INSTITUTE FOR ENERGY RESEARCH

BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER

COMMITTEE ON ENERGY AND COMMERCE

HEARING ON American Energy Security and Innovation: An Assessment of North America's Energy Resources

FEBRUARY 5, 2013

TESTIMONY OF MARY J. HUTZLER

THE INSTITUTE FOR ENERGY RESEARCH

The Institute for Energy Research (IER) is a non-profit organization that conducts research and analysis on the functions, operations, and government regulation of global energy markets. IER articulates free market positions that respect private property rights and promote efficient outcomes for energy consumers and producers. IER staff and scholars educate policymakers and the general public on the economic and environmental benefits of free market energy. The organization was founded in 1989 as a public foundation under Section 501(c)(3) of the Internal Revenue Code. Funding for the institute comes from tax-deductible contributions of individuals, foundations, and corporations.

The United States is Energy Rich

The United States has vast resources of oil, natural gas, and coal. In a few short years, a forty year paradigm—that we were energy resource poor—has been disproven. Instead of being resource poor, we are incredibly energy rich. The world

is changing and the private sector in the United States is leading the way. In December 2011, IER published a report entitled *North American Energy Inventory* that provides the magnitude of these resources for the United States, Canada, and Mexico.[1] As the report shows, the United States is vastly endowed in all three forms of organic fossil energy. In fact, the amount of technically recoverable oil in the United States totals almost 90 percent of the entire oil reserves in the world.[2]

Technically recoverable resources are not equivalent to reserves, but comparing their magnitudes provides a way to measure size. Technically recoverable resources are undiscovered resources that are recoverable with existing drilling and production technologies, but may not be economic at today's prices. Reserves, on the other hand, are resources that are easily accessible and recoverable with today's technology and at today's oil prices. IER's estimate of technically recoverable oil in the United States is 1,422 billion barrels. That amount of oil can satisfy U.S. oil demand for 250 years at current usage rates or it can fuel every passenger car in the United States for 430 years. It is also more oil than the entire world has used in all human history.

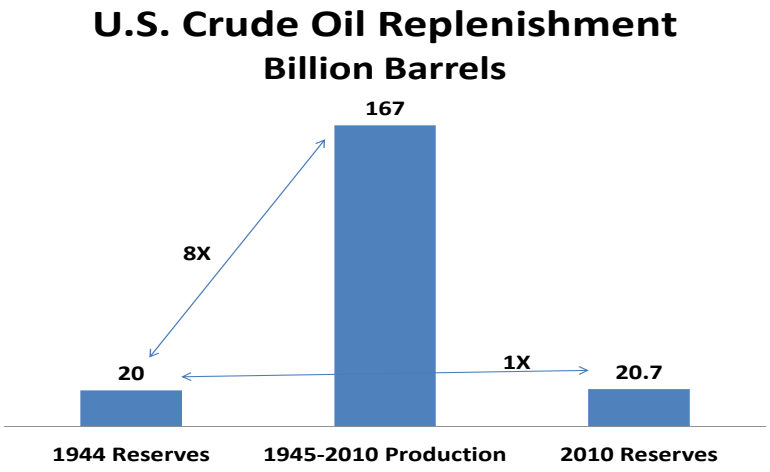
The technically recoverable natural gas resources in the United States total 40 percent of the world's natural gas reserves. At 2,744 trillion cubic feet, it can fuel natural gas demand in the United States for 175 years at current usage rates, or selectively, it can satisfy the nation's residential demand for 857 years or the nation's electricity demand for 575 years.

The technically recoverable coal resources in the United States are unsurpassed and total 50 percent of the world's coal reserves. At 486 billion short tons, it can supply our country's electricity demand for coal for almost 500 years at current usage rates. In fact, the United States has the largest coal reserves of any country in the world with Russia and China rounding out the top three countries in ranking. While we have the largest coal reserves in the world, we do not consume the largest amount of coal. China consumes almost 4 times the amount of coal as we do here in the United States, although its coal reserves are much smaller than ours.[3] In 2011, China consumed more than 3.8 billion short tons of coal while the United States consumed 1 billion short tons.[4] Because government policies are making coal more difficult to use in the United States, some U.S. mining companies are exporting coal to China and elsewhere, in turn keeping mining jobs here at home.

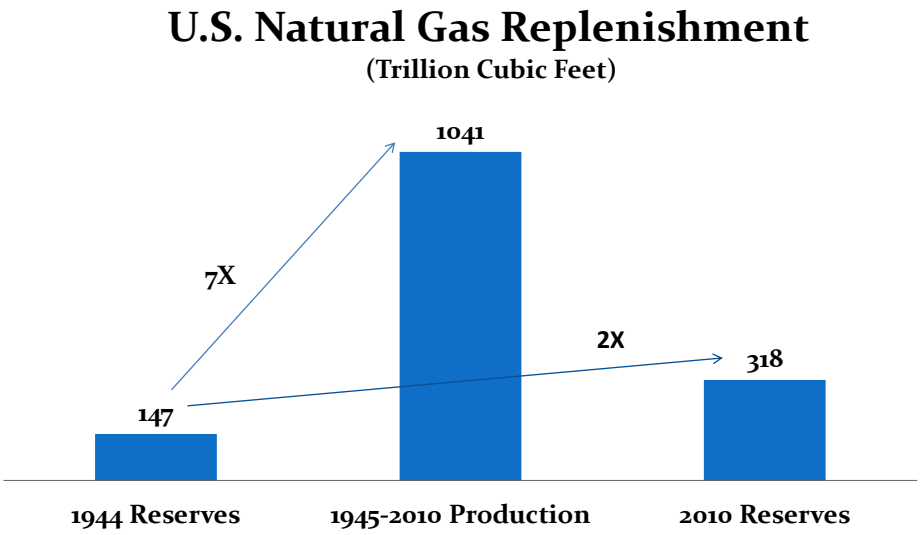
The reason why technically recoverable resources are important is that they become reserves when one or more of the following occurs: technology is developed that enables the resource to become economic such as with hydraulic fracturing, the price of the resource increases to enable production with existing technology, or more resource-rich lands or waters are made available to industry to develop.

Historical production and reserve numbers provide documentation regarding the transition from technically recoverable resources to reserves. For example, in 1944, U.S. oil reserves totaled 20 billion barrels and yet our oil and gas industry produced 167 billion barrels between 1945 and 2010—*8 times the amount of reserves available in 1944*—and the amount of U.S. oil reserves in 2010 still totaled 20.7

billion barrels. Thus, there was no reserve depletion; there was reserve replenishment.



The same is true for natural gas. In 1944, the United states had 147 trillion cubic feet of natural gas reserves, and yet had produced 1,041 trillion cubic feet between 1945 and 2010—7 times the amount of reserves available in 1944. In this case, however, the U.S. oil and gas industry was able to double the 1944 natural gas reserve level with 318 trillion cubic feet in reserves in 2010.



The Myth of Peak Oil, Natural Gas, and Coal

For many years, we have heard of fossil fuels reaching their peak production levels or at the verge of being depleted. For instance in 1855, an advertisement for "Kier's Rock Oil" indicated "...Hurry, before this wonderful product is depleted from Nature's laboratory!" and that was four years *before* the first U.S. oil well was drilled! And in 1919, David White, the Chief Geologist of the United States Geologic Survey stated "...the peak of [U.S.] production will soon be passed—possibly within three years." But, instead, we find that our oil production is growing with forecasters such as the International Energy Agency now predicting that the United States will become the world's largest oil producer by 2017.[5] Further, the IEA predicts that the United States will become almost energy self-sufficient by 2035.

And the peak production myth was not confined to just oil. For example, in January of 2007, Paul Hanrahan, the Chief Executive Officer of AES Power stated "The U.S. is running out of natural gas—production is declining and demand growing—so the expectation is that the import levels will go from 3 percent today to about 24 percent in 2020." Forecasters such as the Energy Information Administration were predicting that there would not be enough North American natural gas to meet demand and that we needed to build facilities for importing liquefied natural gas. Just a few years later, we find instead a shale gas boom and economics dictating that those *importing* facilities will become terminals for *exporting* natural gas as long as the government approves.

The same is true for the myth of 'peak' coal. In 2007, David Hughes, Geologist for the Geological Survey of Canada, stated, "Peak coal looks like it's occurred in the lower 48." And yet, the United States still has the largest coal reserves in the world. Rather than depletion effects, our coal industry is faced with overly broad and restrictive regulations on the use of coal and increasing restrictions on coal production from the U.S. Environmental Protection Agency.

The U.S. Shale Oil and Gas Revolution

The reason for the boom in both oil and natural gas production in the United States is that our oil and gas industry was able to revolutionize drilling and production from shale formations by combining hydraulic fracturing and horizontal drilling technology. Hydraulic fracturing uses water, sand, and trace amounts of chemicals to break apart the shale rock and horizontal drilling allows the oil to be produced

from the shale formations which, vein-like, run parallel to the surface thousands of feet below . Hydraulic fracturing has been in use since the 1940s, but combining fracturing with horizontal drilling allows much more of the oil and natural gas to be extracted than if the hydraulic fracturing was only used in vertical wells. When combined with the incredible advances in computer interpretive capabilities, an energy miracle is afoot.

That these technologies have combined to revolutionize the industry can be seen from the following example. In 1995, before hydraulic fracturing was being used in shale oil and shale gas drilling, the U.S. Geological Survey (USGS) estimated that the Bakken formation held 151 million barrels of technically recoverable oil. But in 2008, after the impact of hydraulic fracturing and horizontal drilling was included in the USGS's assessment, the estimate of recoverable oil in the Bakken jumped by a factor of 25.[6] The oil was always there, but it was human ingenuity, free enterprise and the application of technology—the things that have always made America great—that combined to free these energy riches.

Ten years ago, shale oil formations produced about 200,000 barrels of oil a day. Today, these formations produce over one million barrels and production could reach three million barrels a day by 2020. This new oil production is occurring in a number of places around the country, including the Bakken formation in North Dakota, the Eagle Ford formation in Texas, and the Niobrara formation in Colorado. Unlike the large oil fields of the past few decades such as the fields in the Gulf of Mexico or Prudhoe Bay, Alaska, these new shale fields are mostly on private and

state lands. As a result, total U.S. oil production has increased, in spite of the federal government leasing fewer and fewer acres for energy production.

Shale gas has greatly increased the nation's supply of natural gas and has made the United States the largest natural gas producer in the world. In 2011, the United States out produced Russia by almost 5 trillion cubic feet (28.6 trillion cubic feet of natural gas produced here compared to 23.7 trillion cubic feet produced in Russia).[7] The U.S. Marcellus and Barnett shale formations are providing vast new natural gas reserves. U.S. proven reserves of shale gas increased from 21.7 trillion cubic feet in 2007[8] to 60.6 trillion cubic feet[9] in 2010. Between 2007 and 2010, shale gas production increased by over 300 percent from 1.3 trillion cubic feet produced in 2007 and 5.3 trillion cubic feet produced in 2010.[10]

The outlook for natural gas production in the United States has dramatically changed over the last decade. Just a few years ago, U.S. manufacturing facilities were moving abroad to pursue more affordable gas. At the time, the U.S. had relatively high natural gas prices. Now, due to hydraulic fracturing technology, energy companies are considering building liquefied natural gas terminals to export natural gas and new manufacturing plants are springing up around the country. The boom in natural gas production has completely changed the natural gas landscape and has greatly lowered natural gas prices for consumers and industrial users.

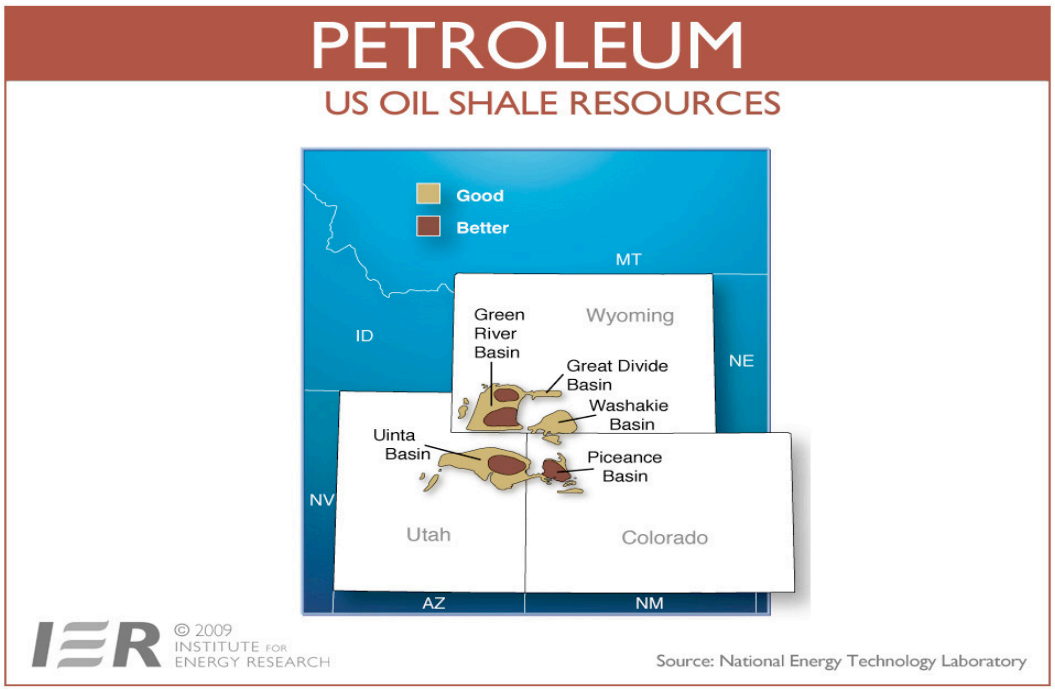
Lower energy prices benefit the entire economy, but especially the economically disadvantaged and those on fixed incomes. Expanded energy production resulting in lower prices is thus a benefit to society.

Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

The increase in hydraulic fracturing, however, has led to attacks on natural gas production. Many special interest groups have launched anti-hydraulic fracturing campaigns, claiming that it is a new, dangerous technology that contaminates groundwater. But the reality is far different. Hydraulic fracturing has been used for over 60 years in over one million wells. Despite this widespread use—much of which occurred well before there were as rigorous state regulatory programs as there are today—there are no confirmed cases of groundwater contamination from hydraulic fracturing. If there was a problem, it would have shown up by now.

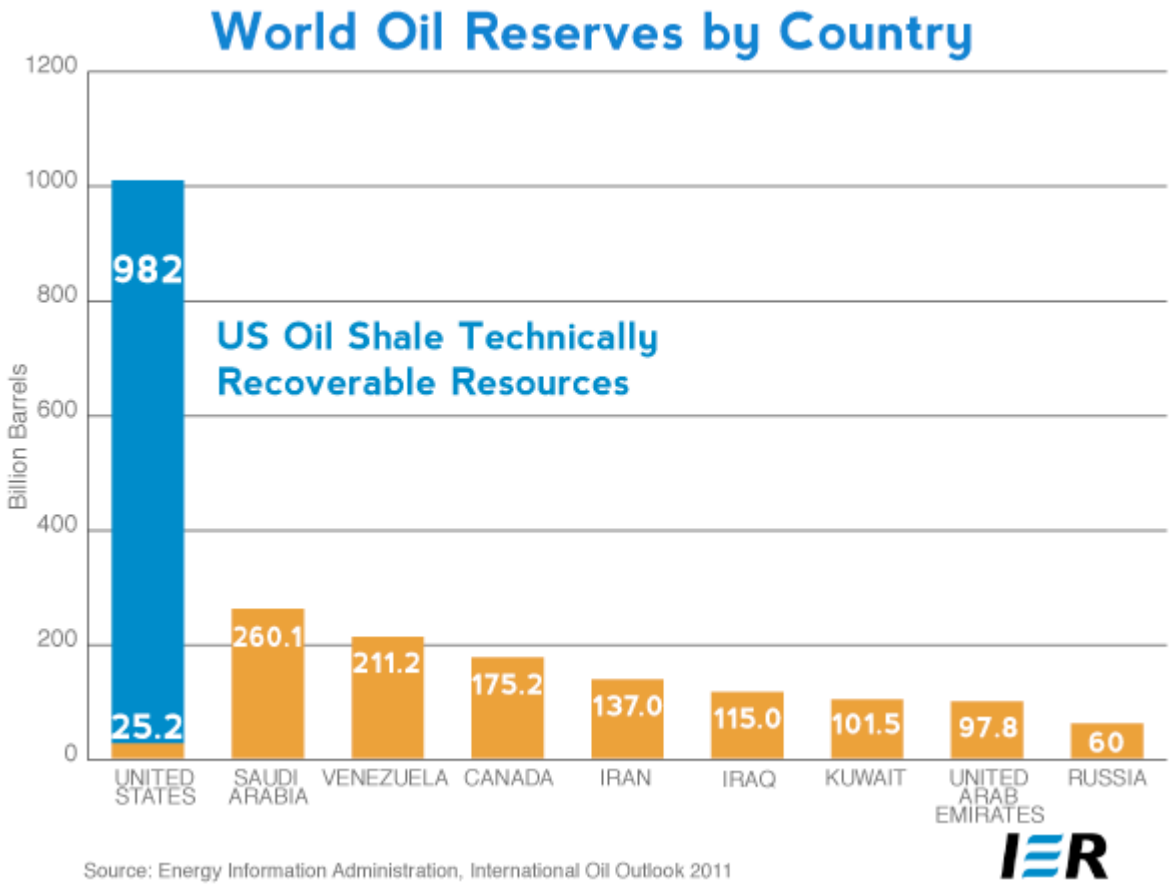
Oil Shale

Another area of potential oil growth is oil shale, a sedimentary rock that contains kerogen, a solid organic material. When the kerogen is heated to high temperatures, it releases petroleum-like liquids that can be processed into liquid fuels. The USGS estimates that U.S. oil shale resources total 2.6 trillion barrels of oil; about one trillion barrels of which are considered recoverable under current economic and technological conditions.[11] These one trillion barrels are nearly four times the amount of Saudi Arabia's proven oil reserves—a large enough supply for about 140 years at America's current rate of oil use. Oil shale is concentrated in the western United States in Utah, Wyoming, and Colorado and mainly on Federal lands.



Despite the great promise these resources hold, one of the first acts of the Obama administration was to withdraw the research and development oil shale leases that the Bush administration had offered consistent with the Energy Policy Act of 2005.[12]

Private sector research and development is necessary to bring these resources to market. Without these leases and the potential to commercialize the energy resource, companies will not invest the hundreds of millions of dollars required to develop the necessary technology. In Jordan, for example, Shell pledged to spend $500 million in exploration of the country's oil shale resources in return for the right to develop these resources if the exploration was successful.[13] The potential that oil shale holds here in the United States can be seen by the following graph:



Oil Sands

Another unconventional oil is oil sands. Oil sands are permeated with bitumen, which is a form of petroleum in solid or semi-solid state that is typically found blended with sand, clay, and water. Petroleum is extracted from oil sands by either traditional pit mining on the surface or in-situ production underground. Once extracted, the petroleum is diluted with condensate or other light oils or upgraded using processing units into a light, sweet "synthetic" crude oil.

Our northern neighbor, Canada, ranks third in the world in oil reserves (175 billion barrels) due mainly to its oil sand deposits. It is also the largest supplier of oil and petroleum products to the United States, supplying us with almost 3 million barrels per day.[14] Because of Canada's large oil reserves, TransCanada proposed an addition to its Keystone pipeline system, the Keystone XL, which would move oil from Canada to U.S. Gulf Coast refineries, with a capacity of 830 thousand barrels per day.

The Keystone XL pipeline would not only move Canadian oil but it would also help to move oil from areas in the United States where it is land-locked, such as shale oil production in North Dakota and crude oil stored at Cushing, Oklahoma. However, before the pipeline can be built, it must receive a permit from the U.S. State Department indicating that it is in the 'national interest' since it would cross the U.S. border with Canada. The U.S. government has delayed, denied and delayed again its approval due to environmental concerns regarding its original proposed route that crossed an environmentally sensitive area in Nebraska. TransCanada then submitted a revised route that the state of Nebraska approved, but U.S. State Department approval is still under study.

In the mean time, TransCanada is building the southern section of the pipeline, from Cushing to the Gulf Coast refineries, which does not need a Presidential permit, but which will help with the oil that is being land-locked in Cushing. Construction of Keystone's "Gulf Coast Project" began in the fall of 2012 and is expected to be in service by mid-to-late 2013.

The consequences for our neighbor and ally of pipeline construction delay has been a significant decrease in the price Canada receives for its oil, which in turn will reduce investment in Canadian energy production. Railroads are now moving oil, which is more costly and less safe than transport by pipeline.

Increased domestic production and increased imports from Canada along with approval of the pipeline could enable the United States to be almost independent of overseas oil in the future.

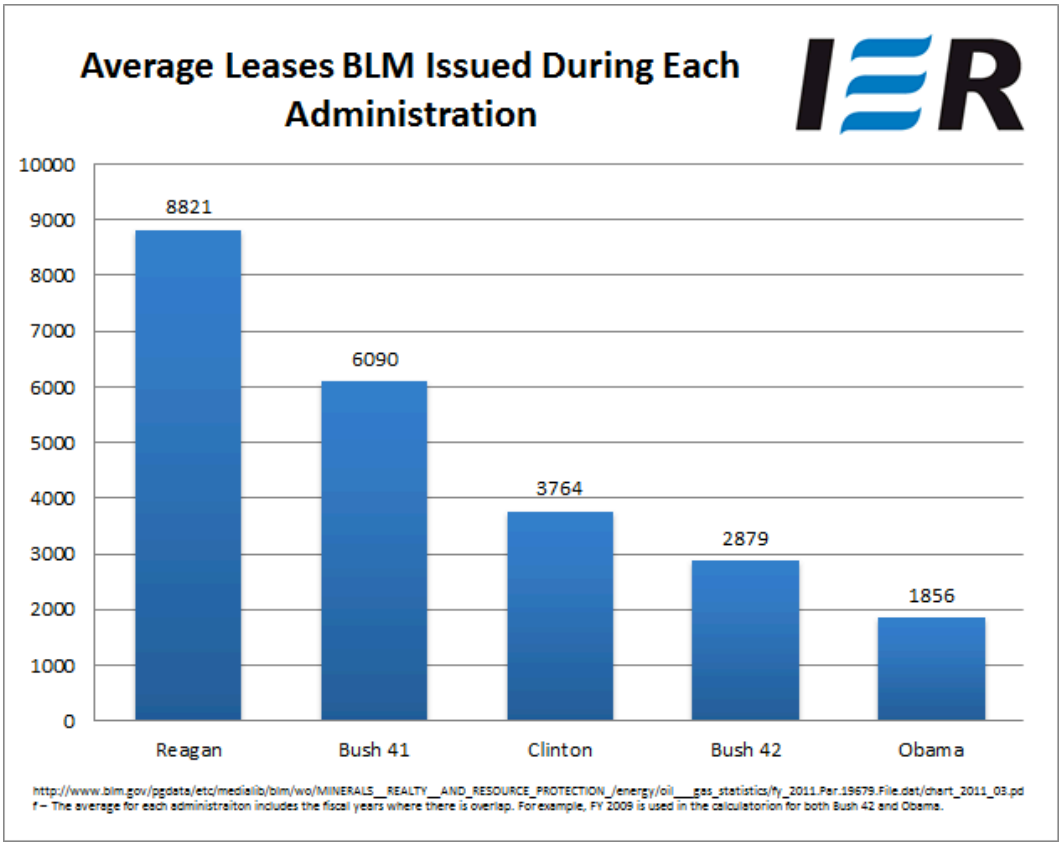
Production on Federal Lands

The United States is an energy-rich country with large quantities of U.S. energy resources found on federal lands. The federal government owns 28 percent of the land in the United States, and a majority of the land in the energy-rich western states.[15] The federal government also controls oil and natural gas leasing on the Outer Continental Shelf (OCS)—the submerged area between land and the deep ocean. Developing oil and natural gas production on federal lands is becoming more difficult and time consuming. As a result, oil production is decreasing in the

federally-controlled offshore areas and Alaska, but increasing on state and privately-controlled onshore areas.

Furthermore, the federal government offers very little of its land for energy exploration or production. In fact, the federal government has leased less than 2.2 percent of federal offshore areas[16] and less than 6 percent of federal onshore lands for oil and gas production.[17] The extent of the government's energy holdings is little understood. The United States owns roughly 700 million acres of subsurface mineral estate onshore throughout the nation. Additionally, it owns 1.76 billion acres of offshore mineral lands, for a total of 2.46 billion acres. *The U.S. government's mineral estate acreage holdings therefore are larger than the land masses of all nations on earth except Russia and Canada.* The extent to which this mineral estate has been examined for energy wealth for the benefit of U.S. citizens has been extremely limited and is increasingly so. If additional lands were leased, more domestic energy production, jobs and economic development could be pursued.

In 2009, the Obama administration leased fewer onshore acres for energy development than in any preceding year on record.[18] But the declining trend did not begin with the Obama administration. For example, President Bush leased less land than President Clinton.[19] The next graph shows the decline in federal lands leased by the Bureau of Land Management since the 1980s.[20]



Part of the reduction in area offered for lease occurred because in 1982, Congress banned the development of oil and natural gas resources on most of the Outer Continental Shelf. America's OCS encompasses 1.76 billion acres of submerged, taxpayer-owned lands, with over 97 percent of these offshore lands not leased for energy exploration and development.[21]

The Bureau of Ocean Energy Management (BOEM), an agency of the U.S. Department of Interior, estimates that the OCS contains 86 billion barrels of technically recoverable oil (over 12 years of supply at current consumption rates) and 420 trillion cubic feet of technically recoverable natural gas (about 18 years of supply at current consumption rates).[22] The Congressional prohibition was reinforced by a

presidential moratorium instituted in 1990 by President George H.W. Bush. These moratoria made the United States the only developed country in the world that comprehensively banned access to its own offshore energy sources.

The moratoria remained in place until the price of oil rose to more than $145 a barrel in 2008, prompting a public outcry that led President George W. Bush to finally lift the presidential offshore ban. Congress followed by allowing its moratorium to expire on September 30, 2008. It was finally permissible for the United States to move forward with developing its offshore energy resources.

Following the removal of the moratoria, the Department of the Interior issued a plan to lease newly opened offshore areas between 2010 and 2015, but this plan was quickly rescinded by the Obama administration. President Obama proposed opening a few additional offshore areas in March of 2010,[23] but canceled those plans less than a month later, following the Deepwater Horizon accident in the Gulf of Mexico. Instead of offering more areas for energy production, the Obama administration halted all drilling in the Gulf, initially as a six-month moratorium.

Later, the administration claimed to have relaxed the moratorium, but a *de facto* moratorium remained in place because the administration granted only a handful of the necessary government permits needed for drilling on federal land (including offshore areas). A federal judge eventually held the administration in contempt for their "determined disregard" to take action on drilling permits.[24]

After a disaster like the Deepwater Horizon, a review is understandable, but the response was considered by many experts as overblown. For example, the drilling moratorium and the subsequent de facto moratorium not only affected deepwater drilling, but also shallow-water drilling in the Gulf of Mexico. Yet shallow-water operators have a very impressive safety record. Over the last 15 years, 11,070 wells were drilled in shallow water and less than 15 barrels of oil were spilled.[25]

Since March 2011, the administration has been slowly issuing deep-water offshore permits for the Gulf of Mexico.[26] The administration has also approved a few supplemental plans to applications for deepwater drilling that were originally submitted in the 1980s. But these moves were made too late for the deepwater drilling rigs that had already moved to Brazil, French Guiana, Egypt, and other parts of Africa.[27]

Additionally, the administration's proposed leasing plan for 2012 through 2015 is the most anemic 5 year OCS leasing plan since the Outer Continental Shelf Leasing Act of 1978 (OCSLA). In sum, the 5 year plan in place through 2017 includes virtually none of those areas removed from the moratoria by Congress and the President in 2008. Barring changes, the OCS moratorium will be 35 years old when it expires at the end of the current OCS lease plan in 2017. For two generations, the federal government has denied its citizens access to the energy resources they own on their own lands.

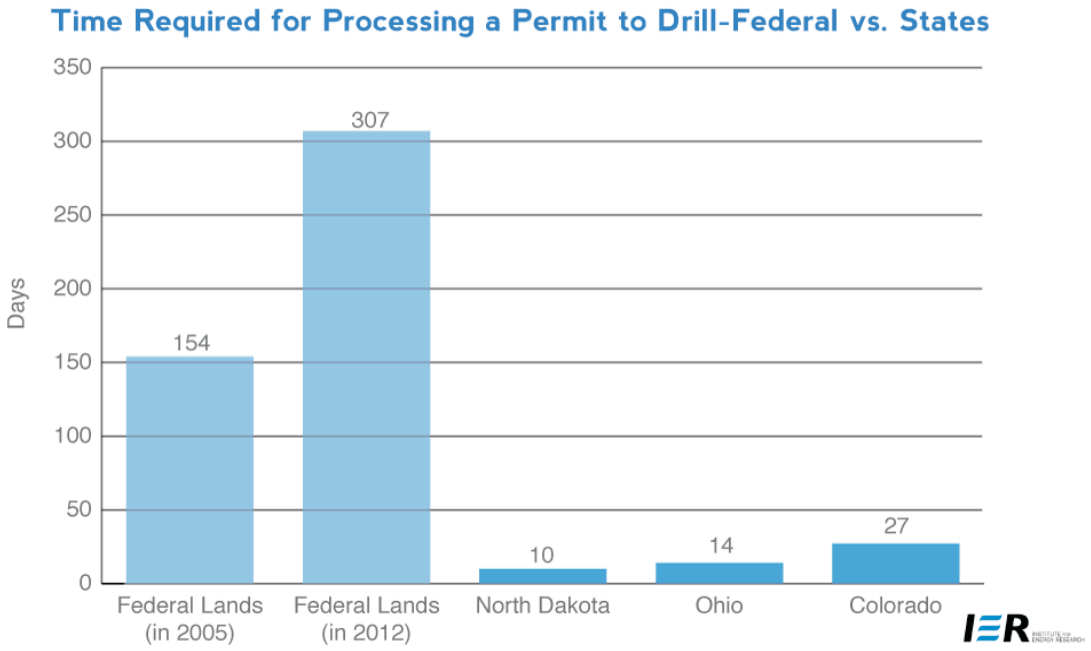
Data from the Energy Information Administration (EIA) show that production in the Gulf of Mexico slowed significantly following the moratorium. In 2010, 1.55 million

barrels of oil a day was produced in the federal offshore Gulf of Mexico and only 1.32 million barrels a day in 2011. Thus, after the moratorium and permitting difficulties, oil companies produced 15 percent less oil a day in 2011.[28] In 2012, EIA expects oil production in the federal offshore Gulf of Mexico to drop further to 1.27 million barrels per day before increasing to 1.37 million barrels per day in 2013. Even in 2014, the agency does not expect oil production from the Federal offshore Gulf of Mexico (1.44 million barrels per day) to reach the level of 2010 production.[29]

The large increases in oil production that have occurred in the United States are mainly on private and state lands. The Congressional Research Service (CRS) found that oil production on private and state lands makes up about 70 percent of total U.S. oil production. According to CRS, 96 percent of the increase in oil production between fiscal years 2007 and 2012 came from private and state lands and production there increased 11 percent in fiscal year 2011 from fiscal year 2010 levels. In contrast, the CRS report found that oil production from the federal onshore mineral estate was a mere 306,000 barrels per day (5.5 percent) out of a total of 5,590,000 barrels produced daily in the United States in fiscal year 2011.[30]

Total natural gas production on federal and Indian lands has decreased each year since fiscal year 2003, the first fiscal year that EIA provides the information. In FY 2011, production was 4,859 billion cubic feet—a 10-percent decrease from fiscal year 2010, and a 31-percent decrease compared with the fiscal year 2003 level. Offshore natural gas production has been on a consistent downward trend over the last 9 years, falling more than 60 percent.[31]

Oil and gas producers prefer to explore and drill on private and state lands because there is a lot less red tape involved and much shorter approval times, which means it is less costly to invest and drill for them on state and private lands than on federal lands. The states and private land owners have just as much interest in the protection of their lands, but they have found ways to balance environmental protection with economic growth. In any enterprise, time is money, and as it stands now, it takes over 300 days to process a permit to drill on Federal lands onshore, while it takes less than a month to process a permit to drill on private and state lands.



Oil and gas production projects frequently have very long lead times, unlike some other businesses. We know, for example, the speed with which information technology progresses, and know that most high tech firms would quickly abandon

economic commitments constrained by government policies that take a decade or more before deployment. Multi-billion dollar projects, such as many of the large offshore oil projects, take years to plan and build the necessary infrastructure to bring oil to market. For example, the Thunder Horse field was discovered in the Gulf of Mexico in 1999, but the first barrel of oil was produced in 2008. This long lead time means that decisions made today affect oil production for years in the future.

One frequent criticism of the development of the Alaskan National Wildlife Refuge (ANWR), for instance, is that it would take years to start producing oil. In 1995, President Clinton vetoed a bill to permit oil exploration and development in ANWR. If he had signed that bill, oil would be produced in ANWR today, and the Trans Alaskan Pipeline would not be running at about one quarter of its capacity.

Meanwhile, Shell has paid the government over $2.5 billion and spent in excess of $4 billion to explore for oil offshore Alaska, but has yet to receive permits from the government to drill for oil and gas. If more oil is not allowed to be produced soon from Alaska, the Trans Alaskan Pipeline System, one of North America's most valuable energy assets will be at risk. The pipeline, which once delivered 2.1 million barrels of oil per day to the West Coast, now has sufficient underutilized capacity to accommodate twice the amount of oil that is currently being produced in North Dakota, the second largest oil producing state in the Union. There is no lack of oil in Alaska or off its coasts; the problem is that government policies stand in the way of additional oil production in Alaska.

Areas that the federal government could open to oil and gas development include:

- The 10.4 billion barrels of oil and 8.6 trillion cubic feet of natural gas in the Arctic National Wildlife Refuge
- The 86 billion barrels of oil and 420 trillion cubic feet of natural gas in the outer continental shelf of the lower 48 states
- The 896 million barrels of oil and 53 trillion cubic feet of natural gas in the Naval Petroleum Reserve-Alaska
- The 25 billion barrels of oil in the outer continental shelf of Alaska
- The 90 billion barrels of oil and 1,669 trillion cubic feet of natural gas in the geologic provinces north of the Arctic circle
- The 982 billion barrels of oil shale in the Green River Formation in Colorado, Utah, and Wyoming.

These technically recoverable resources total 1,194 billion barrels of oil and 2,150 trillion cubic feet of natural gas that is owned by the federal taxpayer. At today's prices ($100.00 per barrel of oil and $4.00 per thousand cubic feet of natural gas), the value of the estimated oil resources is $119.4 trillion and the value of the estimated natural gas resources is $8.6 trillion for a grand total of $128 trillion.[32]

The Congressional Budget Office (CBO) estimated that under current policies, revenues from royalties, rents, and bonuses from oil and gas leases on public lands will generate about $150 billion over the next 10 years. The CBO further estimated that if certain resources currently off limits were immediately opened to oil and gas leasing, another $7 billion would be realized over that period.[33] The CBO study

estimates are considered to be conservative when compared to historical data and estimates by other analysts and do not consider the earnings from taxes paid by these industries or their employees.

Partially in response but also for education purposes, IER commissioned a groundbreaking paper that will soon be released highlighting the larger economic effects, including economic growth, wages, jobs, and federal and state and local tax revenues, of opening Federal lands and waters to oil and gas leasing. The IER paper relies on the CBO natural resource and oil and gas price estimates to maintain direct comparability with the CBO analysis while recognizing that those figures have historically been proven to vastly underestimate resources and revenues. The government's resource information is poor in large part due to the lack of exploration resulting from practices limiting access to federal lands such as the moratoria.

The study finds that if the federal government opened up additional federal lands and waters to exploration and production, the increase to GDP would be $127 billion *annually* for the next seven years, and $450 billion *annually* in the long run. Most impressively, the opening of federal lands would have a cumulative increase in economic activity of up to $14.4 trillion over a period of 37 years. And the ripple effect of that boom would be 552,000 in job gains *annually* over the next 7 years with *annual* wage increases of up to $32 billion over that time period and an increase of 1.9 million jobs *annually* in the long run with *annual* wage increases of $115 billion. Federal and state and local tax revenues would also increase to the

tune of $2.7 trillion in federal revenues and $1.1 trillion in state and local revenues over 37 years.[34]

Coal is also produced on federal lands, but its production decrease has not been as great as that for oil and natural gas. Coal production on federal and Indian lands peaked at 509 million short tons in fiscal year 2008 and has been decreasing slightly each year since then. In fiscal year 2011, coal sales from production on federal and Indian lands reached 470 million short tons, a 2-percent decrease from fiscal year 2010 and an 8-percent decrease since the peak in fiscal year 2008.[35]

At today's prices, the value of the government's estimated coal resources in the lower 48 states is $22.5 trillion for a total fossil fuel value on federal lands of $150.5 trillion. Most of the coal resources in Alaska are deemed to be federally owned and are estimated to be 60 percent higher than those in the entire lower 48 states but are not included in these estimates.

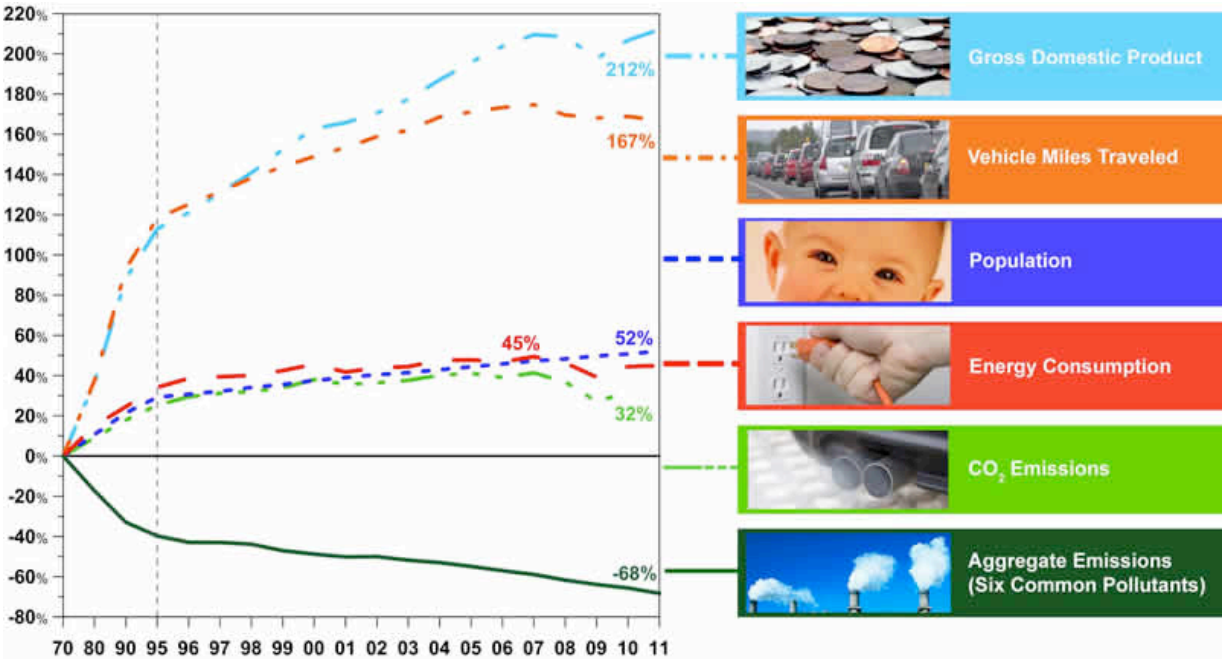
Coal's Environmental Issues

Over 90 percent of coal in the United States is used for electricity generation. Until recently, coal had been used to produce 50 percent of the nation's electricity, but is losing market share to natural gas and renewable energy as natural gas prices drop, renewable energy is mandated and subsidized, and new environmental regulations take effect. The Environmental Protection Agency (EPA) has produced regulations that essentially ban new coal plants and make its continued use in existing plants

extremely costly. As a result, coal produced only 42 percent of our electricity in 2011[36] and is expected to have produced only 38 percent in 2012.[37]

One of the biggest stated concerns about coal is air pollution. Coal produces more emissions than natural gas when burned. However, due to actions taken by industry and technological advances, our air quality is improving and new coal plants are cleaner than ever before. Pollution control technologies such as flue gas desulfurization, selective catalytic reducers, fabric filters, and dry sorbent injection have greatly reduced coal plant emissions. According to the National Energy Technology Laboratory (NETL), for example, a new pulverized-coal plant (operating at lower, "subcritical" temperatures and pressures) reduces the emission of nitrogen oxides (NOx) by 86 percent, sulfur dioxide (SO_2) by 98 percent, and particulate matter by 99.8 percent, as compared with a similar plant having no pollution controls.[38]

These advances in technology have enabled large improvements in air quality. Since 1970, the total emissions of the six criteria pollutants have declined by 68 percent, even though energy consumption has increased by 45 percent, vehicle miles traveled have increased by 167 percent, and the economy has grown by 212 percent.[39] (The "criteria pollutants" are carbon monoxide, lead, sulfur dioxide, nitrogen oxides, ground-level ozone, and particulate matter.) The following chart from EPA shows the increase in economic measures compared to the decrease in pollution emissions.[40]



As technology continues to advance, coal-fired power plants will become even cleaner and air quality will continue to improve. In fact, as the *New York Times* has reported, China is actually constructing some coal plants that are cleaner than those allowed to be built in the United States.[41] An irony of our current regulatory policy may be that China will ultimately become the world's supplier of the most advanced clean coal plants, despite the U.S. coal resource base which dwarfs their own.

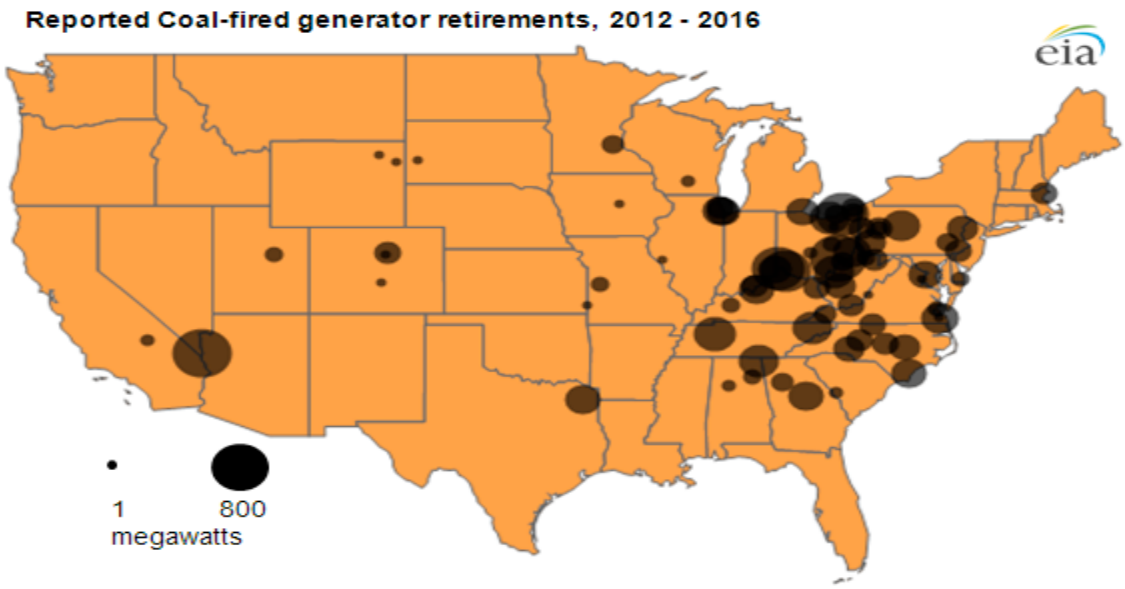
Although coal produces relatively inexpensive energy, many activist groups adamantly oppose coal mining and coal-fired power plants. The Sierra Club, for example, has worked particularly hard to stop coal-fired power plants. They claim that they have prevented 150 new coal-fired power plants from being built.[42]

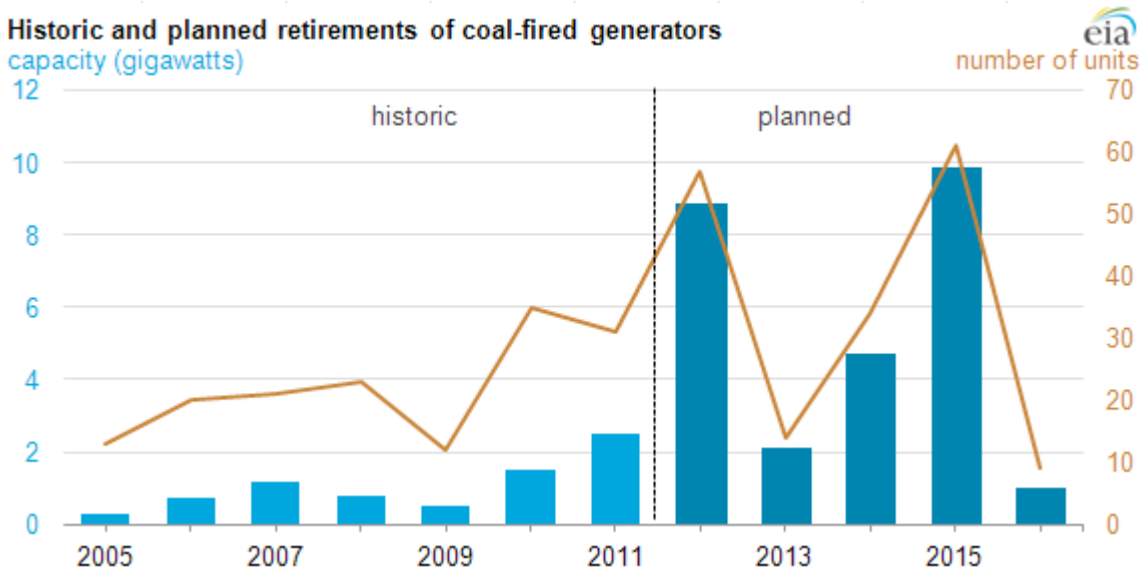
Coal mines, especially in Appalachia, are coming under increasing fire from environmental interest groups and the Obama administration. The EPA revoked a

clean water permit that the Army Corps of Engineers had previously awarded, despite the fact that, according to the Army Corps, the permit complies with West Virginia state water law and the federal Clean Water Act.[43] The problem, according to EPA, is that granting the permit would lead to changes in the conductivity (or salinity) of the water that might be detrimental to mayflies, stoneflies, and caddis flies.[44] In other words, EPA denied the permit, not because of impacts on human health, but potential impacts on mayflies. Because EPA implemented this conductivity guidance without going through the proper regulatory process, a federal district court threw out EPA's conductivity standards.

The EPA has promulgated new regulations that target mercury from coal-fired power plants (the Mercury and Air Toxic Standards), which many call Utility MACT because the rule requires "Maximum Achievable Control Technology" for mercury at coal-fired power plants.[45] These technologies must be installed over a tight 3-year period between 2012 and 2015, raising the cost of generating power from existing coal-fired plants where the economics make sense to install the technology, or forcing those plants to retire or to convert to natural gas. The National Economic Research Associates found compliance costs to be $21 billion per year and lost jobs to amount to 183,000 per year. Because the increased costs will be passed to consumers through higher electricity rates, businesses will be forced to reduce jobs as well. Studies project that retail electricity prices will increase between 10 and 20 percent in most of the country and over 20 percent in the coal-dependent states in the Midwest.[46]

EIA announced that plant owners and operators expect to retire about 27 gigawatts of coal-fired capacity by 2016 — four times the 6.5 gigawatts of capacity retired between 2007 and 2011 mostly because of the new regulations imposed by the EPA. In 2012, electric generators are expected to retire 9 gigawatts of coal-fired capacity, the largest amount of retirements in a single year in America's history. The 27 gigawatts of retiring capacity is 8.5 percent of total coal-fired capacity (318 gigawatts). The 2012 record retirements are expected to be exceeded in 2015 when nearly 10 gigawatts of coal-fired capacity are expected to retire.[47] Most of the units retiring are located in the Mid-Atlantic, Ohio River Valley, and Southeastern United States as shown in the map below.





EIA's numbers are based on current utility expectations. The Edison Electric Institute expects a larger number of forced retirements—about 48 gigawatts of coal units at 231 plants—between 2010 and 2022, or about 15 percent of the coal fleet.[48]

Further, pending greenhouse gas regulations will require all new coal-fired plants to reduce their greenhouse gas emissions even though there is no cost effective way to do so. This is essentially a ban on new coal-fired plants because the technology does not exist commercially for them to meet natural gas carbon dioxide levels that are required by the EPA regulation.

Many believe that the administration is planning on releasing regulations effectively requiring all coal-fired power plants to reduce their greenhouse gas emissions or close. EPA could decide that the modifications made to plants during the upgrades to comply with utility MACT are significant and treat the existing power plant as a "new source" forcing the plant to almost halve its carbon dioxide emissions or

shutter. While EPA has denied this, the agency's recent anti-coal track record calls for close attention to upcoming regulatory initiatives. There is little reason in the record to believe that the EPA will not attempt to regulate carbon dioxide emissions from existing coal-fired power plants.

Regulating carbon dioxide emissions for coal-fired plants will force mass coal plant retirements, causing unemployment at coal-fired power plants and coal mines. According to a report from the United Mine Workers of America, job losses associated with the closure of EPA-targeted coal units (due to Utility MACT and tighter greenhouse gas standards) could amount to more than 50,000 direct jobs in the coal, utility and rail industries, and an indirect job loss figure exceeding 250,000.

Some have suggested that these closures are mainly due to the low price of natural gas made possible through shale gas discoveries. Regardless, it would be prudent for policy makers and analysts to consider the consequences of removing one of the major three sources of electrical generation from our fuel mix for electricity. Currently our electrical generation mix is largely coal, natural gas and nuclear power. While natural gas prices are currently low, gas-directed rig activity is also very low, which could have an impact on supplies in the out years. Further, the Wall Street Journal reported on January 29 that pressure is increasing to shutter nuclear power plants.[49]

If the United States decides that it can provide the vast majority of its electricity from natural gas, it must assure that those supplies will not be threatened by government actions, including the federalization of hydraulic fracturing regulation or other attempts to require federal permission to drill natural gas wells. The consequences of skyrocketing electricity prices brought on by bad public policies will only exacerbate the economic ills our nation faces going forward.

Conclusion

The United States has more combined oil, coal, and natural gas resources than any other country on the planet. As we used these energy resources over the past 50 years, not only did we grow our economy and improve our quality of life, but we improved our air quality as well. We are energy rich, not poor. We have enough energy resources to provide reliable and affordable energy for decades, even centuries to come. The real question is whether the federal government will permit us to have access to our abundant energy resources, not whether sufficient resources exist.

Decisions made today about access to energy resources affect energy production for years and decades into the future. The more areas that are accessible to energy production today increases the likelihood of more domestic energy production later. Increased energy production promotes jobs, government revenues from taxes and lease sales, and increased economic activity.

In turn, this supplies the revenue, wealth and technology to provide the energy breakthroughs of the future. Energy is defined as "the capacity to do work." Its reliability, affordability and abundance are critical to the future work of our nation.

Thank you for the opportunity to supply this testimony for the Committee's use.

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