cost-effective opportunities to reduce energy consumption, promote alternative fuels, bring advanced clean electricity generation to a larger scale, and accelerate research, development, and deployment of promising technologies. All of these steps will be taken with the aim of maintaining and improving our energy infrastructure while continuing to ensure the reliable flow of energy to consumers.

The National Governors Association will work to identify opportunities for multistate compacts and state-industry partnerships that meet the initiative's objectives of reducing consumption, promoting clean energy alternatives, and reducing greenhouse gas emissions.

States are a powerful force for change. Their actions, individually and in regional coalitions, will collectively shape our nation's energy policy. Each governor, working with colleagues around the nation, now has the opportunity to use all of the tools at his or her disposal to help the nation meet its energy challenges and lead the United States toward a secure, clean, and sustainable energy future.

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