TESTIMONY PRESENTED BY
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NATIONAL ENERGY SECURITY ACT, S. 2557

Thank you, Mr. Chairman for the opportunity to provide the view of the petroleum geology community on these important issues. My name is M. Ray Thomasson. I have been a professional geologist for 41 years, engaged in exploration and development for petroleum and natural gas. I am currently President of the American Association of Petroleum Geologists (AAPG), a professional organization composed of more than 30,000 geoscientists. These men and women are engaged in exploration and development of energy resources throughout the world, in research on new exploration and development concepts, and in the education of future geoscientists for the profession. The AAPG, founded in Tulsa, Oklahoma in 1917, was chartered to serve the profession through the identification and application of new science and technology for the discovery and production of hydrocarbon resources. The application of new exploration and development concepts has led to more efficient practices that have lowered the cost of produced products and significantly reduced the environmental consequences of such activities. The membership of AAPG is proud of their contributions in supplying the world with reliable and inexpensive energy, in developing new ways to do that job better, and in the education of new geoscientists to carry on the tradition.

I would like to note that AAPG is affiliated with the American Geological Institute, an umbrella organization representing the geoscience community with offices in the Washington, D.C. area, and acknowledge their assistance in the development of this presentation.

Mr. Chairman, we appreciate the opportunity to provide our views on S. 2557; The National Energy Security Act. Of the issues addressed by this proposed legislation, I will comment in particular on the following:

- Opening ANWR to petroleum exploration,
- Improving the oil and gas leasing program on federal lands, and
- Tax incentives to expand domestic production.

Mr. Chairman, crude oil, and more recently natural gas, have fueled the economic development of our country. The 200 million vehicles (cars, trucks, and busses) that traverse our streets and highways, the planes that transport us from coast to coast and around the world, the ships that bring passengers and goods to and from our shores, the factories and businesses that produce and distribute the products we use are powered in large measure by fossil fuels. Today, the average U.S. citizen uses about 26 barrels of crude oil and 84 thousand cubic feet of natural gas per year. Thus, the U.S. with less than 5 percent of the world's population consumes about 25 percent of the world's petroleum production. Compare that with the Far East with 40 percent of the world's population that has a per capita consumption of crude oil of less than one barrel per year and natural-gas consumption that is too small to measure. The mechanical and thermal energy as well as the products produced from these fossil fuels are important contributors to our standard of living. So, it should be no surprise to see other nations working toward similar goals. Thus, the competition for global supplies of oil and gas will increase dramatically as these emerging economies enter the consumer age.

Today, the U.S. imports more than one-half of our crude oil and refined products needs. That amount has increased substantially since our "energy crisis" of 1973. At that time our imports amounted to only 35 percent of our total demand. Yet, the result of an embargo by Arab producers was long lines at service stations with rationing of the amounts that could be purchased. The petroleum industry responded to that crisis with an increase in exploration and

development. That effort resulted in a net increase in domestic production and a corresponding decline in imports. However, it is important to note that the response was not instantaneous. In fact, almost five years passed before such increases were realized (Figure 1). Construction of new rigs, training of crews, and the exploration process itself takes a long time. Today, we would be in substantially worse shape if such an event were to occur because since 1985 domestic production has declined at an annual average rate of 180 thousand barrels per day. It should be noted that masked in these data is the fact that the automotive industry substantially improved the mileage efficiency of the U.S. automotive fleet. While that had a major effect on transportation fuel demand during the years following the 1973 crisis, having been done, it is not likely to be achieved again to such a degree.

Natural gas underwent a similar decline in production following the energy crisis of 1973 because of myopic views that the U.S. was running out of gas. Actually, just the opposite is true, in that the North American natural gas resource base, unlike oil, is incredibly large and will be able to fuel our economic engine well into and probably through this century. Unfortunately, legislation was passed in the mid 1970s that substantially changed the economics of exploring for and developing natural-gas. The Fuel Use Act prohibited the use of natural gas for process heat in new facilities and Incremental Pricing passed on the increased costs of natural gas primarily to the industrial sector in an effort to reduce that consumption. These actions reduced the annual base load of natural gas for electric power generation and other industrial uses and essentially made natural gas a winter heating fuel. Thus, the substantial fluctuation in demand between summer and winter caused corresponding large fluctuations in price leading to declining economic performance, especially for small producers. Domestic production declined from 22.6 trillion cubic feet per year in 1973 to 15.8 trillion cubic feet in 1983. In the late 1980s, the industry increased drilling activities, propelled by rising commodity prices and the application of new technologies, and by 1997 production increased to 19.4 trillion cubic feet. Since then it has remained essentially constant. However, demand continued to rise to 22 trillion cubic feet in 1999. This increase in demand in excess of domestic production has been met with imports, largely from Canada.

Mr. Chairman, the questions that need to be asked are why is the domestic production of crude oil declining and why is the production of natural gas essentially flat? One answer that is commonly expressed is that the U.S. is running out of **opportunities** to discover new reserves of oil and gas. That statement is only partially correct. Please note the emphasis on opportunities. Because of changes in the tax code and increasing restrictions in access to public lands, the U.S. petroleum industry is facing declining opportunities to develop those commodities that are present.

However, some will argue that the resources are not there to be found. That is simply not true. From the first effort to estimate the U.S. resources to present, there have been numerous predictions about the demise of our supplies of petroleum and natural gas. Each of those predictions has been proven blatantly wrong. An illustration of previous estimates of remaining crude-oil resources in the U.S. may help to understand this statement. Figure 2 shows 10 historical estimates of the ultimate size of the U.S. crude oil resource versus cumulative production. Note that the size of the resource has "grown" slightly faster than has cumulative production. What this illustration implies is that the more we learn about even the most mature petroleum-producing basins in the U.S., the more resources we discover. The resource has always been there; it is new science and technology that is permitting us to do a better job of assessing the economic amounts that are present. The most recent assessment by the U.S. Geological Survey, as have all prior assessments, demonstrates that the petroleum and natural-gas resource base is large enough to sustain an active domestic petroleum industry for many decades. The next assessment probably will demonstrate a similar growth because we are far from reaching the limit on the applications of new science and technology in the petroleum industry.

Mr. Chairman, the problems of accurately assessing remaining resources is particularly well shown in figure 3. In the 15-year period from 1985 to 2000, the estimates of remaining natural gas in the United States have grown from about 300 trillion cubic feet to more than 2,000 trillion cubic feet. The reason for this is displayed in figure 4 which shows that with increasing technological capability, the industry can economically recover an increasing volume of resources. This is, in large part why we have been able to date to meet the growing demand for natural gas in this country.

I want to caution you as well in your evaluation of the numbers you see for estimates of remaining oil resources. Most estimates, such as those made by Campbell and others, are for conventional resources. In fact, 65 percent of our production of oil today is from so-called unconventional resources. Because, with technology and experience, unconventional resources become conventional and our resource numbers continue to increase.

The real question, Mr. Chairman, is how important is domestic crude oil and natural gas? Is it important enough to permit access to prospective public-lands for exploration and development? Is it important enough to provide appropriate economic incentives for that development? Or, as the present policy seems to be, should we depend more upon other countries to supply our future petroleum needs and not encourage the development of our domestic resources. I need not remind you of the trauma faced by this country in our one experience with an energy crisis in spite of the fact that during that time we lost only 5 percent of our crude oil supply, the amount supplied by Arab OPEC countries. If a 5 percent decline could cause the problems that we had then, think of what would happen today if we lost our imports from the same sources as before.

Many will say that it could never happen again, but most did not believe that it would happen the first time. Witness the fact that we had no contingency for that event. Today, with more than 50 percent of our petroleum coming from non-U.S. sources, our strategic petroleum reserve would provide very little relief from a major disruption in supply, the reason for which it was established. In fact, it is a deterrent to our facing the reality of the situation because it is giving us a false sense of security. In addition, it is looked upon by some to be a quick fix for high oil prices rather than the supply security reserve it was established to be.

While crude oil remains a problem, natural gas is an entirely different matter. Crude oil and refined products can be moved between world markets with relative ease, but natural gas cannot. Natural gas is a North American continental commodity. The natural gas that we need must come from U.S. production as well as imported from our friendly neighbors in Canada and Mexico. Although, Mexico is not a likely source of supply in the foreseeable future. In fact, we are now exporting a small, but increasing, amount of natural gas to Mexico for the growing industrial development just south of our border.

The only alternative to these North American gas sources would be the importation of liquefied natural gas. The fully amortized cost of such gas would be in excess of $5.00 per thousand cubic feet at present prices or essentially double the current market price for natural gas. The likely consumer outrage of having to pay that price would make the current concern over high gasoline and heating oil prices seem benign in comparison.

Mr. Chairman, assessments by the Gas Research Institute and the Energy Information Administration each show a demand for as much as 32 trillion cubic feet per year over the next 15 to 20 years. These forecasts are based upon rapidly escalating increases in usage of natural gas for electric-power generation and other industrial and commercial uses where a less polluting fuel is needed. This essentially is a 50 percent increase over current domestic production. At present levels of exploration and development activity, we are barely replacing our current annual production with newly discovered reserves. To increase that production by 50 percent over that time frame will require a very large increase in drilling activity.

Once before, the U.S. increased production of natural gas by that amount over a 15-year period. However, at that time we had a healthy petroleum industry with about 4,000 drilling rigs and access to prospective lands. Today, we have a substantially diminished industry with fewer than 1,000 active rigs and growing restrictions to prospective lands. If federal restrictions and regulatory burdens in accessing public lands continue as they are today, there is little chance that we will be able to achieve those projected higher production rates. In fact, we may be unable to sustain current levels of production beyond the next few years unless actions are taken now to increase access to public lands and improve economic conditions conducive for exploration and development.

To demonstrate that good things can happen when conditions are right, since 1967 in excess of 300 exploratory wells have been drilled within the offshore outer continental shelf waters of the Canadian Atlantic. To date, at least 12 trillion cubic feet of natural gas and 2 billion barrels of oil have been discovered. These discoveries have been off the Scotian Shelf, the Grand Banks and even the Labrador Sea. The Hibernia platform, 150 miles off the east coast of Newfoundland, is now producing more than 125,000 barrels of oil per day from a large platform on the prolific fishing grounds of the Grand Banks. Natural-gas production of 400 million cubic feet per day began at the end of last year from the Sable Offshore Energy Project, off the coast of Nova Scotia, just a few hundred miles north of Boston. A majority of that gas will be serving the New England market from these off shore production platforms. Assessments to date of the Eastern Canadian offshore indicate that the region contains in excess of 50 trillion cubic feet of natural gas and 10 billion barrels of oil. All of this is being accomplished within the prime commercial fishing waters and the pristine tourist coastlines of Eastern Canada. In fact, for more than thirty years offshore exploration and production calmly have co-existed with tourism and commercial fishing for the betterment of all concerned.

Many experts agree that these types of oil and gas accumulations in the Eastern Canadian offshore extend south along the U.S. Atlantic from Georges Bank on the north to the Carolina Trough to the south, a distance of almost 1,000 miles. In fact, a recent major gas discovery announced by PanCanadian Petroleum of Calgary, in a long, subsurface carbonate reef-styled formation suggests to many that similar potential extends far down the East Coast of the United States, and perhaps even as far as Florida. Nova Scotia, like Florida and the other Eastern seaboard states, has a thriving tourism industry. Yet, tourism, fishing, and offshore petroleum production co-exist in a cooperative and even supportive environment. Simply put, Canada has been able to develop their precious resources in a safe and rational manner. Given our circumstances, especially with respect to natural gas, it is difficult to understand why we cannot do the same, especially since offshore natural gas development poses little threat to any coastline, and significant reserves have already been discovered off New Jersey and Florida years ago. We can do this in the U.S., if only we have the courage to work together as our Canadian neighbors have done among themselves.

Mr. Chairman, the National Petroleum Council has released recently a comprehensive assessment of the natural-gas supply and demand situation in the United States. I urge you and your colleagues to examine this document carefully because it contains valuable information that should have a bearing on matters before your committee. I wish only to summarize a few points from their extensive study. They conclude, as have others, that the resource base is sufficient to support the expected growth in demand. However, they note that a substantial portion of that resource base is, at present, either not accessible due to federal moratoria or accessible with onerous restrictions that destroy the economic viability of development (Figure 5).

The NPC study also notes that a significant increase in capital expenditures will be required to achieve the projected growth in natural-gas demand. For increased exploration and production alone, the capital expenditures will have to be increased from a current rate of about 32 billion per year to more than 50 billion per year by 2015 (Figure 6). Given today's financial climate, that will happen only if appropriate incentives are provided to the industry.

Mr. Chairman, I believe that we have provided information to demonstrate that the industry can and will be able to provide the oil and gas supplies needed by this Nation for the economic stability to permit continued growth and prosperity. However, to do so, the Congress must address two issues. These are improved access to public lands and appropriate incentives to provide for capital generation.

Public lands contain a substantial portion of the undeveloped oil and gas resources of this Nation. They have been under developed with respect to state and fee lands, and thus contain a disproportionate share of the remaining resource base. There are essentially two types of restrictions on public lands, non-accessible and accessible with restrictions. The offshore East Coast is an example of non-accessible lands and some of the Rocky Mountain basins are examples of accessible with restrictions.

The Canadian government has demonstrated its willingness to go forward with the development of its offshore resources, and that is being accomplished in a safe and compatible manner with the prime commercial fishing area of their country. They also enjoy a bountiful tourism industry, which is unaffected by this resource development activity. We believe the resources in the offshore of our East Coast and those of the Eastern Gulf should be opened to access as well. The concern over oil spills has been consistently overstated. Except for two incidents over the last 50 years, one off the coast of California over three decades ago and the other off Mexico in the 1980s, neither of which should have happened, all major spills have come from tanker accidents. Our risk exposure to future large tanker spills increases, given our increasing need for crude oil and refined product imports. The oil that we fail to produce in the U.S. will be delivered by an ever-increasing fleet of tankers with the corresponding risk of more such spills.

We believe that the 1002 area of the Arctic National Wildlife Refuge (ANWR), as well as the similar coastal plain area of the National Petroleum Reserve–Alaska (NPRA), should be opened to exploration and development. The 1002 area represents less than 10 percent of the 19 million acres of ANWR. Experts believe that it contains technically recoverable oil resources of 4.3 to 11.8 billion barrels. Less than 1 percent of the land within the 1002 area would be affected by petroleum exploration and development activities. The coastal plane of the NPRA, recently held back by the BLM from last year's lease sale at the instruction of the Secretary of the Interior contains at least an estimated 1.5 billion barrels. The Alaska pipeline, that has delivered a significant quantity of oil during its life span, is now down to transporting only about 1 million barrels per day. Unless new reserves are developed on the North Slope in the near future, the volume of oil that it carries will continue to decline. At some point, estimated to be about 600 thousand barrels per day, the operation will become uneconomic and will have to be terminated. At that point, based on present legislation, the pipeline may have to be removed. The adverse consequences of that for Alaska and the Nation would be substantial.

We believe that processes used by the Department of the Interior in managing the resources on public lands in the Rocky Mountain region and elsewhere need to be reformed with respect to petroleum exploration access and development. The extensive delays in granting access for exploration and in permits for pipelines to deliver natural gas to markets adds substantial costs to such projects to the point of making many uneconomical. The industry has repeatedly demonstrated the ability to operate in sensitive areas without damage to either the environment or the wildlife that inhabit those environments. Therefore, we would request that the Congress seriously consider reforming both the Clean Water Act and the Endangered Species Act, especially pertaining to wetlands designations, and create preemptive legislation to thwart the EPA's efforts to severely regulate the use of hydraulic fluid bore-hole fracturing methods. All three of these regulatory or legislative burdens significantly hinder the development of our Nation's energy supplies.

The total area of the U.S. Federal Outer Continental Shelf is about 2 billion acres, of which only about 2 percent has been leased. In its 1995 study, the Minerals Management Service assessed a mean undiscovered recoverable resource of 46 billion barrels of oil and 268 trillion cubic feet of

natural gas. This is 2.5 times the offshore reserves found to date. Sadly, most of these public lands are now "off limits" for exploration and development.

Further, we believe that no additional areas of public lands should be removed from access, and especially by the sole action of the President of the United States, until a proper assessment of their resource potential is conducted. Such assessments must include the use of modern technology, including high resolution seismic exploration methods as well as all new methods of modern exploratory drilling technology to determine an area's potential for the development of existing natural resources.

Mr. Chairman, while I recognize that economic incentives are not within the scope of this Committee, I would like to add a few comments on this subject because it is equally important to the industry in meeting the substantial challenge of providing this Nation with needed future energy resources. Because of fundamental changes in the structure of the industry, many of our largest companies are devoting most of their attention to exploration and development opportunities overseas. Thus, the number and size of the operators that are left to develop the remaining resources in the U.S. are smaller on both accounts. Historically, small companies and independent operators have drilled most of the wells in the onshore of the U.S. In the future, we expect these operators to drill virtually all of the onshore wells. While most of the larger companies and a few of the smaller operators conduct exploration and development using internally generated funds, the vast majority must rely on external capital for such activities. In addition to those mentioned previously, we believe the following issues need to be addressed by the Congress:

- Examine the existing permitting process to make sure that permits are executed in a timely and reasonable manner.
- Establish certainty with respect to timing and area of off shore lease sales
- Restoration of the write-off of intangible drilling costs for the passive investor (doctors, lawyers, and other non-industry people).
- Eliminate the onerous Alternative Minimum Tax, which cripples investment.
- Expensing of delay rentals in the year incurred, not capitalizing them as currently required.
- Expensing of geological and geophysical costs.
- Make permanent the suspension of the net income limit for percentage depletion on marginal properties.
- Raise the depletion allowance provision to previous levels.

Petroleum exploration and production are extremely capital intensive and the role of taxation is critically important to the development of oil and gas resources. The U.S. tax code currently contains these onerous provisions which serve as major disincentives to these activities. Major tax reform that more fairly treats capital in its efforts to find and develop new sources of domestic oil and gas will dramatically help our ability to provide safer and more secure resources.

In summary, Mr. Chairman, I have attempted to provide a picture of our present energy situation, and the challenges that we face in meeting the demands for the future. With proper consideration by the Congress for those matters that need your attention, I am confident that the domestic petroleum exploration and production industry can deliver the oil and gas resources needed to help maintain this country on a course of continuing prosperity.

Absent attention to improved access to public lands and fairer tax and regulatory treatment to provide reasonable incentives and opportunities, we will continue to jeopardize our Nation's economic stability, and thus our own national security. Our continued inattention to these potentially dangerous problems, should concern us all. Time is running out. You need to act on these reforms soon. Let's make it happen!

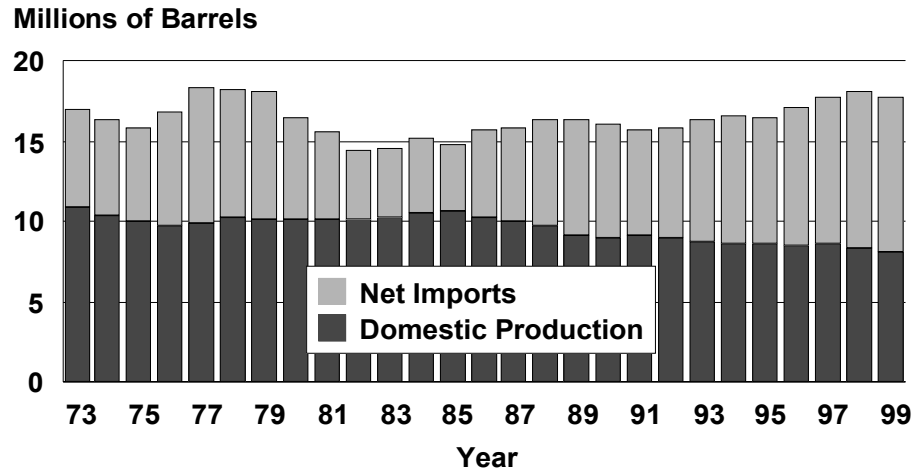


Figure 1. Production versus imports of petroleum from 1973 through 1999.

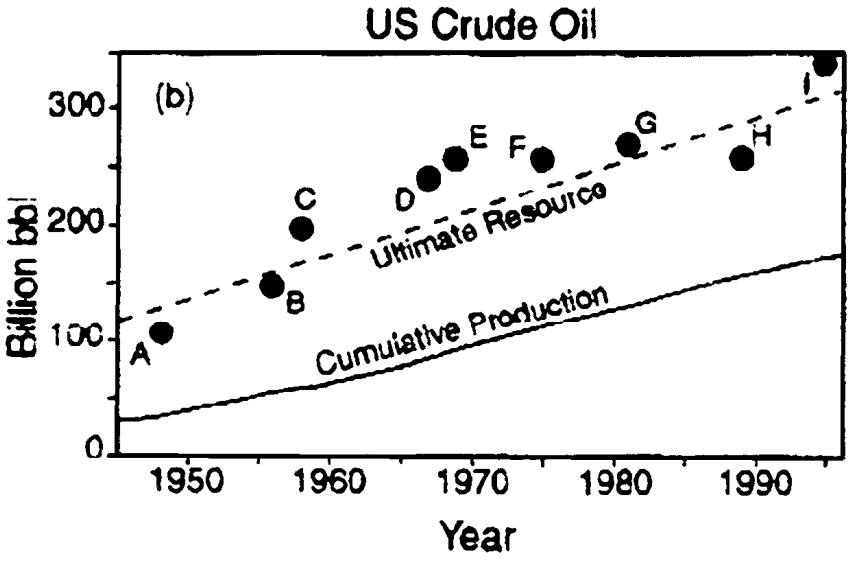


Figure 2. Graph depicting resource estimates of U.S. crude oil resources with respect to cumulative production. The estimates were made by various groups through time. The most recent (labeled I) is that of the U.S.G.S. and Minerals Management Service.

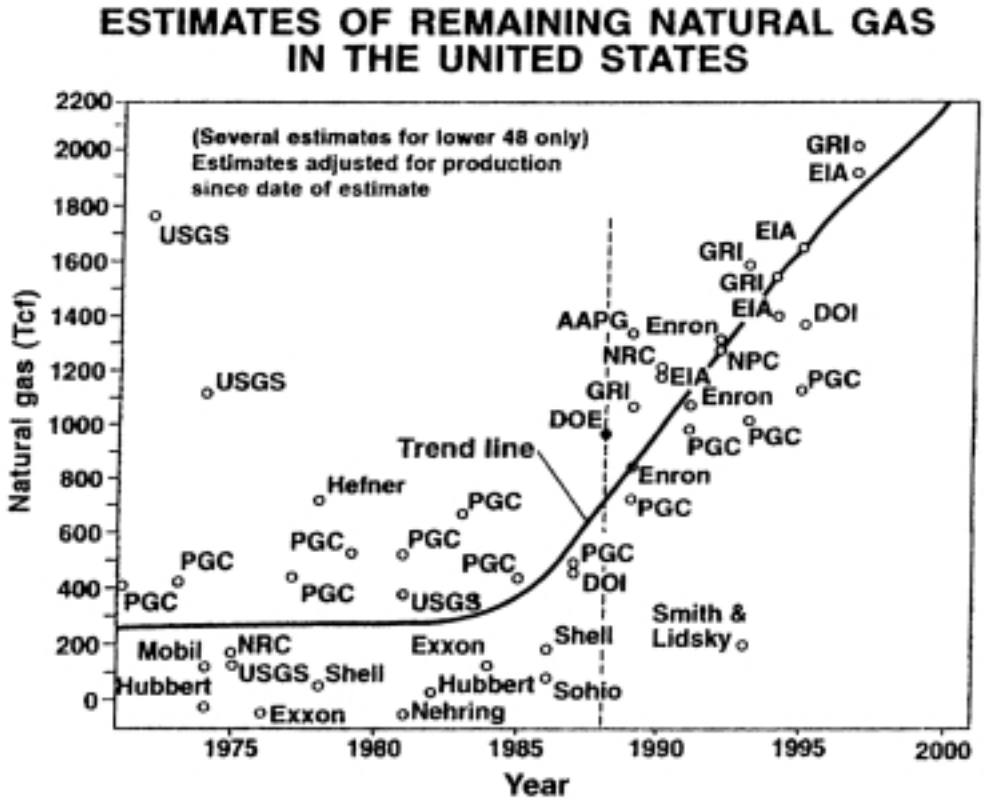


Figure 3. Estimates of remaining natural gas in the U.S. Estimates are from a variety of sources (Fisher, 1999).

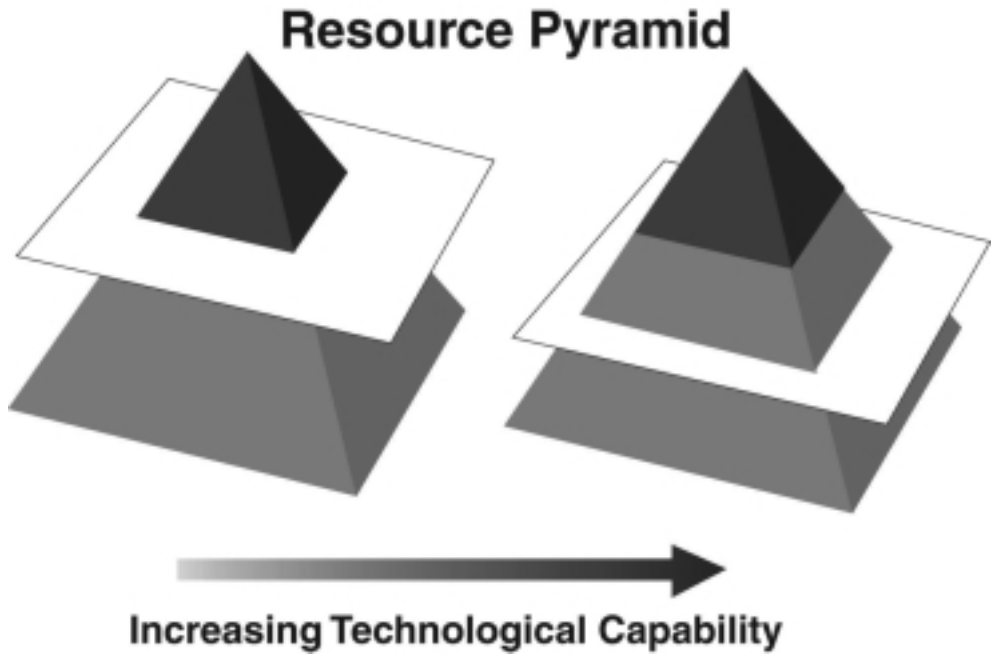


Figure 4. Resource pyramid showing an exponential increase in volume of resource due to increasing technological capabilities.

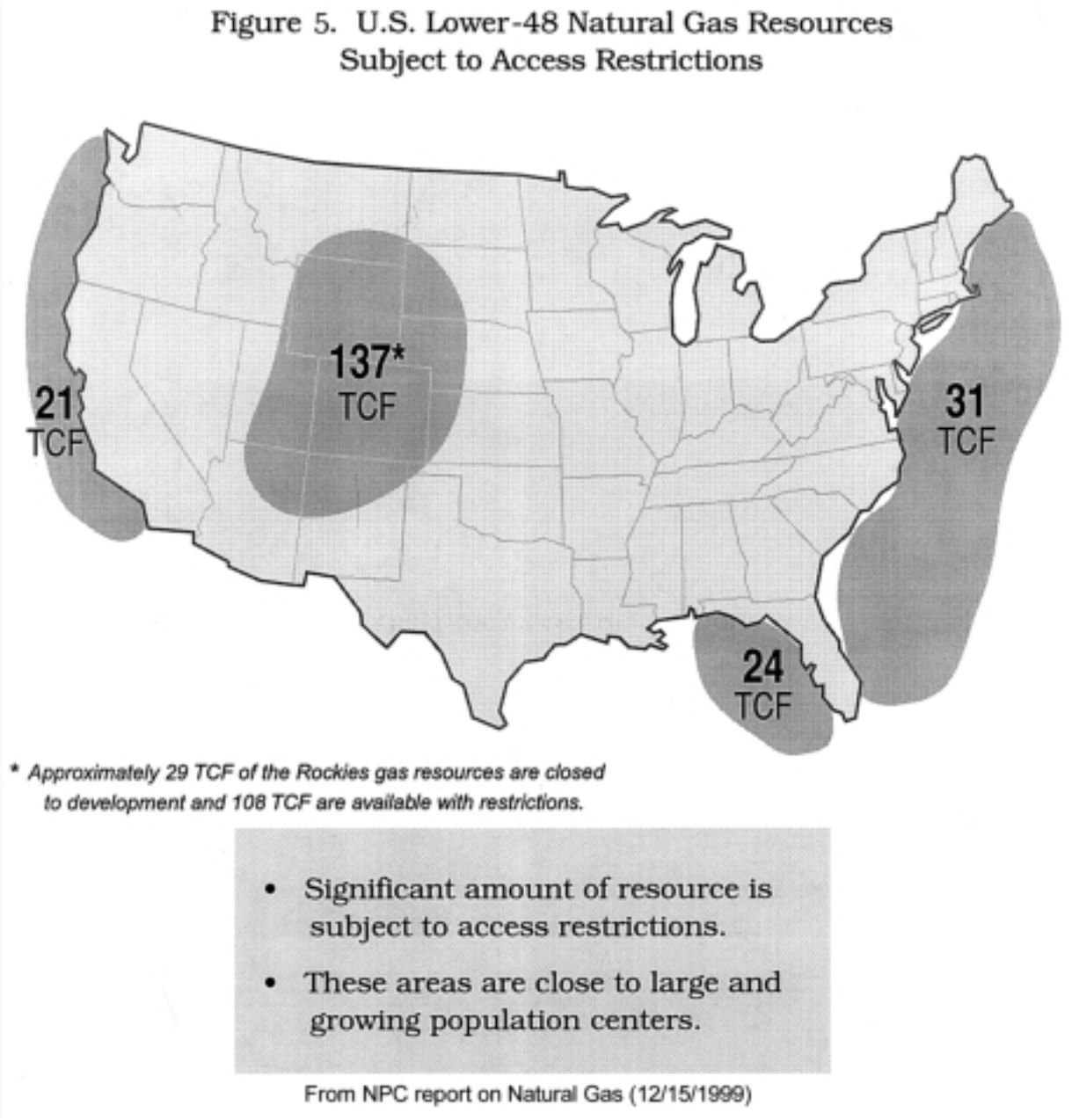
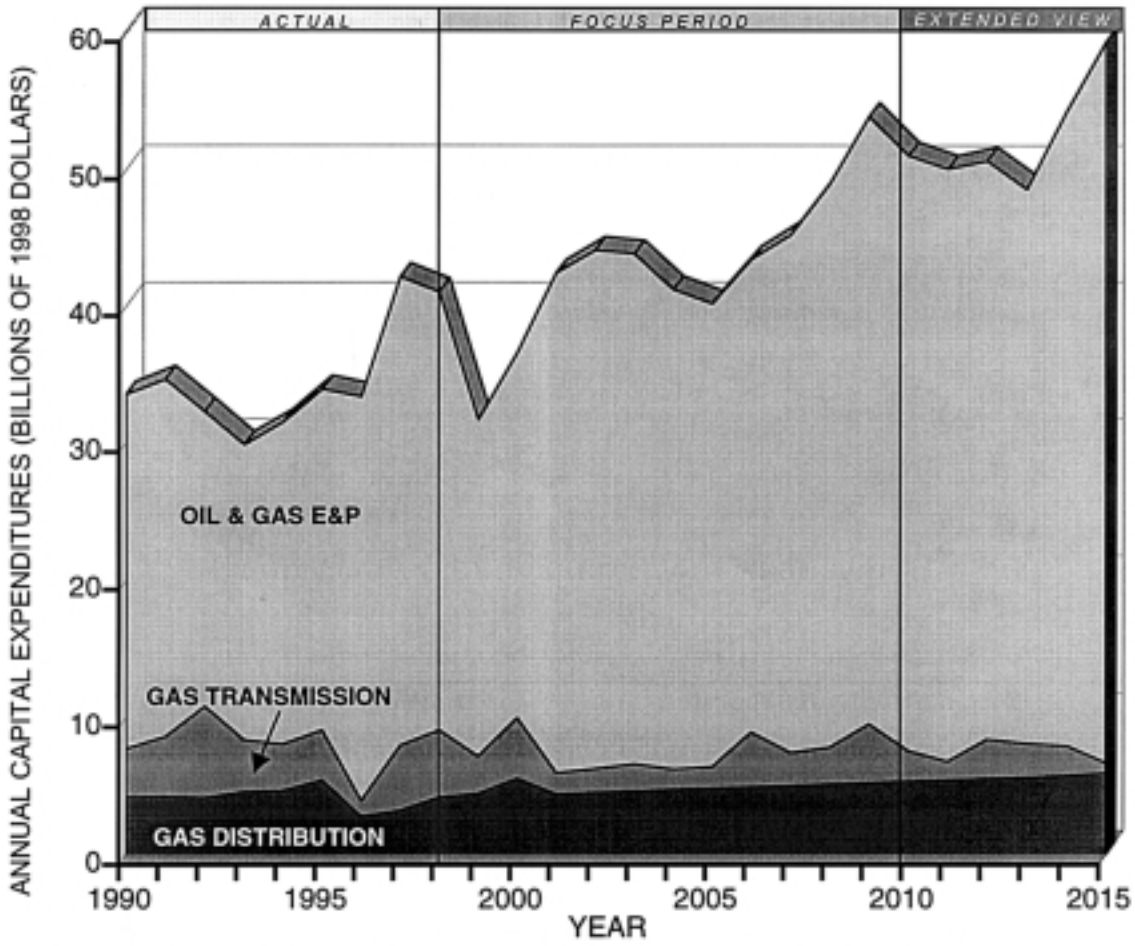


Figure 5. An illustration from the report by the National Petroleum Council on Natural Gas showing estimated volumes of natural-gas resources that are subject to access restrictions.

Figure 6. Capital Required for Expansion



* Because "associated" natural gas is produced with oil, expenditures for oil and gas have not been separated.

- Substantial increase in capital expenditures will be required.
- Total capital expenditures for 1999–2015 will be $785 billion.

Source of historical data: AGA Gas Facts–1998, and estimates from EEA, Inc.

From NPC report on Natural Gas (12/15/1999)

Figure 6. An illustration from the National Petroleum Council report on Natural Gas showing the estimated increase in required capital to develop the projected demand for natural gas supplies.